## Calendar Production

The Faculty of Graduate Studies extends its gratitude to all those dedicated individuals who contributed time and effort towards this Calendar.

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A limited number of complementary copies of this Calendar may be available to some public institutions. Please contact (403) 220 – 6642 or distribution@ucalgary.ca

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The material and information in this Calendar is compiled from academic and administrative office submissions and are time-sensitive. Every reasonable effort is made to ensure it is correct and accurate at the time of publication, but inaccuracies and errors may occur. If there is an inconsistency or conflict between the general academic regulations and policies published in the Graduate Calendar, and such regulations and policies as established by resolution of a Faculty or of the University General Faculties Council, the regulations and policies version as approved by the Faculty or the University General Faculties Council will prevail.

By the act of registration with the University of Calgary, each student shall be deemed to have agreed to be bound by the regulations and policies of the University and of the program in which that student is enrolled as well as any relevant Faculty policies and regulations.

Students are responsible for familiarizing themselves with the general information, rules and regulations contained in the Calendar, and with the specific information, rules and regulations of the Faculty or Faculties in which they are registered or enrolled or seek registration or enrolment, as well as the specific requirements of each degree, diploma or certificate sought. It is the student's responsibility to ensure that the courses chosen are appropriate to the program and graduation requirements.

Students should note that not every course listed in the Calendar is offered every year, nor does being admitted into a program guarantee space in any given course.

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The online Calendar is the official University Calendar. The Graduate Calendar is available online in electronic form on the Faculty of Graduate Studies at: http://www.grad.ucalgary.ca/ .

## FACULTY OF GRADUATE STUDIES

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Associate Deans: Brian MacIntosh
Michael Sideris (Engineering)
Frans van der Hoorn (Medicine)
Lisa Young

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Lindsey Rose, Graduate Associate Registrar (Policy and Planning)

Marilyn Mooibroek, Graduate Student Professional Development and Postdoctoral Program Graduate Program Director
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Jennifer de Roaldes, Special Projects Coordinator

Erin Coburn, Graduate Scholarship Officer
Brad Drebit, Graduate Scholarship Officer
Cristina Rai, Graduate Scholarship Officer
Cathie Stiven, Manager, Graduate Awards

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Catalina Kovacs, Graduate Program Officer
Diane McInnes, Graduate Program Officer
Laura Fitterer, Graduate Program Officer
Corey Wilkes, Graduate Program Officer and Team Lead (Registrations)

Vanessa Gee, Faculty Administrative Assistant
Monica Gollaz, Faculty Administrative Assistant
Nurani Mawji, Administrative Assistant, Financial

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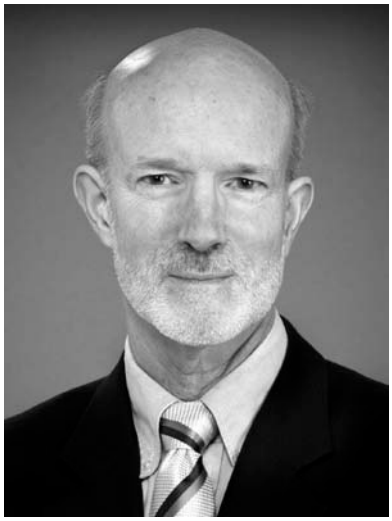


Dr. Frederick L. Hall
Vice-Provost (Graduate Education) and
Dean of Graduate Studies

## A Message from the Dean

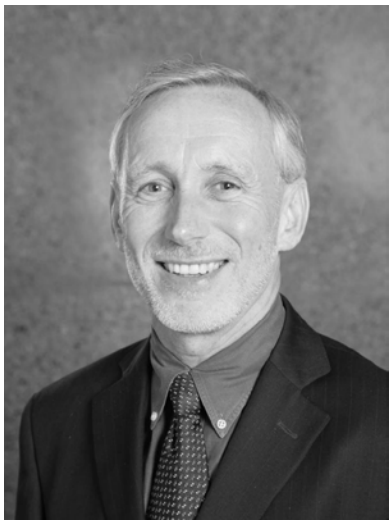
Welcome to the 2010-2011 academic year at the University of Calgary. The on-line Calendar found at http://grad.ucalgary.ca/calendar is now the official version, with this printed version just a snapshot in time of the constantly evolving Graduate Calendar. The on-line version will highlight changes that occur during the year. Any student may choose to remain with the regulations as they were upon her or his entering the program, but we anticipate that changes will always be to improve the graduate program, and therefore to the student's advantage.

This Calendar is meant to serve the needs of three groups of people: current graduate students; the staff and faculty who work with graduate students; and (particularly for the web version of the Calendar) prospective students.

For new and returning students, congratulations on your choice of the University of Calgary, and best wishes for your success here. It is your responsibility to know the regulations of the University and of your program as they are reflected in this Calendar. Knowing the regulations will assist you in setting a timetable for moving successfully through your program. If you have questions about material in the Calendar, or about any aspect of the graduate enterprise, feel free to come to the Faculty of Graduate Studies offices (Earth Sciences 720) or call (403-220-4938) or e-mail us (graduate@ucalgary.ca). Check our website for useful information (http://www.grad.ucalgary.ca/), including especially the Graduate Awards database. Check also the Graduate Students' Association and their website (http://www.ucalgary.ca/GSA/) for additional valuable information. We welcome any comments you may have about the overall structure and presentation of material in this Calendar.

For staff and faculty who rely on this Calendar for your work with graduate students, let me first thank you for your involvement. You are what defines each of the graduate programs for the students, and that is an important responsibility. The organization of the front matter of the Calendar was revised in an effort to make your job easier (as well as to ease navigation of the material for the students). Please let us know what other changes to structure, or to regulations, would help you to make your program and its functioning even better.

And finally, to those prospective students who are far-sighted enough to look into the University's regulations in this Calendar as well as investigating the website of the particular program that interests you, you are exactly the kind of inquisitive, forward-looking student that we would like at the University of Calgary! We have many sources of support for students, starting with our most prestigious competitive award, the Killam doctoral scholarship. Details of the internal awards are on the Graduate Awards Database at http://www.grad.ucalgary.ca//funding. Almost all students in research–based programs receive financial support, which is competitive with that offered by other Canadian universities. The University of Calgary is an exciting place at which to pursue your education. Let our office know how we can assist you to make an informed choice on your graduate education.



Dr. Alan Harrison
Provost and Vice-President (Academic)

## Welcome from the Provost

Welcome to the 2010-2011 academic year at the University of Calgary. Though the university is relatively young in the context of many universities—we celebrated our 40th anniversary only four years ago—we pursue the highest levels of excellence in scholarship, research, and teaching, as is evidenced by our lofty position among the most research-intensive universities in Canada.

Graduate students are important members of the University of Calgary's academic community. As well as taking courses and undertaking research, many of you will be engaged in teaching, either as teaching assistants or as teaching fellows. This experience will be an important element of your academic development, and, additionally, a valuable contribution to undergraduate education.

The Graduate Students' Association (GSA) has become a strong and effective advocate for graduate students at the University of Calgary, and offers a number of opportunities that will expand your horizons and broaden your graduate experience. I encourage you to avail yourself of the services offered by the GSA, and to consider becoming engaged in the Association's many activities.

Good luck for the coming year. May it be both successful and fulfilling.

## Graduate Students' Association (GSA)

The Graduate Students' Association (GSA) was formed in 1967 with the aim of promoting and serving the intellectual, cultural and social interests of graduate students of the University. The GSA advances graduate education through: advocacy, accountability, support, sustainability and integrity. The mission of the GSA is to enable all students to reach the highest possible level of achievement and to support the acquisition of new knowledge and skill. As such, the GSA advocates on behalf of graduate students to the University community, all levels of government as well as the Calgary community as a whole.

### GSA Membership

Membership in the GSA consists of active members, associate members and honorary members. All students registered as full or part-time graduate students in the Faculty of Graduate Studies, the Faculty of Environmental Design, and those in Post-Degree Continuous Learning programs are active members. Active members must pay the annual GSA fee, and automatically become members of The Last Defence Lounge and Restaurant.

### GSA Executive

The affairs of the GSA are managed by an executive body which is elected each spring for a one-year term. The positions include: President, Vice-president Academic, Vice-president Student Life and Vice-president Student Services. The Executive's goals are facilitated by a team of full-time staff members who manage the day-to-day affairs of the GSA, and report directly to the elected executive.

### Graduate Representative Council (GRC)

The Graduate Representative Council (GRC) meets once a month and is the policy-generating and decision-making body of the GSA. Every department in every faculty is guaranteed one or more GRC representatives based on departmental graduate enrollment figures. Representatives are normally elected by their department's graduate students in the fall term to act as liaisons between the GSA and their Departmental Graduate Associations (DGAs). It is the GRC that gives direction to the elected Executive body and, as the governing body, the GRC has the power to modify or review GSA policies.

### Departmental Graduate Associations (DGAs)

Through the GSA, each department of the university is able to form a Departmental Graduate Association (DGA). Start-up grants, the ability to apply for group funding, and receiving a discount for DGA functions at The Last Defence Lounge are just some of the benefits for DGAs. Many departments already have DGAs and the GSA encourages you to join yours—not only because it allows you to network within your department, but it fosters a sense of community for graduate students. If your department doesn't have a DGA and you'd like to form one, the process is quite simple: just stop by the GSA Main Office for more information or visit: http://www.gsa.ucalgary.ca/.

### Graduate Student Orientation

Graduate Orientation is a **free orientation session** given for new September and January graduate student registrants. While it is not mandatory, **the GSA highly recommends that all new graduate students attend**—even if they're U of C undergraduate alumni—in order to learn about the U of C graduate program, the GSA and countless other services/opportunities provided to graduate students. Plus, it gives graduate students a chance meet other graduate students. For more information on Graduate Orientation, please visit: http://www.ucalgary.ca/orientation/grad/2010

### Graduate Student Representation (External and Internal)

GSA representatives, including both the GSA executive and GRC representatives, sit as full voting members on most major committees of the university. As well, graduate students at the University of Calgary belong to provincial and national student organizations, such as the Alberta Graduate Council and the G13.

### The GSA Office and The Last Defence Lounge and Restaurant

The GSA main office is located on the third floor of the MacEwan Student Centre (MSC 350) which houses all of the GSA's operations, including the Health and Dental Plan. Adjacent to the office is The Last Defence Restaurant and Lounge: a members-only lounge to which active graduate students are automatically given a membership. Proof of membership can be obtained from the GSA main office during business hours: it is simply a sticker placed on student ID cards. Recently renovated and with a new menu, The Last Defence offers food and beverage service, a full bar, a patio and hosts special social events and promotions in a modern and chic atmosphere. U of C staff and faculty can purchase memberships for $10 per year, and graduate student alumni are given permanent membership upon graduation. For the latest lounge news, from events to daily specials, please visit: www.lastdefencelounge.ca

### GSA Services

The GSA provides many key services to graduate students, such as offering a **Health and Dental Plan** for all active members. The plan encompasses a wide variety of coverage at competitive rates and allows students to access critical services—from antibiotics and psychiatry to naturopathy and dental work. The GSA also provides a **Career and Mentorship Program** to help graduate students attain their desired career goals—whether this means re-entering industry after graduation or continuing on with academe. To contact the Career and Mentorship Graduate Program Director, email: careers@gsa.ucalgary.ca. The University of Calgary also has an **Ombudsperson** available as a neutral party to help guide students through U of C policy and answer any questions they may have about their rights as students. To contact the U of C Ombudsperson, please email: ombuds@ucalgary.ca. As well, each spring, the GSA hosts **The U of C Graduate Conference**: an inter-disciplinary conference for all graduate students in all departments of the university. This is a great way to get involved, get credit for your CV and meet other graduate students. For more information, you can visit: http://www.gradconference.ca/. Through the GSA, graduate students also have access to **GSA Bursaries, various academic and professional skills workshops, and much, much more**. To access a complete list of GSA services, visit the GSA website at: http://www.gsa.ucalgary.ca/. If you ever have questions or need help, please don't hesitate to stop by the main office—the GSA is here to help you!

### GSA Contact Information:

The Graduate Students' Association
350 MacEwan Student Centre
2500 University Drive NW
Calgary, AB T2N 1N4
Tel: (403) 220-5997
Fax: (403) 282-8992
http://www.gsa.ucalgary.ca/
http://www.lastdefencelounge.ca/

### GSA Office Hours:

Monday to Friday
8:30 am to 4:30 pm

## Message from the GSA President

On behalf of the Graduate Students' Association (GSA), I am pleased to welcome you to the University of Calgary. I would like to wish you every success in your graduate work and I know that you will enjoy a fulfilling experience at one of Canada's top research universities.

The Graduate Students' Association, now in its forty-third year of operation, exists to represent and serve all graduate students at the University of Calgary. As a student-run organization, the GSA works hard with our full-time staff members to organize a host of activities to entertain and enrich the graduate student experience, including academic and professional skill development workshops, intramurals, and social events.

The GSA is here for you. We represent the interests of graduate students at the University of Calgary to the university administration, all levels of government, and the Calgary community. We work closely with our various lobby groups and other graduate student organizations to ensure your needs and interests are represented. In order to succeed, however, we need your input. There are many ways to get involved: send us an e-mail telling us what you want; participate in one of our campus-wide surveys; volunteer for Graduate Orientation; join or form your own Departmental Graduate Association (DGA); become your department's rep to the Graduate Representative Council (GRC); or volunteer for a GSA standing committee. Remember, if your department doesn't have a rep for GRC or a DGA, it's easy to sign up—just contact the GSA main office and we'll guide you through the process.

In addition to services and representation, the Graduate Students' Association is responsible for The Last Defence Lounge, located on the third floor of the MacEwan Student Centre. It's a great place to come for a meal, to attend GSA social events, or to enjoy a casual get-together with friends and colleagues.

On behalf of the entire GSA executive, the GRC and all the GSA staff, welcome to the University of Calgary. We hope you have a wonderful and productive year. For more information please check out our website at: http://www.gsa.ucalgary.ca.

Regards,

James Lange
GSA President 2010-11
pres@gsa.ucalgary.ca

# ACADEMIC SCHEDULE 2010-2011 UPDATED

## JULY 2010

| | |
|---|---|
| 1 Thursday | 2010-2011 University year begins.<br>Canada Day, University Closed. |
| 3 Saturday | Weekend University Summer Term lectures begin. |
| 5 Monday | SUMMER TERM LECTURES BEGIN.<br>First-term and six-week courses. |
| 9 Friday | Last day for registration and change of registration for Summer Term six-week and first-term half courses (without pre-session study).<br><br>Fee payment deadline for Summer Term fees for six-week courses and first-term half courses.<br>No fee refunds for withdrawals from Summer Term six-week courses and first-term half courses after this date. |
| 23 Friday | Last day of first-term lectures in Summer Term.<br>Last day to withdraw with permission from first-term courses in Summer Term. |
| 26 Monday | First-term final examinations for Summer Term.<br>Mid-term break for six week courses. No lectures. |
| 27 Tuesday | Lectures begin for the second-term of Summer Term. |
| 29 Thursday | Last day for registration and change of registration for second-term Summer Term (without pre-session study).<br><br>Fee payment deadline for additional or new second-term half courses.<br>No fee refunds for withdrawals from Summer Term second-term half courses after this date. |

## AUGUST 2010

| | |
|---|---|
| 2 Monday | Alberta Heritage Day. University closed (except MacKimmie, Law, Medical, Gallagher and Business Libraries). No lectures. |
| 7 Saturday | Weekend University Summer Term lectures end.<br>Last day to withdraw with permission from Weekend University Summer Term courses. |
| 14 Saturday | Weekend University Final Examinations. |
| 15 Sunday | Last day to submit Application for Degree for all degrees and diplomas to be conferred at Fall Convocation (see Graduation in Academic Regulations section of the main U of C calendar). |
| 17 Tuesday | SUMMER TERM LECTURES END.<br>Last day to withdraw with permission from full courses, half courses given over a six-week period and second-term half courses in Summer Term.<br>Last day to withdraw with permission from thirteen-week courses (Multi-term) offered from May 17 to August 17. |
| 18-20 Wednesday to Friday | Final Examinations for Summer Term except first-term courses. Final examinations for thirteen-week courses. |

## SEPTEMBER 2010

| | |
|---|---|
| 6 Monday | Labour Day. University closed. |
| 7 Tuesday | Fall Term begins. |
| 7-11Tuesday-Saturday | Block Week. |
| 11 Saturday | Last day to withdraw with permission from Fall Term Block Week courses. |
| 13 Monday | FALL TERM LECTURES BEGIN (except Block Week courses). |
| 18 Saturday | Weekend University Fall Term lectures begin. |
| 27 Monday | Last day to drop full courses and Fall term half courses.<br>No refunds for full courses (Multi-term) or Fall Term half courses after this date. |

## OCTOBER 2010

| | |
|---|---|
| 1 Friday | Fee payment deadline for Fall term full and half courses. |
| 11 Monday | Thanksgiving Day, University closed (except MacKimmie, Law, Medical, Gallagher and Business Libraries). No lectures. |

## NOVEMBER 2010

| | |
|---|---|
| 11 Thursday | Remembrance Day. University closed (except MacKimmie, Law, Medical and Gallagher Libraries). No lectures. |
| 11-14 Thursday to Sunday | Reading Days. No lectures. |
| 12 Friday | Fall Convocation |
| 27 Saturday | Weekend University Fall Term lectures end.<br>Last day to withdraw with permission from Weekend University Fall Term half courses. |

## DECEMBER 2010

| | |
|---|---|
| 4 Saturday | Weekend University Fall Term Final Examinations (except common examinations). |
| 10 Friday | FALL TERM LECTURES END. (For practicum students, the length of the session may be extended).<br>Last day to withdraw with permission from Fall Term half courses (except Weekend University). |
| 13-22 Monday to Wednesday | Fall Term Final Examinations and consolidated end-of-term tests in full courses. |
| 25-31 Saturday to Friday | Holiday Observance. Term Break. University closed. |

## JANUARY 2011

| | |
|---|---|
| 1 Saturday | New Year's Day. University closed. |
| 3 Monday | Winter Term begins.<br>Lectures begin in Block Week courses. |
| 3-7 Monday to Friday | Block Week. |
| 7 Friday | Last day to withdraw with permission from Block Week courses. |
| 10 Monday | WINTER TERM LECTURES BEGIN (except Block Week courses). |
| 15 Saturday | Weekend University Winter Term lectures begin. |
| 21 Friday | Last day to drop Winter Term half courses.<br>No fee refunds for Winter Term half courses after this date. |
| 24 Monday | Last day to add or swap Winter Term half courses.<br>Last day for change of registration from audit to credit or credit to audit. |
| 28 Friday | Fee payment deadline for Winter Term fees. |

Spring and Summer Session Schedule of Classes will be available mid-January. Visit Special Sessions website at http://springsummer.ucalgary.ca/index-main.html.

## FEBRUARY 2011

| | |
|---|---|
| 1 Monday | Last day to submit Application for Degree for all degrees and diplomas to be conferred at May and Spring (June) Convocations. (See Graduation in Academic Regulations section of the main U of C calendar). |
| 20-27 Sunday to Sunday | Reading Week. No lectures. University open (except Family Day). |
| 21 Monday | Alberta Family Day. University closed (except MacKimmie, Law, Medical and Gallagher Libraries). No lectures. |

Spring and Summer Session registration for continuing students begins early February. Visit the Special Sessions website at http://springsummer.ucalgary.ca/.

## MARCH 2011

Spring and Summer Session registration for Open Studies and Visiting students begins early March. Visit the Special Sessions website at http://springsummer.ucalgary.ca/.

## APRIL 2011 UPDATED

| | |
|---|---|
| 2 Saturday | Weekend University Winter Term lectures end.<br>Last day to withdraw with permission from Weekend University Winter Term full and half courses. |
| 15 Friday | WINTER TERM LECTURES END. (For practicum students, the length of the term may be extended).<br>Last day to withdraw with permission from full courses or Winter Term half courses (except Weekend University). |
| 16 Saturday | Weekend University Winter Term Final Examinations (except common examinations). |
| 18-29 Monday to Friday | Winter Session Final Examinations. |
| 22 Friday | Good Friday, University closed (except MacKimmie, Law, Medical, Gallagher and Business Libraries). No Final Examinations. |
| 27 Wednesday | Last day to register for Spring term first-term half courses, six week and thirteen-week courses (Multi-term) courses with pre-session study. |
| 30 Saturday | Winter Term ends. |

## MAY 2011 UPDATED

| | |
|---|---|
| 11 Wednesday | SPRING TERM LECTURES BEGIN. |
| 12 Thursday | May Convocation for Faculties of Law and Medicine. |
| 16 Monday | Last day for registration and changes of registration for Spring term first-term half courses, six-week and thirteen-week courses (Multi-term) (without pre-session study). |
| May 20 | Fee payment deadline for Spring term fees.<br>No fee refunds for withdrawals from Spring term courses after this date. |
| 23 Monday | Victoria Day. University closed (except MacKimmie, Law, Medical, Gallagher and Business Libraries). No lectures. |

## JUNE 2011 UPDATED

| | |
|---|---|
| 1 Wednesday | First-term lectures in Spring Term end.<br>Last day to withdraw with permission from first-term half courses in Spring term.<br>Last day for registration and changes of registration for Summer Term courses (with pre-session study). |
| 2 Thursday | First-term final examinations for Spring Term.<br>Mid-term break for six-week courses. No lectures. |
| 6 Monday | Lectures begin for the second-term of Spring Term. |
| 6-10 Monday to Friday | Spring (June) Convocation for all Faculties except Law and Medicine. |
| 10 Friday | Last day for registration and changes of registration for Spring Term second-term half courses (without pre-session study). |
| 20 Monday | Last day for registration and changes of registration for Summer Term courses (with pre-session study). |
| 24 Friday | SPRING SESSION LECTURES END.<br>Last day to withdraw with permission from full courses, half courses given over a six-week period and second-term half courses in Spring Term. |
| 27-29 Monday - Wednesday | Spring Term Final Examinations except first-term courses.<br>Mid-term break for thirteen-week courses. No lectures. |
| 30 Thursday | University year ends. |

## JULY 2011 UPDATED

| | |
|---|---|
| 1 Friday | 2011-2012 University year begins.<br>Canada Day. University closed. |
| 4 Monday | SUMMER SESSION LECTURES BEGIN. |
| 6 Wednesday | Last day for registration and changes of registration (without pre-session study) first-term and six-week courses. |
| 15 Friday | Fee payment deadline for Summer Term fees..<br>No fee refunds for withdrawals from Summer Term courses after this date. |
| 22 Friday | Last day to withdraw with permission from first-term half courses in Summer Term. |
| 25 Monday | First-term final examinations for Summer Term. |
| 26 Tuesday | Lectures begin for the second-term of Summer Term. |
| 28 Thursday | Last day for registration and change of registration for second-term Summer Term (without pre-session study). |

## AUGUST 2011 UPDATED

| | |
|---|---|
| 1 Monday | Alberta Heritage Day. University closed (except MacKimmie, Law, Medical, Gallagher and Business Libraries). No lectures. |
| 15 Monday | Last day to submit Application for Degree for all degrees and diplomas to be conferred at Fall Convocation (see Graduation in Academic Regulations section of the main U of C calendar). |
| 16 Tuesday | SUMMER TERM LECTURES END.<br>Last day to withdraw with permission from full courses, half courses given over a six-week period and second-term half courses in Summer Term.<br>Last day to withdraw with permission from thirteen-week courses (Multi-term) offered from May 13 to August 13. |
| 17-19 Wednesday to Friday | Final Examinations for Spring and Summer Term multi-term courses. |

## SEPTEMBER 2011

| | |
|---|---|
| 5 Monday | Labour Day. University closed. |
| 6 Tuesday | Fall Term begins. |
| 6-10 Tuesday to Saturday | Block Week. |
| 10 Saturday | Last day to withdraw with permission from Block Week courses. |
| 12 Monday | FALL TERM LECTURES BEGIN (except Block Week courses). |
| 23 Friday | Last day to drop full courses and Fall Term half courses.<br>No refunds for full courses (Multi-term) or Fall Term half courses after this date. |
| 27 Tuesday | Last day to add or swap full courses and Fall Term half courses.<br>Last day for change of registration from audit to credit or credit to audit. |
| 30 Friday | Fee payment deadline for Fall term full and half courses. |

## OCTOBER 2011

| | |
|---|---|
| 10 Monday | Thanksgiving Day. University closed (except MacKimmie, Law, Medical and Gallagher Libraries). No lectures. |

## NOVEMBER 2011

| | |
|---|---|
| 11 Friday | Remembrance Day. University closed (except MacKimmie, Law, Medical and Gallagher Libraries). No lectures. |
| 10-11 Thursday to Friday | Reading Days. No lectures. |
| 10 Thursday | Fall Convocation. |
| 26 Saturday | Weekend University Fall Term lectures end. |

ACADEMIC SCHEDULE

## DECEMBER 2011

| | |
|---|---|
| 9 Friday | FALL SESSION LECTURES END.<br>Last day to withdraw with permission from Fall Term half courses. |
| 12-21 Monday to Wednesday | Fall Term Final Examinations and consolidated end-of-term tests in full courses. |
| 25-31 Sunday to Saturday | Holiday Observance. Session Break. University closed. |

## JANUARY 2012

| | |
|---|---|
| 1 Sunday | New Year's Day. University closed. |
| 2 Monday | Winter Term begins.<br>Lectures begin in Block Week courses. |
| 2-6 Monday to Friday | Block Week. |
| 6 Friday | Last day to withdraw from Block Week courses. |
| 9 Monday | WINTER TERM LECTURES BEGIN (except Block Week courses). |
| 14 Saturday | Weekend University Winter Term lectures begin. |
| 20 Friday | Last day to drop Winter Term half-courses.<br>No refunds for Winter Term half courses after this date. |
| 24 Tuesday | Last day to add or swap Winter Term half courses.<br>Last day for change of registration from audit to credit or credit to audit. |
| 27 Friday | Fee payment deadline for Winter Term half-courses. |

Spring and Summer Term Schedule of Classes will be available mid-January. Visit the Special Sessions website at http://springsummer.ucalgary.ca.

## FEBRUARY 2012

| | |
|---|---|
| 1 Wednesday | Last day to submit Application for Degree for all degrees and diplomas to be conferred at May and Spring (June) Convocations (see Graduation in Academic Regulations section of the main U of C calendar). |
| 19-26 Sunday to Sunday | Reading Week. No lectures. University open (except Family Day). |
| 20 Monday | Alberta Family Day. University closed (except MacKimmie, Law, Medical and Gallagher Libraries). |

Spring and Summer Term registration for continuing students begins early February. Visit the Special Sessions website at http://springsummer.ucalgary.ca.

## MARCH 2012

Spring and Summer Session registration for Open Studies and Visiting students begins early March. Visit the Special Sessions website at http://springsummer.ucalgary.ca.

## APRIL 2012

| | |
|---|---|
| 6 Friday | Good Friday, University closed (except MacKimmie, Law, Medical, Gallagher and Business Libraries). |
| 13 Friday | WINTER TERM LECTURES END.<br>Last day to withdraw from full courses and Winter Term half courses. |
| 16-25 Monday to Thursday (except Friday, April 22, Good Friday) | Winter Session Final Examinations. |
| 30 Saturday | Winter Term ends. |

Note: The dates for the 2011-2012 Academic Year are tentative and subject to review and change.

# Faculty of Graduate Studies General Information

## Introduction

The mission of the Faculty of Graduate Studies at the University of Calgary is to work with graduate programs to aid them in attracting well-prepared students, supporting the students well while they are here, graduating a high percentage of them in reasonable time, and producing graduate degree holders who are well-respected contributors in their fields wherever they are employed. To achieve this, the Faculty works with programs in setting admission standards and program requirements, and in establishing supervisory and examination committees. The Faculty is also closely involved in the administration of over $35 million annually in financial awards for graduate study.

## Contact Information

Location: Earth Sciences 720
Faculty number: (403) 220-4938
Fax: (403) 289-7635
Email address: graduate@ucalgary.ca
Website: http://www.grad.ucalgary.ca

Student information: Enquiries concerning graduate programs should be directed to the unit offering the program. The Faculty website contains direct links to units offering graduate programs.

## Summary of Degree Programs

The Faculty of Graduate Studies administers programs leading to the degrees of:

Doctor of Education (EdD)
Doctor of Philosophy (PhD)
Master of Architecture (MArch)
Master of Arts (MA)
Master of Biomedical Technology (MBT)
Master of Business Administration (MBA)
Master of Communications Studies (MCS)
Master of Disability and Community Studies (MDCS)
Master of Community Medicine (MCM)
Master of Continuing Education (MCE)
Master of Counselling (MC) (a Campus Alberta degree offered in conjunction with the University of Lethbridge and Athabasca University)
Master of Economics (MEc)
Master of Education (MEd)
Master of Engineering (MEng)
Master of Environmental Design (MEDes)
Master of Fine Arts (MFA)
Master of Geographic Information Systems (MGIS)
Master of Kinesiology (MKin)
Master of Laws (LLM)
Master of Music (MMus)
Master of Nursing (MN)
Master of Public Policy (MPP)
Master of Science (MSc)
Master of Social Work (MSW)
Master of Strategic Studies (MSS)

## Combined Degree Programs

The Faculty of Graduate Studies has approved guidelines for Combined Degree Programs. A Combined Degree Program is a formal arrangement between two units offering programs whereby students may be registered simultaneously in two graduate programs (or in one Master's program and one professional program such as LLB or MD that normally admits students with undergraduate degrees). The University of Calgary presently offers the following combined degree programs: LLB/MBA, MBT/MBA, MSW/MBA, MSc/MBA, PhD/MBA, MD/Master's and MD/PhD. Information and application packages are available from the relevant graduate programs.

## Credit Certificate and Diploma Programs

The Faculty of Graduate Studies administers programs leading to certificates and diplomas in Education, Applied Psychology, Nursing and Social Work. The programs provide those who wish to continue their advanced education with an opportunity to acquire additional academic credentials in specific areas. These credentials may be used for credit toward a future degree. The graduate certificate and diploma programs will also be valuable to those who have completed a graduate degree but desire or require further credentials or knowledge and skills beyond their degree.

Please see Program entries in this Calendar for contact information regarding certificate and diploma programs.

## Degrees Offered

| ANTH | APSY | ARKY | ART | BISI | BMEN | CHEM | CMSS | CPSY | COMS | CPSC | CUSP | DRAM | ECON |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PhD | PhD | PhD | | PhD | PhD | PhD | PhD | PhD | PhD | PhD | PhD | | PhD |
| MA | | MA | | | | | | | MA | | MA | | MA |
| | MSc | | | MSc | MSc | MSc | | MSc | | MSc | | | |
| | MEd | | MFA | | MEng | | MSS | | MCS | | | MFA | MEc |
| | MC | | | | | | | | | | | | |
| ENCH | ENCI | ENEL | ENGO | ENME | ENGL | EVDS | FISL | GDER | GEOG | GLGP | | GRST | GSEA |
| PhD | PhD | PhD | PhD | PhD | PhD | PhD | | PhD | PhD | PhD | | PhD | |
| | | | | | | | | EdD | | | | | |
| | | | | | MA | | MA | MA | MA | MSc | | MA | MA |
| MSc | MSc | MSc | MSc | MSc | | | | MSc | MSc | | | | |
| MEng | MEng | MEng | MEng | MEng | | MArch | | MEd | MGIS | | | | |
| | | | | | | MEDes | | MCE | | | | | |
| | | | | | | LLB/MEDes | | | | | | | |
| HIST | KNES | IGP | LAW | LING | MDBC | MDBT | MDCV | MDCH | MDGI | MDIM | MDMI | MDNS | MDSC |
| PhD | PhD | PhD | | PhD | PhD | | PhD | PhD | PhD | PhD | PhD | PhD | PhD |
| | | MA | | MA | | | | | | | | | |
| MA | MSc | MSc | | | MSc | | MSc | MSc | MSc | MSc | MSc | MSc | MSc |
| | MKin | | LLM | | | MBT | | | | | | | |
| | | | LLB/MBA | | MD/ Master's | MBT/MBA | MD/ Master's | MD/ Master's | MD/ Master's | | MD/ Master's | MD/ Master's | MD/ Master's |
| | | | LLB/MEDes | | MD/PhD | | MD/PhD | MD/PhD | MD/PhD | | MD/PhD | MD/PhD | MD/PhD |
| | | | | | | | | MDCS | | | | | |
| MGMT | MTST | MUSI | NURS | PHIL | PHAS | POLI | PPOL | PSYC | RELS | SEDV | SOCI | SOWK | VMS |
| PhD | PhD | PhD | PhD | PhD | PhD | PhD | | PhD | PhD | | PhD | PhD | PhD |
| | | MA | | MA | | MA | | | MA | | MA | | |
| | MSc | | | | MSc | | | MSc | | MSc | | | MSc |
| MBA | | MMus | MN | | | | MPP | | | | | MSW | |
| LLB/MBA | | | | | | | | | | | | | |
| MBT/MBA | | | | | | | | | | | | | |
| MSW/MBA | | | | | | | | | | | | | |

# Admissions

There is no general right of admission to Graduate Programs. Each department determines whether to recommend to the Faculty of Graduate Studies the admission of a particular applicant based not only on the applicant's credentials but also on the availability of resources for supervision and research, departmental research objectives, program balance, and other such considerations. Taking these considerations into account, graduate programs are expected to act in an equitable manner in their admission procedures.

## Qualifications

Applicants must hold or obtain the following minimum qualifications before the Faculty will give consideration to admission:

1. A four-year baccalaureate degree or its equivalent from the University of Calgary or a recognized institution. Degrees and grades from foreign institutions are evaluated for their equivalency to those of the University of Calgary. A grade point average equivalent to 3.00 or better (on the University of Calgary four-point system) is required. This is based on the last two years of the undergraduate degree consisting of a minimum of 10 full-course equivalents of appropriate content for the graduate program applied for, and adequate senior level courses to ensure preparation for graduate work. Any graduate work is also considered. Individual graduate programs may require a higher admission grade point average.

In most cases, a master's degree or equivalent is required for admission to a doctoral program. See program listings for exceptions and details.

Note: In exceptional circumstances, individuals who do not meet formal academic requirements but who have significant life achievements may be considered for admission to some graduate programs. The candidate must provide the relevant graduate program with evidence demonstrating a potential to undertake successfully the proposed program of studies. Such candidates are advised to make early contact with the graduate program. In all such cases, the decision whether or not to admit rests with the Dean of the Faculty of Graduate Studies.

2. Proficiency in the English language is essential for the pursuit and successful completion of graduate programs at the University of Calgary. Prior to admission to the Faculty of Graduate Studies, an applicant whose primary language is not English may fulfill the English language proficiency requirement in one of the following ways:

a) By writing the Test of English as a Foreign Language (TOEFL) and obtaining a score of at least 550 (written test) or 80 (internet-based test)[1]. Applications may be obtained from the TOEFL website: www.ets.org/toefl. When requesting that official test results are forwarded to the University of Calgary, indicate the institution code 0813 and the code appropriate to the graduate program, as listed on the TOEFL website.
b) By writing the academic test format of the International English Language Testing System (IELTS) and obtaining a minimum score of 7.0. IELTS materials can be obtained from IELTS Publications, UCLES, 1 Hills Road, Cambridge CB1 2EU, UK.
c) By writing the Michigan English Language Battery (MELAB) test and obtaining a score of 80. The MELAB test includes a written composition, a listening test, and a test of grammar, vocabulary, and reading comprehension. An optional speaking test is also available. The MELAB test is conveniently offered once a month at the University of Calgary by the Effective Writing Program. For test information and test dates, please see the MELAB tab at http://efwr.ucalgary.ca.
d) By successful completion of Tier 3 of the English for Academic Purposes (EAP) program. For information, see http://www.education.ucalgary.ca/eap/ or contact English for Academic Purposes, University of Calgary, 2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4. Telephone (403) 220-3485; fax (403) 210-8554; e-mail: eapp@ucalgary.ca.
e) By completing the Pearson Test of English (PTE) and obtaining a score of at least 59[1].

The department or graduate program may waive the English proficiency-testing requirement in certain circumstances, such as the possession of a baccalaureate degree or its academic equivalent from a recognized institution in which the language of instruction is English. Contact the graduate program to which you plan to apply for further information.

[1] Some programs require scores higher than the Faculty of Graduate Studies minima. See program listings for specific details.

Students who do not meet admission standards and wish to pursue graduate work are advised to enroll in the equivalent of a full year (a minimum of three graded full-course equivalents) at the senior undergraduate level in order to improve their academic record to acceptable admission standards (a grade of "B" or higher in every course). All such courses represent "make up" work and cannot be used for advanced credit towards a graduate degree program. Successful completion of "make up" work does not guarantee admission to a graduate program. Students are advised to discuss this option with the appropriate graduate program before embarking on such a course.

## Application for Admission

Applications for admission to the Faculty should be submitted through the on-line application system, which can be accessed through program websites. No assurance can be given that applications received after the deadlines noted in the "Application Deadline" section of the appropriate program section of this Calendar will be processed in time to permit the applicant to register for the following session. Specific instructions for applicants are included with the application.

All applications to the Faculty of Graduate Studies of the University of Calgary must include the following:

a) A non-refundable application fee for each application to a graduate degree program. $100 for Canadian citizens or Permanent Residents, $130 for international students with a study permit. Cheques or money orders must be made payable to the University of Calgary. Applications will be processed only if the fee has been paid.
b) Official transcripts from all post-secondary institutions attended
c) Official MELAB, TOEFL, IELTS, GMAT, PTE GRE scores and/or other requirements of the program for which application is being made
d) Endorsement from the Head of the Department - It is the responsibility of the department or graduate program concerned to ensure that the applicant is, in all relevant respects, acceptable to the department and that the student's proposed program is aligned with the availability of resources for adequate supervision and research, with departmental research objectives, and with program balance, as appropriate.

Please see program entries in this Calendar for any additional program requirements, including details on reference letters.

Normally, an appropriate letter of recommendation is one written by an independent individual who can provide an assessment of the applicant's background and capabilities with respect to the prospective program. Letters from friends, family members, colleagues, people currently registered in a graduate degree program, or general reference letters that are not written in support of the person's application to the particular graduate program are not acceptable. An applicant currently registered in a graduate degree program, or who has recently completed a graduate degree program, must submit one letter of reference from his/her program supervisor. Unless the applicant has been out of school for more than four years, at least one letter, and preferably both, should be by an academic. A reference from a non-academic source should come from a person who has had direct supervisory experience of the applicant.

All graduate programs have limited enrollment capacities. Meeting the minimum requirements does not guarantee admission.

If, at any time it is discovered that a student was admitted on the basis of falsified documents or information, the admission will immediately be declared null and void and future admission will be denied.

*Note: Advanced credit can be applied for only when applying for admission. See "Advanced Credit" below.*

Students will not normally be permitted to register in a University of Calgary degree or diploma program while simultaneously working toward another degree or diploma at the University of Calgary or at another institution. Joint degree programs are an exception to this regulation.

## Admission Categories

Graduate students are admitted to the Faculty in one of the following categories:

### Regular

Students may be admitted to a program leading to the Master's or doctoral degree, provided admission qualifications are met.

### Interdisciplinary Degree

A student wishing to pursue a thesis-based degree in an area not sufficiently represented by one graduate program may be admitted both to a home program and a conjoint program in an interdisciplinary area of

study, if one exists. The student should submit an application form and fee, along with official transcripts and letters of reference to the intended home graduate program. The prospective home program will liaise with the conjoint program. Contact the prospective home graduate program for further details.

### Special Case Admission

Special case admission may be used when resources are available to admit a student to undertake graduate studies, but no appropriate program exists. Contact the relevant department for details.

### Qualifying

A student who meets the qualifications for admission but lacks the necessary background for a graduate program in a chosen area of specialization may be admitted as a qualifying graduate student. Upon satisfactory completion of a qualifying year, the student may be transferred to regular student status. Qualifying graduate students must be full-time registrants in either a Master's or a doctoral degree program. Qualifying status will not be granted for a period exceeding one year.

Because a qualifying student is required to take more courses in a degree program than a regular graduate student, a qualifying student in a thesis-based degree program will be assessed an extra year of full program fees. A qualifying student in a course-based program will pay tuition fees for the extra required courses on a per-course basis. Tuition fees for courses taken during the qualifying year will not count toward the tuition fee for the degree program.

### Visiting

A student who is registered in a graduate degree program at another university that does not have an exchange agreement with the University of Calgary, and who wishes to engage in course work and/or research at the graduate level at the University of Calgary for credit at his/her home university may be admitted as a visiting graduate student. A visiting student must submit a completed *Visiting Student Application* form and the application fee. Visiting students apply to specific graduate programs, and the files are forwarded to the Faculty of Graduate Studies in the normal way. Visiting students pay all applicable general and tuition fees. Visiting students are normally permitted to spend a maximum of one year at the University of Calgary. It should be noted that admission as a visiting student does not guarantee later admission to a graduate program at the University of Calgary.

### Conditional Admission for Language Upgrading

An international student holding a scholarship from his/her government may be offered admission into a graduate program conditional on successful completion of the English for Academic Purposes program. In order to be admitted, the student must successfully complete Tier 3 of the EAP program by achieving a grade of B or higher in EAP 190 and a grade of C or better in all other EAP courses. Programs may require a higher level of achievement, which will be set out in the letter of conditional admission. Eligible students who are offered conditional admission must complete the EAP program within one year; after this time the conditional offer of admission is revoked.

### Exchange

#### General

The University of Calgary has reciprocal exchange agreements with other institutions. Graduate students from these institutions may engage in course or research work at the University of Calgary for credit at the home institution.

An exchange student must submit the appropriate application/approval form (http://www.grad.ucalgary.ca//forms/registration).

An exchange student pays tuition fees at the home institution when this is written into the specific exchange agreement, and applicable general fees at the University of Calgary.
If there is no reciprocal fee agreement, the exchange student pays applicable tuition and general fees at the University of Calgary.

Exchange student status does not guarantee admission to graduate programs at the University of Calgary. An exchange student who wishes to apply to a graduate program at the University of Calgary must do so in the usual manner.

#### Western Deans' Agreement

The *Western Deans' Agreement* covers graduate students from the following universities:

- Athabasca University
- British Columbia Institute of Technology
- Brandon University
- Concordia University College of Alberta
- Royal Roads University
- Simon Fraser University
- University of Alberta
- University of British Columbia
- University of Calgary
- University of Lethbridge
- University of Manitoba
- University of Northern British Columbia
- University of Regina
- University of Saskatchewan
- University of Victoria

A graduate student registered in the Faculty of Graduate Studies at one university may apply for student status at a university listed above by completing the appropriate application that requires the approval of the Graduate Director, and the Faculty of Graduate Studies at both the student's home and host universities. Applications should be received in the Faculty of Graduate Studies at the host institution three months before the beginning of the term at the University of Calgary.

The student pays tuition and general fees at the home university and applicable general fees at the host institution.

The student is responsible for arranging for an official transcript to be sent from the host institution to the home institution when the course(s) has been completed.

Each home institution has regulations regarding the maximum number of transfer credits permitted. Further information is available at http://www.grad.ucalgary.ca//policies/westerndean.

#### Canadian Graduate Student Research Mobility Agreement

The *Canadian Graduate Student Mobility Agreement*, initiated by the Canadian Association of Graduate Schools (CAGS), encourages graduate student mobility within Canada in order to foster the exchange of ideas, specialized training, research collaboration, and interdisciplinarity. Graduate students, who must be registered full-time and paying fees at a participating home university, may register as "visiting graduate research students" at another participating university. No tuition fees will be charged to visiting graduate research students, provided they are not taking courses at the host institution. Incidental fees may be charged. A faculty member at the host institution must agree to supervise and take responsibility for the visiting graduate research student during his/her stay. It is recognized that it is the responsibility of the visiting student to find a supervisor at the host institution. For further information, see the Faculty of Graduate Studies website.

### Retention of Student Records

Graduate student files are kept electronically in the Faculty of Graduate Studies. All application documents submitted to the Faculty of Graduate Studies become the property of the University of Calgary and cannot be returned to the student.

When applying for admission to another program, an applicant who completed a graduate degree from the University of Calgary must submit such original transcripts of post-secondary education institutions attended as are required by the program or the Faculty of Graduate Studies, and appropriate letters of reference as required by the program.

### Offer of Admission

An offer of admission to a graduate program shall specify the program to which the student is admitted in terms of available programs as specified in this Calendar. Any more detailed terms of admission applying to a particular offer shall be specified in the offer. Graduate programs will supply a program specification including the terms of admission to the Faculty of Graduate Studies when recommending that a student be admitted or admitting on behalf of the Faculty of Graduate Studies, and will ensure that copies of any documents cited in the specification are lodged with the Faculty of Graduate Studies.

The program specification shall include course requirements, any full-time requirements, and any other relevant program components. It shall also include any offer of funding and any conditions related to that funding, from the program.

An offer of admission to a prospective student who will attend for a qualifying year must include the courses the prospective student is expected to take to upgrade his or her background to enter the program proper. The offer must include the information that these courses, and the tuition paid during the qualifying year, will not count toward the degree program. No fee credit is given for courses that are taken as a qualifying student.

A student may request that the graduate program defer admission for up to one full year. Deferral is not automatic, and terms of the offer of admission may change. The request must be endorsed by the Graduate Program Director, and the prospective supervisor, where applicable.

If, during a student's program, a change in the program is mutually agreed upon by the student and the graduate program, the program may be changed from that specified as part of the offer of admission, but such variation will not come into effect until it is approved by the Faculty of Graduate Studies. The

Change of Program or Status form must be completed and submitted to the Faculty of Graduate Studies for approval. (http://www.grad.ucalgary.ca/forms/registration)

## Advanced Credit

*Thesis-based programs:* Application for credit should be made to the graduate program at the time of admission, so that the graduate program can take previous work into account when specifying a student's program.

*Course-based programs*: The student must request advanced credit in writing at the time of application for admission, endorsed by the Graduate Program Director and submitted to the Faculty of Graduate Studies with the admission recommendation.

Courses for which advanced credit is being sought must be from a recognized institution and not have been used for any degree or diploma accreditation. They must be graded, graduate level courses, and the graded level of performance must be equivalent to a "B" grade or higher standing at the University of Calgary.

The total of advanced credit and transfer credit may not exceed either one-third of the program or two full-course equivalents, whichever is less.

Advanced credit is not normally given for courses taken more than five years before admission to the current graduate degree program or for courses taken for the purposes of qualifying for admission.

## Readmission

A student who withdrew or was withdrawn from program and wishes to be readmitted to the program must apply for readmission to the graduate program, with submission of transcripts for any academic work done since departure and a fee of $180.

If readmission is granted, program requirements and completion time will be stipulated in the offer of readmission. Assessment of requirements for degree completion will take into consideration the relevance of work completed during the initial registration and current program requirements.

A fee assessment, taking into account the completed and remaining requirements and time in the student's program, will be made as part of the offer of readmission.

## Reactivation

A student who has been withdrawn for failure to register and who wishes to reactivate his/her registration, must submit a Faculty of Graduate Studies *Annual Registration* form, and a $180 fee. The student's supervisor and Graduate Program Director must sign the registration form, indicating their willingness to reinstate the student. Reactivation may only take place within four months of the student's annual registration month, and the student will be responsible for fees for the entire term. If the student wishes to return to program after the four-month period has passed, the student must apply for readmission for the next session to which the program will admit students (see above).

# Academic Regulations

The general regulations apply to all graduate students. Regulations specific to particular degree programs are outlined under the heading "Degree Regulations".

Notices of any changes in regulations are available from the program office. It is the student's responsibility to be familiar with the regulations and deadlines of the Faculty of Graduate Studies as stated herein, in the *Faculty of Graduate Studies Handbook of Supervision and Examination*, in the *Graduate Student Appointments Schedule* and, for thesis-based students, in the *Thesis Guidelines* (http://www.grad.ucalgary.ca//policies/thesis).

Notes:

1. Students are advised to consult with their Graduate Program Director and Graduate Program Administrator regarding all aspects of their graduate programs.

2. All graduate students registering or re-registering must have contacted their supervisors and programs to discuss their programs within the first two weeks of their annual registration month.

3. All graduate courses listed in this Calendar are tentative and subject to the availability of instructors and student interest and in some instances are only offered in alternate years. Students should consult a current timetable before registering.

## Conflict of Interest

There is potential for conflict of interest when a student's relationship with a supervisor, or with others who are in a position to influence academic decisions, is more than a strictly academic one. There may also be a conflict of interest with implications for a student's program when a student is at the same time a Board appointee or in a support staff position. In order to avoid conflict of interest and protect privacy, graduate students are not permitted to evaluate other graduate students who are registered in the same program for the same degree.

IN ANY CASE WHERE CONFLICT OF INTEREST IS POSSIBLE, THE DEAN OF GRADUATE STUDIES MUST BE NOTIFIED IN WRITING.

Specific measures may be taken to address specific situations; for instance, there may be special requirements for the composition and procedures of examining committees.

Further details regarding the Graduate Studies Policy on Conflict of Interest can be found at: http://www.grad.ucalgary.ca//policies/conflictofinterest

## Registration

Each year of the program, no later than the deadline date for the annual registration month, each graduate student must register using the Student Centre, which is accessible through https://my.ucalgary.ca. Students enrolled in thesis-based Master's or doctoral programs will be considered full-time.

A student who does not register by the appropriate deadline date will be withdrawn for failure to register.

A complete guide to registration is available online at www.ucalgary.ca/registrar. Please visit this Web site for detailed system instructions as well as up-to-date course registration information.

Students should always consult with their graduate programs concerning course selection. Refer to the deadlines in the Academic Schedule at the beginning of this Calendar.

An advisor or Supervisor must be appointed within one month of the start of a thesis-based program. Thesis-based students complete an annual progress report in May each year. Course-based students should consult their program administrator for program requirements.

Students wishing to audit courses must consult with their graduate program and complete a *Change of Course Registration* form.

Following registration, it is the student's responsibility to verify course registration and fee assessment using the Student Centre. Questions regarding registration should be directed to the appropriate graduate program or the Faculty of Graduate Studies.

Students must maintain continuous registration and pay the appropriate fees until all degree requirements have been completed. A student who fails to re-register by the deadline indicated in the Academic Schedule will be withdrawn from the program for failure to register. Information about readmission or reactivation appears above.

Students in course-based programs must take a minimum of one half-course per registration year. If a student in a course-based program does not take a minimum of one half-course during a registration year, the student will be required to withdraw from program. It is expected that students in course-based programs will complete at least half of the required courses in the first two years of the program.

## Student Status

### Research (Thesis)-Based Programs

Students registered in Master's Thesis and Doctoral Programs will be considered full-time unless their program formally offers a part-time option, by listing the option under their respective program listing in this calendar and approves the student for a part-time registration status.

It is understood that full-time students will normally work an average of 40 hours per week on program-related activities. Program-related activities include course work, systematic reading, laboratory or other research work related to the production of thesis proposals and/or defence of thesis and thesis proposals, field work, and study for candidacy examinations.

A graduate student may arrange to undertake a portion of the full-time requirement at another institution or in the field. Requests for permission to undertake such full-time external student research must be submitted well in advance to the Graduate Program Director for approval.

### Course-Based Programs

#### Full-time Students

Students will be considered full-time if they enroll in six or more half-course equivalents per annual registration.

#### Part-time Students

In order to remain eligible for part-time status, students may enrol in no more than five half-course equivalents per annual registration.

Enrolment in additional courses will require a change in status to full-time enrolment. A change from part-time to full-time status will require program approval indicating satisfactory progress for full- time registration. It will also require that students pay the full-time general fees for the full year retroactive to their anniversary registration date.

Only programs that stipulate a part-time enrolment option under their respective listing in this calendar may approve part-time enrolment requests.

## Change of Registration or Status

Course changes must be done through the online Student Centre at myUofC and will be considered until the deadlines listed in the Academic Schedule of this Calendar.

Course changes after the registration deadline must be done on a *Change of Course Registration* form and a $60 late registration fee will be charged.

Registration to audit a course must be done on a *Change of Course Registration* form.

Changes to full-time/part-time status subsequent to the registration deadline must be submitted to the Faculty of Graduate Studies on a *Change of Program or Status* form.

Forms are available on the Faculty of Graduate Studies website http://www.grad.ucalgary.ca//forms/registration.

## Time Limits

Except where noted in the detailed program descriptions, students in thesis-based programs at the Master's level must complete all degree requirements within four registration years.

Students in course-based Master's programs must complete all degree requirements within six registration years.

It is expected that students completing a Master's degree on a full-time basis will complete the degree within half the time allowed.

Students in doctoral programs must complete all degree requirements within six registration years, although it is expected that most candidates will complete requirements within four years.

## Transcripts and Statements

A student requiring a transcript of his/her University of Calgary record, for personal use or to be sent to another institution, must request such by completing the appropriate form available from the Registrar's Office or online at http://www.ucalgary.ca/registrar/order_transcript.

## Course Withdrawal

A graduate student may withdraw online from a course in which he/she is registered via My UofC, any time up to and including the deadline dates given in the Academic Schedule section of this Calendar. Students are not permitted to withdraw online more than once from the same course. Tuition fees will be refunded only if the student drops a course before the last day for payment of the appropriate fees.

Note: all withdrawals after the registration deadline will be recorded on the student transcript.

## Program Withdrawal

A student wishing to withdraw from the Faculty of Graduate Studies should complete a *Graduate Withdrawal* form, available at http://www.grad.ucalgary.ca//forms/withdrawal.

Fees for subsequent terms will be cancelled upon withdrawal notification.

A student in a course-based program who withdraws from a program without having taken a course during the year will not be refunded the tuition fee assessment of the equivalent to a graduate half-course fee for the registration year unless the student withdraws from program before the fee payment deadline in his/her annual registration month.

When a student withdraws from the Faculty of Graduate Studies, it is the student's responsibility to ensure that all outstanding fees are paid.

After a required withdrawal from a graduate program at the University of Calgary, a student may not apply to another graduate program at the University of Calgary until a year after the final decision to require withdrawal has been made.

Students under academic review will not be permitted to withdraw during the review process.

## Program Extensions

If a student needs longer than the regulation time allowed to complete a program, an *extension to program* may be granted on the basis of a recommendation from the Graduate Director that specifies the grounds for the extension and provides a detailed schedule for the completion of the program.

### Program Extensions for GSA Executive Members

Graduate programs must take the service by GSA Executive members into consideration in assessing the student's progress in the annual progress report. On request, the Faculty of Graduate Studies will grant GSA Executive members extensions to time in program of up to one year per year in office.

## Leave of Absence

The Leave of Absence policy was created to assist graduate students who require a leave from their program. Such leaves are granted for one of the following reasons:

- Bereavement
- Care-giving responsibilities
- Maternity
- Medical requirements
- Military service
- Parental responsibilities
- Political service
- Exceptional circumstances

Leaves of absence may be granted for a minimum of one term and up to one year. They may be renewed so long as the total length of leave time with renewals does not exceed five years. During a leave of absence, students are not expected to work on their graduate programs. The time on leave will not count as time in program, i.e., a doctoral student who completes two years and then takes a one year leave of absence, will still have four years to complete degree requirements.

Application for a leave of absence should be made in advance of the anticipated leave, or as soon as possible after the event necessitating the leave occurs. While it is often difficult to anticipate the need for a leave, it is helpful if the beginning and end of the leave coincide with the beginning and end dates of a term.

During an approved leave of absence of up to one year, all Faculty of Graduate Studies (FGS) administered scholarship funding is deferred until the student returns to full-time registration. Students should be aware that supervisory and/or funding arrangements other than FGS-administered scholarships cannot in general be guaranteed on return from a leave. It is the student's responsibility to ensure that the proposed leave is compatible with the regulations of any granting agency from which funding would normally be received during the leave period, and that such agencies are informed of the proposed leave. Students on student loan programs should clarify the consequences that a leave will have on their repayment status; information about education financing in Alberta can be found at http://www.alis.gov.ab.ca/ec/fo/studentsfinance/students-finance.html. International students should consult the International Student Centre and immigration authorities regarding their immigration status during the proposed leave.

#### Maternity Leave

In the case of a maternity leave which interrupts funding, the Faculty of Graduate Studies will provide funding for up to 4 months at the rate of $1,000 per month for those months in which no other funding is being received. Thus, if a mother is receiving 1 month of maternity leave pay under the GSA Collective Agreement, the Faculty of Graduate Studies will pay for 3 months. Submission of a Leave of Absence for with maternity leave submitted as the reason for the leave will trigger a review by the Faculty of Graduate Studies of the student's eligibility for these funds.

#### Leave of Absence Procedure:

1. The student should discuss the leave and its implications with the supervisor and any other appropriate people, e.g., members of the supervisory committee.
2. The student and supervisor seek the recommendation of the Graduate Program Director.
3. The completed and signed *Application for Leave of Absence* form is forwarded to the Faculty of Graduate Studies for approval. (See http://www.grad.ucalgary.ca/forms/absence)

## Program Work

## Combined Degree Programs

The Faculty of Graduate Studies has approved guidelines for Combined Degree Programs. A Combined Degree Program is a formal arrangement between two units offering programs whereby approved students may be registered simultaneously in two programs. The requirements for both degrees must be completed before the student can graduate. The University of Calgary presently offers the following combined degree programs: LLB/MBA, MSW/MBA, MBT/MBA, MSc/MBA, PhD/MBA, MD/Master's degree, and MD/PhD. Information and application packages are available from the relevant graduate programs.

## Interdisciplinary Degrees

A student wishing to pursue a thesis-based Master's or doctoral degree in an area not sufficiently represented by one graduate program can request to do *an interdisciplinary degree*. In an interdisciplinary degree program, the student is admitted to both a home program and a conjoint program. The student submits an application form and fee along with official transcripts and letters of reference to the proposed home program, which will liaise with the proposed conjoint program. Further details regarding the application process to an interdisciplinary degree program are available at http://www.grad.ucalgary.ca/policies/interdisciplinarity

## Transfer Credit

Students currently registered in a graduate degree program at the University of Calgary may receive credit for courses taken at other recognized institutions.

Program and Faculty of Graduate Studies' approval of these arrangements must be obtained before the courses begin.

*Course-based programs*: Transfer credit for courses may not exceed one third of the program or two full-course equivalents, whichever is less. Transfer credit and any advanced credit received upon entrance to the program may not exceed one third of the program or two full-course equivalents, whichever is less.

In order to receive transfer credit, students must arrange for official transcripts showing the courses taken and grades achieved to be sent from the other institution to the Faculty of Graduate Studies. Courses for which transfer credit is being sought must be from a recognized institution and not have been used for any degree or diploma accreditation. They must be graded, graduate level courses, and the graded level of performance must be equivalent to a "B" grade or higher standing at the University of Calgary. Transfer credit is not granted for courses for which the graded level of performance is equivalent to "B-" or lower.

## Course Work Minima

Course-based graduate programs normally consist of at least six full-course equivalents taken at the graduate level. Audited courses do not count towards the fulfillment of program requirements.

## Distribution of Grades

| Grade | Grade Point Value | Graduate Description |
|---|---|---|
| A+ | 4.0 | Outstanding |
| A | 4.0 | Excellent – superior performance showing comprehensive understanding of the subject matter |
| A- | 3.7 | Very good performance |
| B+ | 3.3 | Good performance |
| B | 3.0 | Satisfactory performance<br>Note: The grade point value (3.0) associated with this grade is the minimum acceptable average that a graduate student must maintain throughout the program as computed at the end of each registration anniversary year of the program. |
| B- | 2.7 | Minimum pass for students in the Faculty of Graduate Studies<br>Note: A student who receives a B- or lower in two or more courses will be required to withdraw regardless of their grade point average unless the program recommends otherwise. Individual programs may require a higher minimum passing grade. |
| C+ | 2.3 | |
| C | 2.0 | |
| C- | 1.7 | All grades below B- are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements. A student who receives a grade of F will normally be required to withdraw unless the program recommends otherwise. |
| D+ | 1.3 | |
| D | 1.0 | |
| F | 0.0 | |

## Student Standing

While "B-" is the minimum passing grade in any one course for students in the Faculty of Graduate Studies, a grade point average (GPA) of at least 3.00 must be maintained in each year of program. A student must have a GPA of at least 3.0 in order to graduate.

A student who receives a "B-" or lower in two or more courses or whose GPA at the annual registration anniversary falls below 3.00 will be required to withdraw unless the program recommends otherwise. A student who receives a grade of F will normally be required to withdraw unless the program recommends otherwise.

A graduate program may recommend to the Faculty of Graduate Studies that a student be required to withdraw for lack of satisfactory progress in either course work or research.

The Faculty of Graduate Studies, after consultation with the graduate program and/or supervisory committee concerned, may initiate the withdrawal of a student.

Final grades may be accessed through the Student Centre at https://my.ucalgary.ca/.

## Examinations

Please refer to the main University of Calgary Calendar for general examination regulations.

In addition to the University of Calgary examination regulations, each student must satisfy all examination requirements, as noted in the Faculty of Graduate Studies *Handbook of Supervision and Examination* section of this Calendar). The handbooks are also available on the Graduate Studies website at http://www.grad.ucalgary.ca//policies/exams.

## Supervisors/ Advisors

Thesis-based Programs

All students in thesis-based programs leading to graduate degrees are required to have a supervisor or an advisor. Students arriving on campus may be assigned an interim advisor until they have had an opportunity to become familiar with the Faculty members and their research interests, but must have a permanent supervisor or advisor no later than one year after initial registration.

These students must have an approved supervisor prior to their second annual registration date. No student will be permitted a second annual registration without having an approved supervisor. See Faculty of Graduate Studies *Handbook of Supervision and Examination* in this calendar.

Course-based Programs

Although the Faculty of Graduate Studies does not require the formal appointment of a Supervisor in course-based programs, a Faculty Advisor or a Supervisor may be appointed by the program. Please see individual program listings for details.

## Annual Reports

Each graduate student must file an annual progress report with his or her graduate program during the month of May every year. Delinquent students may be denied registration. The annual progress report is accessed from the MyUofC Student Centre at: https://cas.ucalgary.ca/cas/?service=https://my.ucalgary.ca/uPortal2/Authentication

## Research and Ethics Approval

All research involving human subjects, animals or biohazards must receive ethics clearance from the appropriate University of Calgary Research Ethics Board. There are two Conjoint Research Ethics Boards, the Conjoint Health Research Ethics Board for the Faculties of Kinesiology, Medicine and Nursing, and the Conjoint Faculties Research Ethics Board for all other Faculties.

The appropriate department or Faculty ethics review committee first reviews research proposals involving human subjects. After the department or Faculty ethics review committee is satisfied, the proposal is sent to the appropriate Conjoint Research Ethics Board with a recommendation for approval.

Graduate students should consult with their departments or graduate programs, and http://www.ucalgary.ca/research/compliance/ethics for information about the ethics approval process.

## Program Transfers

Program transfers must take place before a student's third annual registration. Students should consult the supervisor and Graduate Program Director. Current time in program will be credited; course credit is given at the discretion of the program.

It is the student's responsibility to check the fee implications of the transfer.

Doctoral students who have transferred from another institution must pass a candidacy examination at the University of Calgary. An exception may be made if a candidacy examination equivalent to that at the University of Calgary has been successfully completed at another university.

## Language

Except in certain courses in the language departments, the language of instruction at the University of Calgary is English.

Theses must be submitted in English, except in the Department of Germanic, Slavic and East Asian Studies, the Department of French, Italian and Spanish, and in the French Education sub-specialization in the Graduate Division of Educational Research.

There is no Faculty of Graduate Studies requirement for proficiency in any language other than English. Individual graduate programs, however, may have their own requirements as set out in the *Programs of Study* section in this Calendar.

## Thesis

Students must continue to pay the appropriate tuition and general fees until all degree requirements, including the submission of the thesis to the Faculty of Graduate Studies, have been completed.

Complete information on the formatting, printing, binding and distribution of the thesis is contained in the Faculty of Graduate Studies *Thesis Guidelines*, available at http://www.grad.ucalgary.ca//policies/thesis.

Once all the examiners have signed the approval pages, the student must submit one unbound copy of the thesis, the signed original approval page, a *Departmental Clearance for Convocation for Thesis Students* form that is appropriately signed, a *Thesis Distribution* form and a *University of Calgary Partial Copyright Licence* form, to the Faculty of Graduate

Studies. The Faculty of Graduate Studies will arrange to have the unbound thesis deposited in the University of Calgary Archives.

A second copy of the thesis, submitted in electronic format or as an unbound printed copy, with a *Library and Archives Canada Subject Term Classification* form and a *Library and Archives Canada Non-Exclusive Licence to Reproduce Theses*, will become part of the national thesis database and available from the Library and Archives Canada. (See the *Thesis Guidelines* for further information about the submission format.) The Faculty of Graduate Studies will arrange to have the thesis submitted to the Library and Archives Canada.
Note: Copies of the thesis approval or ethics approval pages with signatures should not be included in submissions to the Library and Archives Canada.

The student may decide not to have a copy of the thesis submitted to the Library and Archives Canada. This decision must be made when the thesis is submitted to the Faculty of Graduate Studies. The Faculty of Graduate Studies will not be responsible for later submission of the thesis to the Library and Archives Canada.

The student is responsible for the costs of printing and binding the required number of copies of the thesis, and for having the required number of copies bound.

## Graduation

The various deadline dates pertaining to Convocation are set out in the Academic Schedule. Students are strongly advised to acquaint themselves with these dates.

### Application for Degree

All students who expect to receive degrees or diplomas at one of the Spring (May or June) or Fall Convocations must complete an online *Application for Degree,* available through the Student Centre via the Portal at https://my.ucalgary.ca. Students who do not complete an *Application for Degree* form will not be included in the graduation list. The deadlines for such applications are February 1 for Spring (May and June) Convocations and August 15 for Fall Convocation.

### Convocation Requirements

In order to be cleared to graduate, thesis-based students must successfully pass a final thesis oral examination, submit an unbound copy of the thesis, a University of Calgary *Partial Copyright Licence*, and a *Department Recommendation for Convocation Clearance* form to the Faculty of Graduate Studies, and fulfill graduate program requirements for the submission of thesis copies.

If a student has not been cleared to graduate before the student's next annual registration date, the student must register. If the student does not register, the student will be withdrawn for failure to register. When the student subsequently applies for re-admission to graduate, the student will be assessed fees retroactive to the date of withdrawal.

## Appeals

The University recognizes that there are instances when a student may wish to challenge University decisions about grades or academic policy. When a dispute arises, every effort should be made to resolve the issues informally rather than resort to a formal appeal. If, however, a formal appeal is necessary, the student should follow the Appeals Procedures that are described below.

Appeals for reappraisal of graded term work, reappraisal of final grades, and other academic appeals are pursued through the teaching Faculty. The Faculty of Graduate Studies Appeals Committee hears appeals against rulings by the Dean of Graduate Studies, or designate.

The following general guidelines define the routes of appeal in different areas:

### General Principles

1. Reappraisals of term and final grades occur at the department/Faculty level that originated those decisions, e.g., within the teaching Faculty.
2. Appeals of grade reappraisals and other such academic decisions will be first handled at the level of appeal closest to the level at which the decision was made.
3. Appeals against Faculty of Graduate Studies decisions or regulations will be handled through the Faculty of Graduate Studies.
4. Students must begin the reappraisal/appeal process at the appropriate level and proceed through successive levels of appeal in order, and with no omissions.
5. At every level, students should attempt, to the utmost of their ability, to present their arguments as effectively and as fully as possible. Mere dissatisfaction with a decision is not sufficient grounds for the appeal of a grade or other academic decision.
6. The General Faculties Council's Committee to Hear and Determine Student Academic Appeals will hear an appeal only if there is a credible allegation of: (a) bias, or (b) unfair procedures at a lower level of appeal, or (c) substantial new evidence which could not have been presented at an earlier stage.
7. Students may obtain help in understanding the appeals process and in writing appeal letters from the Graduate Students' Association.

## Reappraisal of Graded Term Work

A student who feels that a piece of graded term work (term paper, essay, test, etc.) has been unfairly graded may have the paper re-graded as follows. The student shall discuss the work with the instructor within fifteen days of being notified about the mark or of the item's return to the class. If not satisfied, the student shall immediately take the matter to the head of the department offering the course who will arrange for a reassessment of the work within the next fifteen days. Students in faculties without a departmental structure should take the matter to the Dean or the appropriate associate/assistant Dean of the Faculty offering the course. The result of that reassessment should be given to the student in writing.

The reappraisal of term work may cause the grade to be raised, lowered or to remain the same. There is no limit to the number of times that a student may request a reappraisal of term work.

### Teaching Faculty Appeals Committee

Reappraisal of term work is generally settled at the departmental level. If the student is not satisfied with the decision and wishes to appeal, the student shall address a letter of appeal to the Dean of the Faculty offering the course within fifteen days of the unfavourable decision. In the letter, the student must clearly and fully state the decision being appealed, the grounds for appeal and the remedies being sought, along with any special circumstances that warrant an appeal of the reappraisal. The student should include as much written documentation as possible.

At this stage the Dean of the Faculty offering the course, at his or her discretion, may attempt to resolve the situation without proceeding to the Faculty Appeals Committee. If the matter is not resolved to the student's satisfaction, the appeal letter will be sent to the Faculty Appeals Committee.

The teaching Faculty Appeals Committee will not hear the appeal if the appeal letter does not detail the decision being appealed, grounds for appeal and outcome sought by the student, or if the chair of the Faculty Appeals Committee decides that sufficient grounds do not exist. If the appeal is to be heard and if the student has not already received a copy, the student is advised to request from the Dean's office, a copy of the principles and procedures that govern the Faculty Appeals Committee for that Faculty. These procedures will detail the composition of the committee, the right of the student to have an advocate at the hearing, how the hearing will be conducted, and other information.

The Faculty Appeals Committee will report its decision to uphold or deny the appeal in writing to the Dean of the Faculty, the Registrar and the appellant as quickly as possible.

### Reappraisal of a Final Grade

In the reappraisal of a final grade, the only elements that will be considered are the grading of the final examination, if any, together with a recalculation of the weighted components that make up the final mark. An exception may occur when an instructor evaluates a piece of graded term work or other component at the end of the session; that grade may also be considered in a reappraisal of final grade.
A student wishing a reappraisal of an individual final grade should first attempt to examine the final examination at the department or Faculty office. Then the student shall obtain a *Request for Reappraisal of Final Grade* form from the Registrar's Office. On that form the student is required to indicate exactly what error was made in marking the examination and/or in computing the final grade and where the error can be found. The form will not be processed and the reappraisal will not take place unless the student provides a detailed rationale that outlines where and for what reason an error is suspected.

Students wishing a reappraisal of a final grade (excluding Law courses) must submit their request by the following dates: Fall Session - March 1, Winter Session - June 30, Spring Session - August 15, Summer Session - October 15.

The reappraisal form shall be sent/brought to the Registrar who shall forward it to the department head or Dean of the Faculty offering the course. Reappraisals of final grades are dealt with by the head of the academic unit in consultation with members of staff. Normally, the department/Faculty will respond to a *Request for Reappraisal of Final Grade* within thirty days of its initiation. After the reappraisal is completed, the department shall return the form to the Registrar who shall inform the student in writing of the result of any request for reappraisal.

Students should be aware that the grade being reappraised may be raised, lowered or may remain the same. A student may request a reappraisal of final grade only twice in one academic year (July 1 - June 30).

### Teaching Faculty Appeals Committee

Procedures for appealing a final grade reappraisal beyond the departmental level are detailed above in Appeals - Faculty Appeals Committee, and are the same for a final grade as for a piece of graded term work.

### General Faculties Council's Committee to Hear and Determine Student Academic Appeals

Procedures for appealing a final grade reappraisal beyond the Faculty Appeals Committee level are detailed below in Appeals - General Faculties Council's Committee to Hear and Determine Student Academic Appeals, and are the same for a final grade as for a piece of graded term work.

## Appeals Against Faculty of Graduate Studies Rulings

### Faculty of Graduate Studies Appeals Committee

If a student wishes to appeal a Faculty of Graduate Studies ruling (e.g., the requirement to withdraw for academic reasons, the denial of continued registration, the denial of the right to graduate, specific requirements by the Faculty for the completion of a degree/course of study), the student shall address a letter of appeal to the Chair of the Graduate Studies Appeals Committee within fifteen days of the unfavourable decision.

In the letter of appeal, the student must clearly and fully state the ruling/decision being appealed, the grounds for appeal and the remedies being sought, together with all supporting evidence or documentation, if any. Mere dissatisfaction with a ruling is not sufficient grounds for an appeal.
In the process of deciding to initiate an appeal, the student may seek the assistance of the Graduate Students' Association.

If the appeal letter does not detail the decision being appealed, the grounds for appeal and the outcome sought by the student, or if the Chair of the Faculty Appeals Committee decides that sufficient grounds do not exist, the appeal will not be heard. If the appeal is to be heard and the student has not already received a copy, the student is advised to request from the Dean's office, a copy of the principles and procedures that govern the Faculty Appeals Committee. These procedures will detail the composition of the committee, the right of the student to have an advocate at the hearing, how the hearing will be conducted, and other information.

The Faculty Appeals Committee shall report, in writing, its decision to uphold or deny the appeal, to the Dean of Graduate Studies and the appellant as quickly as possible.

Please see the Faculty of Graduate Studies website for additional details on the procedures for appeals to the Faculty of Graduate Studies Appeals Committee: http://www.grad.ucalgary.ca/policies/appeals.

### General Faculties Council's Committee to Hear and Determine Student Academic Appeals

This committee hears appeals of decisions made by Faculty Appeals Committees on matters of academic concern to students. The General Faculties Council's Committee will hear an appeal only if there is reason to believe that the Faculty Appeals Committee showed bias, unfair procedures, or if there is substantial new evidence that could not have been presented to a Faculty Appeals Committee. Grades obtained in courses completed by the student in the appeals process will not be considered as new evidence. Before the General Faculties Council's Committee will accept an appeal, the chair of that committee must be satisfied that departmental and Faculty appeals procedures have been fully utilized.

Students wishing to make an appeal to the Committee to Hear and Determine Student Academic Appeals must do so within fifteen days of the unfavourable decision from the Faculty Appeals Committee. A letter of appeal should be sent to the Secretary to General Faculties Council (Administration Building, Room 127), and must indicate the decision being appealed, the grounds for appeal (i.e., alleged bias, alleged unfair procedures, or substantial new information), and the remedies being sought by the student, together with all supporting documentation. The appeal letter should also state the levels of appeal that have already been utilized.

The General Faculties Council's Committee will not hear the appeal if the chair decides that sufficient grounds do not exist.

A student whose appeal is to be heard by the General Faculties Council's Committee is entitled to obtain from the Secretary to General Faculties Council the principles and procedures governing the General Faculties Council's Committee. These procedures will detail the composition of the committee, the right of the student to have an advocate, how the hearing will be conducted and other information.

The committee will normally give fifteen days written notice of a hearing to the appellant and to the head of the academic unit against whose office the appeal is being made. Normally, the General Faculties Council's Committee will hear an appeal within thirty days of its acceptance. The chair of the General Faculties Council's Committee will convey the committee's findings in writing to the appellant, the respondent, the Secretary to General Faculties Council and the Registrar.

For more specific information and other principles governing student academic appeals, the Secretary to General Faculties Council should be consulted.

### Further Information About Other Appeals and Petitions to the University

It is expected that the procedures outlined above will be sufficient to deal with any student appeal. Students should note, however, that the current University Act, Section 45(2) states: "Subsection (1) does not take away or impair the right of any student or group of students to petition any of the governing bodies of the University in respect of any matter, but such petition shall be in writing and shall be transmitted to the governing body through the president of the university."

The Board of Governors has approved principles and procedures to guide its Petitions Committee in considering student petitions. However, the Board of Governors recognizes that the General Faculties Council is the final body of appeal with respect to academic matters including, but not limited to, grades, examinations, refusal of continued registration, or the requirement to withdraw from the University for academic reasons. The Petitions Committee will not attempt to evaluate the merits of any course or program grade, or of any other decision relating to an academic matter. The Board of Governors and the Petitions Committee of the Board of Governors do not have any jurisdiction to determine petitions received from students pursuant to section 45(2) and 42(1)(a) of the *Universities Act*, where the petitions are in relation to courses offered and marked at an educational institution other than the University of Calgary, notwithstanding that the course may be credited toward a University of Calgary degree program.

A petition to the Board of Governors must be directed in writing to the President. The nature of the petition and the remedies sought by the petitioner(s) shall be clearly stated in a letter, and all supporting evidence or background materials included. If the Petitions Committee finds that the case has merit, the matter may be returned directly to the appropriate jurisdiction for a rehearing. In the case of substantially academic matters, referral will be to General Faculties Council for its determination as to the appropriate level of jurisdiction. The Petitions Committee may allow a hearing if it accepts jurisdiction in the matter and deems the facts to warrant such a hearing.

The Petitions Committee will not hear a petition for any remedy that may be obtained through existing appeal procedures within the University before those appeal procedures have been fully utilized, nor will academic decisions be set aside on the basis of minor irregularities in procedure.

In the case of a petition challenging a decision of the University body on procedural grounds such as breaches of natural justice or fairness, the Petitions Committee will normally refer the issue back to the level of appropriate jurisdiction for a rehearing and new determination of the question. In the case of a petition challenging a decision in which the student is denied permission to register, the student shall not be registered while the petition is before the Board.

For more specific information on the principles and procedures governing student petitions to the Board of Governors, the Secretary to the Board of Governors should be consulted.

### Continued Registration While Under Appeal

Students who appeal academic decisions to the teaching Faculty Appeals Committee or the General Faculties Council's Committee to Hear and Determine Student Academic Appeals have the right to continue their registration and to attend classes during the appeal process. The student is required to pay all fees. If the appeal fails, the student's registration will be cancelled, regardless of the date, and all fees refunded in full. Students petitioning the Board of Governors are not permitted to register while under petition.

## Statement on Principles of Conduct

### Preamble

This statement applies to all members of the University community – including students, faculty, administrators, any category of staff, practicum supervisors, examiners, and volunteers. This statement applies in all situations where the persons are acting in their University capacities, whether or not on the University's property. It also applies to visitors or any other persons on University property, and to persons with whom the University contracts for services.

All members of the University community have a responsibility to familiarize themselves with this Statement on Principles of Conduct and to conduct themselves accordingly.

### Statement

The University of Calgary community has undertaken to be guided by the following statements of purpose and values:

- to promote free inquiry and debate
- to act as a community of scholars
- to lead and inspire societal development
- to respect, appreciate, and encourage diversity
- to display care and concern for community

The University seeks to create and maintain a positive and productive learning and working environment, that is, an environment in which there is:

- respect for the dignity of all persons
- fair and equitable treatment of individuals in our diverse community
- personal integrity and trustworthiness
- respect for academic freedom
- respect for personal and University property

Those persons appointed by the University to positions of leadership and authority have particular responsibility, not only for their own conduct, but also for ensuring, to the extent of their authority and ability:

1. that a positive and productive learning and working environment is created and maintained
2. that conflicts and concerns are addressed in a positive, timely, reasonable, and effective manner
3. that persons within their jurisdiction are informed of their rights and responsibilities with respect to conduct

The University undertakes to ensure that its policies, systems, processes, and day-to-day operations foster the goals in #1 and #2 above.

The University encourages and undertakes to support all members of the University community in resolving conflicts and concerns in a positive, timely, reasonable, and effective manner.

The University undertakes to ensure that the protection afforded by the principles of natural justice is extended to all members of the University community.

The University undertakes to provide resources through various offices to generate awareness related to this Statement on Principles of Conduct throughout the University community and to assist in resolving conflict in a positive way.

(Note: The principles of natural justice reflect a concept that ensures fair play. The specific requirements of natural justice will often vary depending on the circumstances but are generally considered to ensure a full and fair consideration of the issue, including consideration in the absence of bias.)

## Student Misconduct

A single offence of cheating, plagiarism, or other academic misconduct, on term work, tests, or final examinations, etc., may lead to disciplinary probation or a student's suspension or expulsion from the Faculty if it is determined that the offence warrants such action.

## Statement of Intellectual Honesty

Intellectual honesty is the cornerstone of the development and acquisition of knowledge. Knowledge is cumulative and advances are predicated on the contributions of others. In the normal course of scholarship these contributions are apprehended, critically evaluated, and form a foundation for further inquiry. Intellectual honesty demands that the contribution of others be acknowledged. To do less is to cheat. To pass off contributions and ideas of another as one's own is to deprive oneself of the opportunity and challenge to learn and to participate in the scholarly process of acquisition and development of knowledge. Not only will the cheater or intellectually dishonest individual be ultimately his/her own victim but also the general quality of scholarly activity will be seriously undermined.

It is for these reasons that the University insists on intellectual honesty in scholarship. The control of intellectual dishonesty begins with the individual's recognition of standards of honesty expected generally and compliance with those expectations.

With respect to student work in a course, it is the responsibility of the instructor to specify the academic requirements of the course.

## Integrity in Scholarly Activity

In addition to its regulations dealing with student academic misconduct, the University has a policy and procedures governing the scholarly integrity of members of the University's Faculty and persons holding post-doctoral fellowships or their equivalent. The policy and procedures are titled Integrity in Scholarly Activity and apply to both teaching and research.

### Policy

The University and its members are committed both institutionally and individually to integrity in scholarly activity. Accordingly, the University has developed and implemented a policy and attendant procedures for handling cases of alleged scholarly misconduct. These are designed to recognize the differences among disciplines, to provide for fair treatment of those whose integrity is brought into question, and to protect those who set the process in motion or otherwise assist in dealing with complaints.

### Scholarly Misconduct

The policy defines scholarly misconduct as including: plagiarism; fabrication or falsification of research data; conflict of scholarly interest, including suppressing the publication of the work of another scholar and improper negative reviewing of a research grant application by another scholar; and other practices that deviate significantly from those which are commonly accepted as appropriate within the scholarly communities.

As well, each Faculty has definitions and guidelines that are applicable to those disciplines and activities that characterize scholarly work within the Faculty. In particular, the Faculty guidelines deal with the retention of original data and material products relating to scholarly activity and the authorship of published or presented work.

## Plagiarism/Cheating/Other Academic Misconduct

### Definitions

1. Plagiarism - Plagiarism involves submitting or presenting work in a course as if it were the student's own work done expressly for that particular course when, in fact, it is not. Most commonly plagiarism exists when:
(a) the work submitted or presented was done, in whole or in part, by an individual other than the one submitting or presenting the work (this includes having another impersonate the student or otherwise substituting the work of another for one's own in an examination or test),
(b) parts of the work are taken from another source without reference to the original author,
(c) the whole work (e.g., an essay) is copied from another source, and/or,
(d) a student submits or presents work in one course which has also been submitted in another course (although it may be completely original with that student) without the knowledge of or prior agreement of the instructor involved.
While it is recognized that scholarly work often involves reference to the ideas, data and conclusions of other scholars, intellectual honesty requires that such references be explicitly and clearly noted. Plagiarism is an extremely serious academic offence. It is recognized that clause (d) does not prevent a graduate student incorporating work previously done by him or her in a thesis.
2. Cheating is an extremely serious academic offence. Cheating at tests or examinations includes, but is not limited to, dishonest or attempted dishonest conduct such as speaking to other candidates or communicating with them under any circumstances whatsoever; bringing into the examination room any textbook, notebook, memorandum, other written material or mechanical or electronic device not authorized by the examiner; writing an examination or part of it, or consulting any person or materials outside the confines of the examination room without permission to do so, or leaving answer papers exposed to view, or persistent attempts to read other students' examination papers.

3. Other Academic Misconduct - Other academic misconduct includes, but is not limited to, tampering or attempts to tamper with examination scripts, class work, grades and/or class records; failure to abide by directions from an instructor regarding the individuality of work handed in; the acquisition, attempted acquisition, possession, and/or distribution of examination materials or information not authorized by the instructor; the impersonation of another student in an examination or other class assignment; the falsification or fabrication of clinical or laboratory reports; the non-authorized tape recording of lectures.

4. Any student who voluntarily and consciously aids another student in the commission of one of these offences is also guilty of academic misconduct.

### Penalties

1. Failing Grade - A student may be given a failing grade in either an exercise or course in which that student is found guilty of plagiarism, cheating or other academic misconduct. Except in circumstances in which leniency is warranted, this penalty will only be applied in conjunction with one or other of the other penalties mentioned in this section. In situations in which a student is registered in a Faculty other than that in which the course is given, this is the only penalty that shall be applied by the host Faculty. A student may not avoid a failing grade by withdrawing from the course.

2. Disciplinary Probation - When a student is placed on disciplinary probation, he or she is entitled to proceed with a degree or other academic program, but only on condition that the registration will be forfeited and the student suspended or expelled, if he or she is found guilty of a further academic offence. A student who is placed on disciplinary probation is eligible to continue in the Faculty in the normal way after the satisfactory completion of his or her probationary period. This penalty shall be applied by the Faculty in which the student is registered at the time of the offence.

3. Suspension - Suspension takes place when a student is denied registration within a degree or other academic program for a specified period of time. A student who has been placed under suspension is conditionally eligible to reapply for admission or registration at either the end of a specified period of time or thereafter. Suspension does not imply automatic readmission; a student must satisfy the Dean and/or the Faculty concerned of his/her eligibility for readmission. This penalty shall be applied by the Faculty in which the student is registered at the time of the offence.

4. Expulsion - A student who is expelled from a Faculty is dismissed permanently from the Faculty with no right to apply for readmission to that Faculty. This penalty shall be applied by the Faculty in which the student is registered at the time of the offence.

5. Effects of Suspension or Expulsion from a Faculty - A student suspended or expelled from a Faculty normally may not apply or be considered for readmission to the University in another Faculty, until at least twelve months after the end of the session in which the academic offence takes place.

6. Expulsion from the University - If, upon suspending or expelling a student from a Faculty, the Dean and/or Faculty determine that the severe sanction of expulsion from the University is warranted, such a recommendation may be made to the Vice- President (Academic), who may act to expel the student from the University.

### Penalties and Their Application

1. In cases in which the Dean and/or Faculty is satisfied that a student is guilty of plagiarism, cheating or other academic misconduct in circumstances which suggest a clear intention to deceive or otherwise commit an academic offence, the normal penalty will be either suspension or expulsion from the Faculty.

2. In cases in which the Dean and/or Faculty is satisfied that an offence has been committed, but doubt is left as to the existence of a clear intention to deceive or otherwise commit an academic offence, the normal penalty will be probation.

3. In cases where a student is found guilty of more than a single offence, the normal penalty will be expulsion from the Faculty, and in the most serious cases, expulsion from the University.

### Procedures

1. Identification of Students in Tests or Examinations - Invigilators of any tests or examinations may, when they have reason to believe that there is cause to do so, challenge any candidate to produce proof of identity either in the form of the University I.D. card or of some acceptable equivalent (i.e., one bearing a photograph) such as the Provincial Drivers License, Canadian Citizenship Card, Passport, etc.

If there is clear evidence that impersonation has occurred, the individual shall not be permitted to continue the examination and shall be reported immediately to the Dean of the Faculty in which the course is offered or his/her delegate.

A student who is not able to provide acceptable proof of identity may be permitted to continue the examination provided that he or she undertakes to provide verification of identity later. If verification is not provided, then the student will receive an "F" in the examination, and the matter will be referred to the Dean of the Faculty in which the course is offered or his/her delegate for consideration of further disciplinary action.

2. The Responsibility of Instructors in Cases of Plagiarism, Cheating and Other Academic Misconduct - An instructor has the obligation to report immediately all suspected cases of plagiarism, cheating or other academic misconduct in his/her course or courses to the Dean of his/her Faculty, or his/her delegate, and to his/her head of department or equivalent.

3. The Encouragement of the Reporting of Plagiarism, Cheating or Other Academic Misconduct - Students or other persons who consider that they have evidence of conduct which amounts to plagiarism, cheating or other academic misconduct are encouraged to report such conduct to the Dean of the relevant Faculty or his/her delegate. An individual or group of individuals making such a report must be prepared to state the alleged facts and their reasons for suspicion in writing, and to appear before the Dean, his/her delegate, the appropriate Faculty disciplinary body, the Faculty Appeals Committee and the General Faculties Council's Committee to Hear and Determine Student Academic Appeals.

4. The Responsibility of the Dean of the Faculty in Which the Course is Offered - The initial responsibility for dealing with cases of plagiarism, cheating or other academic misconduct, lies with the Dean of the Faculty offering the course in which the student is enrolled or his/her delegate, subject to structures for advice, recommendation or action devised by that Faculty. Where the student is registered in that particular Faculty, any disciplinary action taken will normally not be of concern to any other Faculty.

5. The Relative Responsibilities of the Faculty in Which a Student Takes a Course and the Faculty in Which He/She is Registered at the Time of the Offence - In cases in which a student registered in the Faculty of Graduate Studies is accused of plagiarism, cheating or other academic misconduct, the Dean of Graduate Studies shall be advised of the incident, its circumstances, and its disposition within the host Faculty, and where appropriate shall take disciplinary action within his/her own Faculty subject to structures for advice, recommendation or action devised by that Faculty. This notification shall be the responsibility of the Dean of the host Faculty, or his/her delegate.

6. The Disposition of Cases by the Faculty of Graduate Studies – When a graduate student is found guilty of plagiarism, cheating or other academic misconduct by the teaching Faculty, the student may appeal an unfavourable decision to the General Faculties Council's Committee to Hear and Determine Student Academic Appeals. When the student accepts the ruling of an appeals committee, or when all avenues of appeal of academic misconduct are exhausted, the Dean of Graduate Studies will make a ruling on the student's registration in the Faculty of Graduate Studies. The Dean of Graduate Studies or his/her delegate shall place on probation, suspend, or expel from the Faculty of Graduate Studies. The probation, suspension, withdrawal or expulsion will be confirmed in writing to the student, the letter to include reference to Faculty and University appeal procedures. In cases in which the student has admitted the offence reference shall be made to this fact in the letter.

The Registrar will be notified of the action taken by a copy of the letter. On receiving notification the Registrar is empowered to withhold the issuance of a transcript or statement of grades for the student disciplined pending the expiry of the appeal period, or exhaustion of the appeal process allowed for under Appeals below.

## Academic Misconduct - Criminal Offence

Where there is a criminal act involved in plagiarism, cheating or other academic misconduct, e.g., theft (taking another student's paper from his/her possession, or from the possession of a Faculty member without permission), breaking and entering (forcibly entering an office to gain access to papers, grades or records), forgery, impersonation and conspiracy (impersonating another student by agreement and writing his/her paper) and other such offences under the Criminal Code of Canada, the University may take legal advice on the appropriate response and, where appropriate, refer the matter to the police, in addition to or in substitution for any action taken under these regulations by the University.

## Academic Appeals

1. The Appeals Process - In the case of appeal of a grade, the appeal should be to the Appeals Committee of that Faculty offering the course. A student who is placed on probation, suspended, or expelled from the Faculty of Graduate Studies, may appeal that decision, or any other Faculty of Graduate Studies ruling, to the Faculty of Graduate Studies Appeals Committee. The appeal, which must be initiated within fifteen days of the receipt of the letter from the Dean or his/her delegate, shall be in writing, addressed to the chairperson of the appropriate committee, and shall state specifically (a) the decision which is being appealed, (b) the grounds for the appeal, (c) the remedy being sought.

2. Sufficient Grounds - A student must satisfy the Appeals Committee that there are sufficient grounds for appeal. The principles applicable to an appeal to a Faculty Committee are those of fairness as set down in relation to the Committee to Hear and Determine

Student Academic Appeals of General Faculties Council that are filed with the Secretary to General Faculties Council. It is recognized that the specific procedures used to attain fairness may vary from one Faculty to another.

3. Appeal from a Faculty Appeals Committee - Where a student is unsuccessful in an appeal to a Faculty Appeals Committee, he/she may appeal that decision to the Committee to Hear and Determine Student Academic Appeals of General Faculties Council, subject to the principles and procedures of the General Faculties Council's Committee as approved by General Faculties Council and filed with the Secretary to General Faculties Council.

4. Notification to the Registrar - When an appeal has been lodged by a student, the Registrar shall be notified by the chairperson of the Faculty Appeals Committee or General Faculties Council's Committee, as the case may be, of that fact, and of the disposition of the case by that body.

5. The Position of a Student Launching an Appeal Against Suspension or Expulsion - Where a student's appeal against suspension or expulsion is accepted for hearing and is under consideration by an appeals committee, a student shall be granted tentative registration and permitted to attend classes. If the appeal succeeds, the student will be officially registered and assessed fees retroactively to the beginning of the session.

6. The Position of a Student Whose Appeal Against Suspension or Expulsion is Unsuccessful - In cases in which the student has been allowed to attend classes pending the disposition of an appeal and the appeal fails, the original date of the suspension or expulsion stands.

7. The Effect on a Student's Permanent Record - Where a student has been suspended, expelled or placed on disciplinary probation and does not launch an appeal within fifteen days, or his/her appeal is unsuccessful, the notation "suspended or expelled from or placed on disciplinary probation by the Faculty of Graduate Studies, for academic misconduct" will be entered on the student's permanent record upon receipt of such notice by the Registrar from the Dean of the Faculty.

Where a student is suspended or expelled prior to the completion of the session, the symbols RW (required to withdraw) will be entered in the grade column on the student's record in the courses in which he or she was registered for that session except for the course(s) in which an "F" grade has been given as a penalty. Where a student is suspended or expelled after the completion of a session the final grade will be entered on the student's record in the courses in which he or she was registered for that session except for the course(s) in which an "F" grade has been given as a penalty.

A student's record will be cleared of the notation "placed on disciplinary probation for academic misconduct" when the probationary period has been completed, or upon completion of a degree program, or after three years have elapsed, whichever comes first. A student's record will be cleared of the notation "suspended for academic misconduct" at the time of readmission to the same Faculty, upon readmission to and completion of a degree program in another Faculty, or after three years have elapsed, whichever comes first. At the time the record is cleared of the notation, the RW symbols will be changed to W, but any "F" grades, as given because of plagiarism, cheating or other academic misconduct, will remain "Fs." A student's record will not be cleared of the notation "expelled for academic misconduct." These regulations also apply to students on probation, suspension or expulsion for non-academic misconduct (see below).

## Non-Academic Misconduct Policy

### Purpose

1 The goal of this policy is to provide a clear and transparent process for managing and addressing non-academic misconduct and to do so in a manner that is centralized and follows the principles of natural justice.

The primary objective is to ensure that appropriate Student behaviour is maintained in a diverse educational environment.

### Scope

2 The Policy applies to unacceptable conduct of any Student (all undergraduate and graduate students as well as postgraduate students in the Faculty of Medicine) while on the University of Calgary premises or when acting as a Representative of the University at off-campus venues and events. This Policy also applies to University of Calgary Students studying on exchange at other campuses, or attending a satellite location of the University (e.g. Downtown Campus).

In addition, the University reserves the right to take necessary and appropriate action to protect the safety and security of the campus community, including taking necessary and appropriate action in cases when a Student is accused of serious conduct, and there is a clear connection to the University of Calgary regardless of where the conduct occurred or is alleged to have occurred.
Students are expected to be individually responsible for their conduct. Any Student found responsible for violations of the Policy will be subject to disciplinary actions as outlined in the Policy, regardless of how the incident is dealt with by other policies or law(s).

### Definitions

3 In this policy:

a) "Advisor" is a person who attends a Hearing with a Student to act as a support person to him/her during the Hearing. The Advisor does not represent the Student, nor is the Advisor considered a party to the Hearing. An Advisor includes, but is not limited to, the University Ombudsperson, the SU Student Rights Advisor, a peer, a representative of the Students' Union or Graduate Students' Association, or a Student and Enrolment Services Peer Helper.

b) "Appeal Board" is the final committee to which Students may appeal decisions made pursuant to this policy. The Board consists of five members: one faculty member, one staff member, one Student, a vice-chairperson and a chairperson. The Board is chaired by the Vice-Provost (Students). Appeal Hearings through the Appeal Board are arranged through the Office of the Vice-Provost (Students).

c) "Associate Vice-Provost (Student Success and Learning Support Services)" is the person who will receive, review and hear allegations of misconduct and make determinations and/or recommendations under this policy. An appointed and approved delegate of the Associate Vice-Provost (Student Success and Learning Support Services) may also serve to receive, review and hear allegations of misconduct and make determinations and/or recommendations under this policy.

d) "Guest" is a person invited on to campus by a registered Student.

e) "Hearing" is the adjudication process carried out to resolve a potential violation of the Policy.

f) "Representative of the University" means a registered Student who is participating in a University-related function or event and is doing so in his/her capacity as a University of Calgary Student. A Student who is participating in a field trip, off-campus volunteer or service-learning initiative or special event hosted by the University is considered to be acting as a Representative of the University.

g) "Student" is a person who is registered in any course of study.

h) "Students-at-Risk" means any Student whose physical or mental state is such that they may be or have become a threat to themselves, others, the educational process, or the University of Calgary community in general.

i) "Students-at-Risk Evaluation Team" serves as an emergency support committee that responds to Students-at-Risk and makes decisions related to situations involving Students-at-Risk.

j) "Student Groups" are recognized Student Groups and/or groups of Student volunteers and/or groups of University Students who publicly affiliate with one another for a specific rationale or cause.

k) "Student Host" means a person who is hosting a Guest on University premises.

l) "University" refers to the University of Calgary, and includes buildings and lands owned, leased, operated, controlled or supervised by the University.

### Policy Statement

4 PREAMBLE

4.1 The University of Calgary comprises a community of Students, faculty and staff who are dedicated to furthering learning, intellectual inquiry and personal and professional development. Our community is one of education, work and living. Membership in this community implies all members act with personal integrity and in harmony with the educational goals of the institution.

4.2 The Non-Academic Misconduct Policy exists to promote the safety and security of all members of the University of Calgary community. The University views the non-academic misconduct process as a learning experience which results in personal understanding of one's responsibilities and rights within the University environment. To this end, the Student conduct process attempts to balance an understanding and knowledge of Students and their needs and rights with the expectations of the

University and larger community. All members of the University community share responsibility for ensuring a safe and secure environment and the University will take reasonable steps to ensure that all members of the community are aware of their rights and responsibilities.

4.3 In consultation with faculty, staff and Student representatives, the University has developed the following Non-Academic Misconduct Policy to ensure the safety and security of the educational, living and work environment of Students and all members of the University of Calgary community. Any actions taken by Students to directly or indirectly jeopardize the orderly functioning of the institution will be handled through the policy articulated below.

## PRINCIPLES

4.4 The principles of this policy recognize that each member of our community has an obligation to treat one another with mutual respect. This policy reflects the contributions of all constituencies of the University of Calgary community. This policy is bound by the principles of procedural fairness and natural justice. Allegations of violations of this policy will be dealt with through clear communication that the behaviour is prohibited, notice of allegations, reasons for sanctions, notice of procedures, the opportunity to be heard, notice of rationale for any decision, and the right to appeal within a clearly defined appeal structure.

## VIOLATIONS

4.5 The University of Calgary expects Students to maintain standards of personal integrity that are in harmony with the educational goals of the institution and to assume responsibility for their actions; to observe the law and University regulations; and to respect the rights, privileges, and property of others.

4.6 Nonacademic misconduct includes the actions set out in 4.9 and 4.10, any of which constitutes a violation under this Policy and which are therefore subject to the sanctions outlined.

4.7 Student Hosts are responsible for the actions of their Guests while on University premises and will be dealt with under this policy for the misconduct of their Guests.

### Minor Violations

4.8 Depending on the specifics of the situation and upon review of the facts, a minor violation may be moved to a major violation.

4.9 Minor violations are unacceptable actions by a University of Calgary Student or Student group that include, but are not limited to:

a) excessive noise;
b) engaging in communication toward an individual or group which may be considered harassing or offensive (including online communication);
c) engaging in disruptive behaviour. Disruptive behaviour is that which disrupts or invades the rights of others;
d) damage or destruction of property (under $500.00);
e) misuse of library or computer resources;
f) any unauthorized entry or presence in a University building or on University grounds;
g) abusing or hindering the non-academic misconduct process;
h) failure to complete a sanction for a violation of the Policy.

### Major Violations

4.10 Major Violations are actions by a University of Calgary Student or Student group which endanger the safety and/or security of another individual or the University of Calgary community, or that contravene municipal, provincial or federal law. Major violations include, but are not limited to:

a) contravening the Alberta Gaming and Liquor Act and/or the University Alcohol Policy;
b) possessing, using, exchanging, manufacturing or selling illegal drugs;
c) possessing, storing, using or misusing any firearm, weapon, hazardous material or explosive substance;
d) damage or destruction of property (over $500.00)
e) failure to comply with the direction of a Campus Security Officer or University official in the legitimate pursuit of his/her duties;
f) hazing;
g) sexual assault or sexual misconduct;
h) fraud, including misuse of Student ID card or furnishing false information;
i) vandalism, tampering, defacing or damaging property that is not one's own;
j) stealing or possessing property that is not one's own without permission of the owner;
k) engaging in disruptive behaviour that involves substantial disorder and/or disruption to the operation of the University;
l) engaging in physical actions which may be considered to endanger the safety of, be considered intimidating by, and/or be considered physically abusive by the victim;
m) engaging in intimidating, threatening and/or offensive verbal or non-verbal behaviour or communication toward an individual or group;
n) tampering with fire and/or emergency equipment;
o) setting unauthorized fire(s);
p) unauthorized use of University facilities and/or equipment;
q) trespassing or attempting to fraudulently gain entry on University property;
r) publicly displaying and/or making pornographic material available anywhere on the University campus;
s) failing to follow prescribed risk management procedures;

## PROCEDURES

### Residence Violation Procedures

4.11 Any breaches of the Residence Services Agreement are handled by the Department of Residence, Food and Conference Services in accordance with its disciplinary procedures and sanctions. Conduct which is deemed in violation of the Residence Services Agreement may also be referred to this non-academic misconduct process by the Director of Residence, Food and Conference Services. This may result in additional outcomes for the Student.

### General Provisions

Any Student reported for alleged non-academic misconduct is subject to formal procedures under this policy regardless of concurrent action or inaction of civil or criminal authorities.

4.12 Where there are questions about the application of this policy and/or related policies, they shall be determined by the Associate Vice-Provost (Student Success and Learning Support Services) in consultation with the administrators of the other policies. Where there is a conflict between two policies, or between sanctions under this policy and another University policy with respect to student non-academic misconduct, this policy and its sanctions will take precedence.

4.13 Where a Student's conduct violates this policy and gives rise to a complaint of academic misconduct, the Student may be subject to penalties under both or either policy.

4.14 Any member of the University of Calgary community may file a complaint concerning a violation under this policy with the Office of the Associate Vice-Provost (Student Success and Learning Support Services) within three (3) working days of the incident in question. This time period for filing notice of an alleged violation may be extended at the discretion of the Associate Vice-Provost (Student Success and Learning Support Services).

4.15 A Student who is subject to this policy because a complaint has been filed against him/her is encouraged to seek advice from an Advisor in all matters related to non-academic misconduct, and may be accompanied by an Advisor to any Hearing related to non-academic misconduct. Except in exceptional circumstances which would be so defined by the Associate Vice-Provost (Student Success and Learning Support Services), a Student may not bring a parent or guardian as an Advisor to a Hearing. In addition, as the process for handling non-academic misconduct is an administrative process and is not a criminal process, Advisors may not include legal counsel except when a student is charged with a criminal offense arising from the same incident.

4.16 Every Student who has allegedly been involved in non-academic misconduct and invited to a Hearing shall be provided with, in writing:

a) a proposed date of the Hearing, including notice of the right to reschedule the Hearing within reasonable time frames;
b) a notice of the alleged violation(s), including designation of violation(s) as major or minor violations(s);
c) a summary of pertinent evidence and particulars regarding the alleged violation (which may include summaries of Campus Security reports);
d) a copy of or access to this Policy, as well as specific copies of or access to other policies which are being invoked in addressing the non-academic misconduct alleged.

### Procedures for Addressing Minor Violations

4.17 A minor violation may be dealt with by the official/designate within the area or department where it occurs and the appropriate sanction as set out in this policy may be applied.

4.18 A minor Violation may also be referred to the Associate Vice-Provost (Student Success and Learning Support Services) when the University official/designate believes:

a) satisfactory resolution of minor allegations and sanctions cannot be achieved between the Student and the University official; or,

b) the same minor Violation has been repeated by the Student, or there is a pattern of disruptive conduct;

c) the action of the Student has resulted in a monetary loss to the department which must be recovered through a restitution process.

4.19 The Associate Vice-Provost (Student Success and Learning Support Services) may:

a) dismiss the matter and provide written notification to the referring official/designate and the Student of the decision within ten (10) working days; or

b) arrange a Hearing with the Student and, if satisfied that the violation has been committed, impose any of the sanctions listed in this policy. The Student may arrange to have an Advisor attend the Hearing.

4.20 Where the Student decides not to appear at a scheduled Hearing, a decision will be made in the absence of the Student based on available information.

4.21 If the Associate Vice-Provost (Student Success and Learning Support Services) determines that the issue will be dismissed without Hearing, every effort will be made to first discuss the matter with the complainant prior to informing the Student of the dismissal. If necessary, an opinion from University Legal Services will be sought.

4.22 All decisions will be communicated in writing to the Student and the referring University official/designate, within five (5) working days.

4.23 Timeframes indicated in 4.15, 4.20 and 4.23 are subject to extension only as the result of exceptional circumstances, such as absence from the office.

### Procedures for Addressing Major Violations

4.24 A major violation is referred to the Associate Vice-Provost (Student Success and Learning Support Services) by the University official/designate in whose jurisdiction the incident has occurred or by the Department of Campus Security, normally within three (3) working days of the violation/incident.

4.25 The Associate Vice-Provost (Student Success and Learning Support Services) may:

a) dismiss the matter and provide formal notification to the University official or the Department of Campus Security and the Student of the decision within ten (10) working days; or

b) arrange a Hearing with the Student and, if satisfied that the violation has been committed, impose any of the sanctions listed below (including a recommendation for suspension, expulsion or exceptional sanction). The Student may arrange to have an Advisor attend the Hearing.

4.26 Where the Student decides not to appear at a scheduled Hearing, a decision will be made in the absence of the Student based on available information.

4.27 If the Associate Vice-Provost (Student Success and Learning Support Services) determines that the issue will be dismissed without Hearing, every effort will be made to first discuss the matter with the complainant prior to informing the Student of the dismissal. If necessary, an opinion from University Legal Services will be sought.

4.28 All decisions will be communicated in writing to the Student and the referring University official/designate, within five (5) working days.

4.29 Timeframes indicated in 4.25, 4.26, and 4.29 are subject to extension only as the result of exceptional circumstances, such as absence from the office.

### SANCTIONS

4.30 Sanctions may be applied independently or in combination for any single violation of this policy. Sanctions are intended to be corrective rather than punitive. Repeated and/or multiple violations of the policy will likely result in increased sanctions and/or severity of sanctions.

a) Written Warning: this warning will outline the details of the violation and warn the Student that repeated violations will result in more severe sanctions. This warning will be kept in the Student's conduct file and a copy may be sent to the original complainant. Note that there may be instances wherein confidentiality does not allow details to be revealed to the complainant.

b) Educational Sanction: participation in educational workshops, written assignments, personal reflection paper, restorative justice process or service to the University community.

c) Restitution to the University or to the affected individual or group of individuals if monetary loss has occurred as a result of the violation.

d) Behavioural contract: This set of conditions will be developed with the Student and signed by the Associate Vice-Provost (Student Success and Learning Support Services) or the Vice-Provost (Students) and the Student. Any breach of conditions as outlined in the behavioural contract may result in additional sanctions, including suspension or expulsion from the University.

e) Fine for non-compliance: In the event that a sanction is assigned and the Student does not complete the sanction, a fine will be assigned for non-compliance. Fines for non-compliance will not exceed $125.00 (Note that one representative from each of the Students' Union and Graduate Students' Association will determine an appropriate fund to allocate funds collected through fines).

f) Loss of privileges: loss of privileges for a defined period of time. This may include but is not limited to library, athletics, or parking privileges.

g) Probation: Placed on probation for a specified period of time and/or until imposed conditions are met. Failure to comply with conditions specified in probationary agreement could result in additional sanctions, including but not limited to suspension or expulsion.

h) Notice of Trespass: This sanction will be assigned for major violations and denies the individual the ability to enter the University campus entirely, or the ability to enter specific buildings on the University campus, or the ability to enter the University campus at specific times (e.g. after 5:00 pm and prior to 8:00 am). Individuals violating a notice of trespass may be charged by the Calgary Police Service.

i) Suspension: Loss of all academic privileges at the University for a specified period of time and/or until imposed conditions are met (i.e. completion of conditions as outlined in Behavioural Contract). A suspension for violation of the non-academic misconduct policy will be noted on a Student's academic transcript.

j) Expulsion: Loss of all academic privileges for an unspecified period of time. An expulsion for violation of the Non-Academic Misconduct Policy will be noted on a Student's academic transcript.

### University Temporary Suspension and Trespass Sanctions

4.31 The University reserves the right to bypass general non-academic misconduct procedures where immediate action is required because:

a) a Student's behaviour affects other members of the community's use and enjoyment of University privileges and facilities

b) there are reasonable grounds to believe that the safety of the community is endangered

c) there is a high potential of physical danger posed by the Student's continued presence

d) damage to University property is likely

e) the continued presence of the Student would be disruptive.

4.32 Pending convening of a Hearing, the Vice-Provost (Students) or the President may apply a *temporary* University-wide suspension and trespass sanction. In cases where there is a real and present danger or high potential to cause harm posed by a Student, and the President and/or the Vice-Provost (Students) are not immediately available, the Associate Vice Provost (Student Success and Learning Support Services), or the Director of the Department of Campus Security may impose a notice of trespass sanction whereby the Student may be excluded from the University.

4.33 Pending convening of a Hearing in residence, and in cases where there is a real and present danger or high potential to cause harm posed by a Student in residence, the Director of Residence, Food and Conference Services may impose a temporary suspension and trespass sanction whereby the Student may be

excluded from the residence complex and/or any campus dining facility. The Director will provide a full report to the Vice-Provost (Students) and Associate Vice-Provost (Student Success and Learning Support Services) without delay.

4.34 Upon imposition of such temporary sanction, the Student will be excluded from campus or residence, for as long as reasonably required, in the judgment of the President, the Vice-Provost (Students), the Associate Vice-Provost (Student Success and Learning Support Services), the Director of Campus Security, or the Director of Residence, Food and Conference Services. The date of return to the University campus will be conveyed to the Student as soon as possible following the incident. Normally such notice will be provided recognizing that legal, criminal or medical interventions may restrict the University's ability to do so.

4.35 A formal notification of Hearing will be delivered within five (5) working days of the incident. On the date/time of the Hearing, the Student, having received proper notice of the meeting to be held regarding the incident, may only enter the University campus as authorized to attend that meeting on that day. In certain circumstances, special arrangements may be made for the Student to report to the Department of Campus Security upon arrival on campus and to be escorted to the meeting.

### Internal Process and Criminal and Civil Actions

4.36 In most circumstances, the University will endeavour to deal with Student misconduct under this policy rather than pursuing remedy through criminal proceedings. In cases where there is real and present danger or a high potential of harm posed by the Student, Campus Security or other University officials may contact Calgary Police Service to respond to an incident. In this case, a full report of the incident will be forwarded to the Vice-Provost (Students) and the Associate Vice-Provost (Student Success and Learning Support Services).

4.37 Nothing in this policy prevents any member of the University community from proceeding with criminal or civil actions independent of any University action.

4.38 The timeframe indicated in 4.36 is subject to extension only as the result of exceptional circumstances, such as absence from the office.

## Appeals

4.39 Students may appeal a decision made pursuant to this policy in writing within five (5) working days of receiving a decision. The appeal must contain a copy of the decision, a full statement of grounds for appeal, the outcome sought and any supporting documentation.

4.40 The grounds for appeal are one or more of the following:

- relevant evidence that emerges which was not available at the time of the original decision; or
- there was clear evidence of bias in the Hearing or original decision; or
- the non-academic misconduct procedures were not followed and the outcome of the case might have been substantially affected by this failure; or
- the severity of the sanction imposed exceeds the nature of the violation for reasons identified by the appellant.

NOTE: dissatisfaction with the sanction imposed does not constitute grounds for an appeal.

4.41 The appeal hearing officer or Appeal Board determines whether grounds for appeal will be accepted. If grounds for appeal are accepted, appeals shall be heard as follows:

a) An official/designate within a department who serves as a Hearing officer under this policy may have his/her decision appealed to the Associate Vice-Provost (Student Success and Learning Support Services).
b) The Associate Vice-Provost (Student Success and Learning Support Services) may have his/her decision appealed to the Vice-Provost (Students) or to the Appeal Board. The Student may choose his/her appeal body.

4.42 The body considering the appeal may, after reviewing the case:
a) Uphold the finding and/or sanction(s)
b) Reverse the decision.
c) Reverse only the sanction(s) and/or modify sanction(s), including increasing severity of initial sanction(s) assigned.
d) Determine a procedural error occurred and request that the original Hearing officer re-hear the case.

4.43 The decision will be relayed to the Student in writing within five (5) working days of the Hearing, unless the decision can be made at the time of the Hearing.

4.44 The decision of the appeal Hearing officer or Appeal Board is final, subject to a Student's right to appeal to the Student Discipline Appeal Committee of the Board of Governors. Note that only the sanctions of suspension, expulsion or monetary fine may be appealed to the Student Discipline Appeal Committee of the Board of Governors as set out in the Post Secondary Learning Act.

4.45 Timeframes indicated in 4.40 and 4.44 are subject to extension only as the result of exceptional circumstances, such as absence from the office.

## STUDENTS-AT-RISK

4.46 In addition to dealing with non-academic misconduct, the University has a right and responsibility to address the conduct of a Student-at-Risk in order to protect that Student and/or members of the University community from any threat posed by their conduct. The University will always seek to balance the rights of the Student-at-Risk with the rights of members of the University community when governing the conduct of a Student-at-Risk.

4.47 Addressing the conduct of a Student-at-Risk can pose unique challenges to the University wherein that Student has a disability or diagnosis that is contributing to the "at-risk" behaviour. The University acknowledges that it has a duty to accommodate a Student with a disability, in accordance with provincial law and University policy. Accommodation of Students with disabilities should be made in accordance with the following principles: respect for dignity, individualized accommodation, inclusion and full participation. The Student has a corresponding responsibility to make full disclosure of his/her disability and to cooperate with the University in making appropriate accommodation for him/her, including advising University officials of the need for accommodation, cooperating with University officials in the accommodation process, and providing medical or other requested information relating to the disability and the required accommodation.

4.48 The following procedures may be invoked in addition to, or as an alternative to managing Student behaviour and conduct under the non-academic misconduct process.

### Students-at-Risk Evaluation Team

4.49 The Students-at-Risk Evaluation Team will be used to provide a coordinated response and support to the Student-at-Risk. Protocol for dealing with Students-at-Risk may differ depending on the level of threat posed by the Student-at-Risk, and is described in the Process and Procedures for Responding to Students-at-Risk, as set out below.

### Process and Procedures for Responding to Students-at-Risk

4.50 Observance of behaviour that suggests a Student is at risk should be reported to the Director of University Security. This report, along with any prior reports related to the Student and his/her conduct, will then be forwarded to the Associate Vice-Provost (Student Success and Learning Support Services).

4.51 Normally, within three (3) working days of receiving a report of a Student-at-Risk, the Associate Vice-Provost (Student Success and Learning Support Services) will call a meeting of the Students-at-Risk Evaluation Team to review the report and to make a determination of the level of risk.

4.52 In extenuating circumstances, an intervention, including but not limited to ensuring the Student-at-Risk receives immediate counseling or medical attention will be arranged prior to calling a meeting of the Students-at-Risk Evaluation Team.

4.53 Response to the situation is normally based on the level of threat, as outlined below.

4.54 Level 1 threat means that there is no clear, immediate threat at present and no known occurrence of misconduct, but the conduct of the Student-at-Risk creates a reasonable fear/concern that a threat may exist in the future and misconduct may occur.

4.55 If the committee determines that a Student's behaviour is assessed as a Level 1 threat, the Associate Vice-Provost (Student Success and Learning Support Services) will arrange a meeting with the Student within five (5) working days. Possible outcomes for Level 1 threat behaviour include but are not limited to: an offer of appropriate support and/or referral, and/or campus behavioural contract, and/or imposed limits on presence on campus.

4.56 Level 2 threat means that there is no clear, immediate threat at present but misconduct has occurred and the conduct of the Student-at-Risk creates a reasonable fear/concern that a threat continues to exist and further misconduct is likely to occur.

4.57 If the committee determines that a Student's behaviour is assessed as a Level 2 threat, the Associate Vice-Provost (Student Success and Learning Support Services) will arrange a meeting with the Student as soon as possible, but in any case, within five (5) working days. The Students-at-Risk Evaluation Team will determine on a case-by-case basis if the Student should appear before the entire Evaluation Team for this meeting, or if a meeting with the Associate Vice-Provost (Student Success and Learning Support Services) will suffice. Possible outcomes for Level 2 threat behaviour include but are not limited to: those outlined under Level 1 and/or referral of the case through the non-academic discipline process in accordance with this policy.

4.58 Level 3 threat means that there is a clear, immediate threat at present, which triggers the University's duty to warn and to take action to protect the Student-at-Risk and/or others.

4.59 If the committee determines that a Student's behaviour is assessed as a Level 3 threat, the committee will first determine whether interim conditions and measures are required to address any immediate threat, including temporary trespass and suspension. The Associate Vice-Provost (Student Success and Learning Support Services) will arrange a meeting with the Student and the Students-at-Risk Evaluation Team within three (3) working days. Assessment of a Level 3 threat may trigger the University's duty to warn and to take action to protect the Student-at-Risk and/or others. The University reserves the right to share information regarding the Student-at-Risk in order to address the immediate threat and the Student's behaviour. Possible outcomes for Level 3 threat behaviour include but are not limited to: those outlined under Levels 1 and 2, and/or involuntary leave or withdrawal from the University.

4.60 Note that in certain circumstances, the ability to define the level of threat may be beyond the expertise of the Students-at-Risk Evaluation Team, or of the professional staff at the SU Wellness Centre. In this instance the Student may be required to undergo assessment with specialists independent of the University. The Associate Vice-Provost (Student Success and Learning Support Services) may impose a sanction of temporary trespass and suspension until such evaluation is completed.

Temporary Suspension Prior to Meeting

4.61 The Director of Campus Security, the University President or the Associate Vice-Provost (Student Success and Learning Support Services) may authorize a temporary suspension of a Student-at-Risk until a meeting can be arranged if they believe there is a risk of harm to self or others.

Involuntary Leave and Withdrawal

4.62 Involuntary leave is defined as involuntary physical removal from campus for a period of time specified by the Associate Vice-Provost (Student Success and Learning Support Services) or the Students-at-Risk Evaluation Team. Involuntary withdrawal includes involuntary physical removal from campus and academic withdrawal from the University. Involuntary withdrawal requires consultation with University Legal Services and approval from the University President. Involuntary withdrawal may last for one academic term or longer. Involuntary leave or withdrawal is not pursued as a punitive step, but may coincide with sanctions for Student misconduct.

Decision Notification

4.63 For those cases that are deemed a level one or two threat, decision notification will follow procedural timelines outlined in this policy.

4.64 If a Student is placed on involuntary leave or withdrawal, he/she shall be notified of that decision by the Associate Vice-Provost (Student Success and Learning Support Services), together with the terms and conditions associated with the involuntary leave or withdrawal. A copy of the letter will be included in the Student's conduct record in the Office of the Associate Vice-Provost (Student Success and Learning Support Services). The Director of any University department with an interest in the decision will also be copied on the letter (as deemed necessary and appropriate). Where involuntary withdrawal is invoked, the Student-at-Risk will be prevented from re-enrollment for the duration of the involuntary withdrawal. In some cases, if the Student-at-Risk is receiving medical or psychological care from a member of the SU Wellness Centre, arrangements will be made to continue treatment for a defined period of time. Upon notification of involuntary leave or withdrawal, the Student-at-Risk will also be provided with information on return to campus procedures.

Return to Campus Procedure for Involuntary Leave

4.65 Following an involuntary leave, the Student-at-Risk must apply in writing to the Associate Vice-Provost (Student Success and Learning Support Services), in order to return to campus. The application will require the following in order to be considered: evidence that all terms and conditions associated with the involuntary leave have been met, evidence that all current outstanding disciplinary sanctions have been completed, and, if applicable, an assessment and treatment plan, completed by appropriate treating medical professional(s). The Associate Vice-Provost (Student Success and Learning Support Services) will provide completed applications and accompanying documentation to the Students-at-Risk Evaluation Team to consider. During the review process, the Evaluation Team may require the Student to provide additional or more recent documentation from treating medical professional(s). If the application is approved, the Students-at-Risk evaluation team will develop a Return to Campus Management Plan. The Associate Vice-Provost (Student Success and Learning Support Services) shall review the Return to Campus Management Plan with the Student.

Return to Campus Procedure for Involuntary Withdrawal

4.66 Following an involuntary withdrawal, the Student-at-Risk must apply in writing to the Associate Vice-Provost (Student Success and Learning Support Services) in order to return to campus. The application is due no later than sixty (60) days before the Student's anticipated return to campus. The application will require the following in order to be considered: evidence that all terms and conditions associated with the involuntary withdrawal have been met, evidence that all current outstanding disciplinary sanctions have been completed, and a treatment summary completed by appropriate treating medical professional(s). The Associate Vice-Provost (Student Success and Learning Support Services) will review the completed application and accompanying documentation and forward for the consideration of the Students-at-Risk Evaluation Team. During the review process, the Evaluation Team may require the Student to provide additional, more recent documentation from treating medical professional(s). If the application is approved, the Students-at-Risk Evaluation Team will develop a Return to Campus Management Plan. The Associate Vice-Provost (Student Success and Learning Support Services) shall inform the Student, in writing, as to whether the application has been approved and, if approved, shall review the Return to Campus Management Plan with the Student. This will normally be completed within thirty (30) days of the anticipated return to campus date.

Return to Campus Management Plan

4.67 Where a Student has received approval to return to campus following involuntary withdrawal, the Students-at-Risk Evaluation Team shall prepare a Return to Campus

Management Plan that outlines any terms and conditions of the Student's return to campus and any support services required. The Associate Vice-Provost (Student Success and Learning Support Services) will review the plan with the Student and obtain agreement. A designate from the Students-at-Risk Evaluation Team will implement the Return to Campus Management Plan with the Student and monitor the Student's transition back to campus. The person monitoring the Return to Campus Management Plan shall regularly report the Student's progress back to the Students-at-Risk Evaluation Team. The Return to Campus Management Plan may also include the disposition of any outstanding non-academic discipline matters and/or sanctions.

### Eligibility for Appeal

4.68 Students may appeal the decisions made under the Process and Procedures for Responding to Students-at-Risk under the appeal guidelines set forth in this policy.

## ADMINISTRATION OF THE POLICY

### Authority and Amendments

4.69 Amendments to the Non-Academic Misconduct Policy must be recommended to the Vice-Provost (Students), who oversees in the administration and implementation of the policy. Any changes must be first authorized by the Vice-Provost (Students) and then brought to General Faculties Council (GFC) for approval. The policy will be reviewed after twelve (12) months and every two (2) years thereafter and will include input from Students, staff and faculty who are involved in the administration of the policy.



### Appeal Board

4.70 Appeal Board Hearings always serve as a final appeal authority for Students who are found in-violation of this policy. Except in exceptional cases wherein the Board is hearing an appeal of the Vice-Provost (Students), the Vice-Provost (Students) will serve as Chairperson of this Board and will call meetings as necessary. In the event that the Vice-Provost (Students) must be excused from chairing Appeal Board Hearings, the Vice-Chairperson of the Appeal Board will be appointed to Chairperson for the Hearing.

4.71 The Executive Assistant of the Vice-Provost (Students) will serve as administrator for all Board Hearings.

### Non-Academic Misconduct Policy Records

4.72 Records of charges and sanctions, other than suspension or expulsion, will not be placed in Student academic records. Records of all decisions, including charges and sanctions, will be maintained as part of the confidential records maintained by the Offices of the Associate Vice-Provost (Student Success and Learning Support Services) for a period of up to five years after the Student graduates or ceases to be a Student. Reports and statistics compiled by the Associate Vice-Provost on the nature and number of cases and outcomes, including sanctions, will not include identification of individual Students. Records of charges that are dismissed will be sealed and kept for a period of one (1) year after the incident date and will be destroyed after one year. Records may be released as required by law.

### Reporting

4.73 An annual report detailing types of cases heard and actions taken under this policy will be provided to the General Faculties Council.

## 5 Responsibilities

### Appeal Board

Approval Authority –

- ensure appropriate rigour and due diligence in the development or revision of this policy.

Implementation Authority –

- ensure that University staff are aware of and understand the implications of this policy and related procedures;
- monitor compliance with the policy and related procedures;
- regularly review the policy and related procedures to ensure consistency in practice;
- sponsor the revision of this policy and related procedures when necessary.

### Students-at-Risk Evaluation Team

## 6 Appendices

Appendix 1: Appeal Board Composition
Appendix 2: Students-at-Risk Evaluation Team Composition

## 7 Procedures

Appeal Board Procedures
Students-at-Risk Evaluation Team Procedures

## 8 History

Approved: February 4, 2010 (GFC 515.11)
Effective: February 4, 2010

Note: The electronic version is the official version of this policy. See: http://www.ucalgary.ca/policies/files/policies/Non-Academic%20Misconduct%20Policy.pdf

# Sexual Harassment

The University of Calgary recognizes its moral and legal responsibilities to protect its students, staff and Faculty against sexual harassment and has established a Sexual Harassment Policy and related procedures to deal with this serious issue.

The simple definition of sexual harassment is "unwanted sexual attention." Any type of conduct that emphasizes the sexuality, gender or sexual orientation of an individual and creates for them an offensive, intimidating or hostile learning, working or living environment is sexual harassment. The harassment is more serious if submission to or acceptance of such behaviours is made either an implicit or explicit condition of an individual's employment or academic status.

Sexual harassment may take various forms. It includes but is not limited to the following: verbal abuse or threats of a sexual nature; unwelcome remarks, jokes, innuendos or taunting about a person's sex (often linked with references to the body, attire, age or marital status of the individual); the display of pornographic, sexually offensive or derogatory pictures; unnecessary and unwelcome physical conduct such as touching, patting, pinching; unwelcome sexual invitations or requests, usually of a persistent nature; sexual assault. Gender harassment or sexism may also be one form of sexual harassment.

Sexual harassment has both males and females as its victims and perpetrators. It can occur between members of the opposite sex or of the same sex. Although sexual harassment often occurs where there is a real or perceived power imbalance, it can also occur amongst peers.

### Advice and Information

Individuals with a concern regarding a possible occurrence of sexual harassment have the following mutually non-exclusive alternatives to assist them: (a) If possible, immediate personal strategies should be utilized such as informing the alleged harasser (either in person or by letter) that such behaviour is offensive and requesting an end to the perceived harassment. Frequently, this assertive stance curtails further incidents. (b) If this is not possible or productive, someone who is empowered to investigate allegations of sexual harassment should be contacted: the Sexual Harassment Adviser at 220-4086 or the appropriate Dean or administrative equivalent who supervises the alleged harasser. In cases where physical assault has occurred, the complaint may also be lodged with Calgary Communities Against Sexual Abuse (CCASA) at 237-5888 or the Calgary Police at 266-1234. Whatever routes are taken, every effort should be made to document precisely what has transpired. Complaints of sexual harassment do not have to enter a formal investigative and disciplinary procedure simply because an individual has chosen to speak to the Sexual Harassment Adviser. Individuals are free to simply make a report of the incident to the Adviser. These reports are useful for statistical purposes and assist in directing educational initiatives. Individuals wishing to pursue the matter can file a written complaint with the Adviser who will then attempt to affect an "informal resolution" to the problem. Informal resolutions usually involve the Adviser consulting with the two parties either individually or together. The end result must be satisfactory to all parties. If an informal resolution fails or is inappropriate, a formal hearing may be held on any written complaint of sexual harassment where there is no other negotiated or legislated procedure to pursue a complaint against the alleged offender.

Due to the nature of the issue of sexual harassment, the policy and procedures are regularly revised and updated. Persons seeking information on this issue are therefore encouraged to contact the Sexual Harassment Adviser to obtain a copy of the latest official document. The Adviser is located in MacEwan Student Centre, University Counselling Services, Room 375 and may be reached by telephone at 220-4086.

Additional information is available on the web at www.ucalgary.ca/sexualharassment.

# Policy of Support for Persons with Life Threatening Communicable Illnesses

The University recognizes that persons suffering from life threatening communicable illnesses have a right and a responsibility to continue in their regular work or academic pursuits as long as they are capable of carrying out the duties and obligations associated

with those pursuits; and recognizes that individuals who contract a life threatening communicable illness, including AIDS, are entitled to continue in their employment or studies provided that the health, safety and well being of others are not endangered.

The University is guided in the application of this policy by current research findings and medical advice relevant to the individual case.
All members of the University community are urged to recognize the responsibility they have for ensuring that those with such illnesses are treated in a caring and supportive manner.

GRADUATE STUDIES | UNIVERSITY OF CALGARY

# HANDBOOK OF SUPERVISION AND EXAMINATION

## Preamble

This handbook contains the rules, guidelines and procedures of the Faculty of Graduate Studies that pertain to the administration of graduate programs and to the appointment of graduate supervisors. While the rules are stated in fixed or absolute terms, it is intended that they be administered with some degree of flexibility and, to that end, the Dean of Graduate Studies and his/her designates are empowered to grant exceptions, extensions and variances, upon written request and explanation. Requests, whether from students or faculty members, should be made over the signature of the Graduate Director of the program concerned.
The Head of a Department, Director of an interdisciplinary program or, in the case of non-departmentalized faculties, the Dean of the Faculty, is responsible for graduate programs. However, this responsibility is normally delegated to a Graduate Director. In this document, for the sake of clarity in describing common practice, the Graduate Director is referred to as the person responsible for the graduate program.
Please note that in this document "the Dean" refers to the Dean of Graduate Studies unless otherwise noted.
The Handbook of Supervision and Examination is published as part of the Graduate Calendar. Changes made to the regulations during the year are indicated in the official online Calendar.

## Part I: Course-based Master's Degree (Approved by Graduate Council November 9, 2008)

### 1. Supervision

Although the Faculty of Graduate Studies does not require the formal appointment of a Supervisor, programs may appoint a Faculty Advisor or a Supervisor. The latter must meet Faculty of Graduate Studies requirements for graduate supervision. Those requirements are outlined in Supervisory Policy http://grad.ucalgary.ca//policies/supervision.

### 2. Judgement of Student Performance

If a student's grades do not meet the Calendar requirements (see Calendar, Student Standing), the Faculty of Graduate Studies will notify the program of this. In addition, the program may independently judge that a student's performance is not satisfactory. In either case, it is the responsibility of the Graduate Director to promptly notify the student in writing that performance is below an acceptable level. A student will be required to withdraw from the Faculty of Graduate Studies for reasons of unsatisfactory performance unless the program recommends otherwise.

### 3. Research Component and Exit Requirements

The Campus Alberta Quality Council requires a research component for all Course-based Master's programs, and states that this requirement can be satisfied in a variety of ways, for example, by "one or more research courses in the program," or a capstone course that focuses "on the integration and application of the knowledge acquired." The programs may also "culminate in a comprehensive examination involving an examination committee."[1] The Faculty of Graduate Studies operates in accordance with CAQC guidelines, and requires that the nature of the research component and the form of any comprehensive examination must be identified in program regulations that are approved by the Faculty of Graduate Studies Academic Program Committee.

### 4. Transfers

#### 4.1 Transfers at the Master's Level

Application for Change of Area of Specialization

A student requires approval of both the Graduate Director and the Dean of the Faculty of Graduate Studies to transfer from one area of specialization to another, while remaining within the degree program.

#### 4.2 Transfers from Course-based Master's Degree to Thesis-based Master's Degree

A student requires approval of both the Graduate Director and the Dean of the Faculty of Graduate Studies to transfer from a Course-based Master's Degree to a Thesis-based Master's Degree.

#### 4.3 Transfers to Doctoral Programs

##### 4.3.1 Transfer from Master's to Doctoral Programs

Program Heads may recommend outstanding Master's students for transfer to the doctoral program. Such recommendations must be endorsed by the proposed doctoral Supervisor and accompanied by the names of members of the proposed doctoral supervisory committee. The transfer must be approved by the Dean of Graduate Studies.

##### 4.3.2 Course and Examination Requirements

Courses credited in the prior Master's program will be taken as fulfilling doctoral requirements where applicable, in accordance with program requirements for required doctoral course work. All students transferring from Master's to doctoral programs will be required to sit the doctoral candidacy examination.

##### 4.3.3 Time Limits on Transfers

Transfers from Master's to doctoral programs must be completed within twenty-four months of the student's initial registration in the Faculty of Graduate Studies. All transfer students must attempt the candidacy examination within thirty-six months of first registration in the Faculty of Graduate Studies.

[1] All quotations are from http://www.caqc.gov.ab.ca/pdfs/Graduate_Program_Asessment_Standards_REVISED_8_July_2008_3_pdf as at 2008 October 10

GRADUATE STUDIES | UNIVERSITY OF CALGARY

# HANDBOOK OF SUPERVISION AND EXAMINATION

## Part II: Thesis-based Master's Degree (Approved by Graduate Council April 2, 2009)

SUPERVISORS AND SUPERVISORY COMMITTEES

### 1.0 Selection of a Supervisor

#### 1.1 General Advice to Students

All students must have either an interim advisor or an approved Supervisor at the time of first registration, and a permanent Supervisor no later than the second annual registration. It would help the student in program planning if the selection of a Supervisor were completed as quickly as possible. Students are encouraged to think about and select their areas of specialization as early as possible, and preferably before beginning the program.

#### 1.2 Supervisor Selection

The initial selection of a Supervisor should be by mutual agreement between student and faculty member, and approved by the Graduate Director. Difficulties or conflicts in selecting or recommending a Supervisor should be referred promptly to the Dean by any of the persons involved.

##### 1.2.1 Supervisor Eligibility Requirements

Continuity of supervision throughout a graduate program is important to a student's success. Normally, faculty members with Continuing Board appointments in the professorial ranks are chosen as Supervisors. However, there are occasions when it is to the student's advantage for a program to recommend the appointment of a Supervisor who does not have a Continuing Board appointment. For example, an individual who holds an appointment that is Specific Term (Contingent, Limited Term, Term Certain), Clinical or Adjunct, or Honorary, or has Emeritus status, or is from outside the University, may be appointed Supervisor. In cases such as these, the Faculty of Graduate Studies requires assurance that the proposed Supervisor will be able to provide continuity.
The proposed Supervisor must understand the commitment expected in terms of time and funding and be familiar with current graduate program and Faculty of Graduate Studies regulations. The Graduate Director must ensure that supervision will be provided for the probable time period required for the completion of the degree program.
If the proposed Supervisor is someone from outside the graduate program who does not have a Continuing Board appointment, a Co-supervisor must be appointed.
The Supervisor should be currently active in research in an area related to the student's interest. Faculty members working on their own graduate degrees cannot be approved in any supervisory capacity without special dispensation from the Dean. For detailed policy and the required forms, see http://www.grad.ucalgary.ca > Policies and Procedures.

##### 1.2.2 Conflict of Interest

The relationship between Supervisor and student is an academic one. Where other relationships exist or develop that might give the appearance of conflict of interest they must be immediately reported to the Graduate Director who can consult with an Associate Dean or the Dean if the Graduate Program Director is unable to resolve the situation. (See Graduate Studies Conflict of Interest Policy: http://www.grad.ucalgary.ca//policies/conflictofinterest ).

#### 1.3 Appointment of Co-supervisor

In addition to those cases noted above in which it is required that a Co-supervisor be appointed, a Co-supervisor may be appointed by the Graduate Director upon the written recommendation of the Supervisor and agreement of the student. A postdoctoral fellow as defined in the Postdoctoral Fellow Policy may be appointed a Co-Supervisor.[2]The role of the Co-supervisor in this case is to provide supplementary guidance, instruction and research stimulation on a regular or extensive basis.

#### 1.4 Supervisor or Co-supervisor from Outside the Department, Program, or Faculty

A Supervisor or Co-supervisor may be from a department, program, or faculty other than the student's home department, program, or faculty. The recommendation must be endorsed by the student. The faculty member's home program should be notified by the relevant Graduate Director whenever the faculty member is asked to supervise or co-supervise outside the home program. Such an "external" Supervisor or Co-supervisor must agree to be responsible to the Graduate Director of the student's home department in all matters related to the supervisory responsibilities.

#### 1.5 Continuity of Supervision

Students are entitled to continuity of supervision. In the case of the resignation from the University, illness or death of the Supervisor, the Graduate Director must make immediate arrangements to provide continuity of supervision pending the appointment of a new Supervisor.

#### 1.6 Supervisor Selection and Approval Deadlines

Regular students are required to have approved Supervisors within twelve months of initial registration. A student admitted as a special case admission must have an approved Supervisor before admission.

### 2.0 Responsibilities of Supervisors

#### 2.1 Knowledge of Rules and Procedures

Supervisors should be familiar with the rules and procedures of the Faculty of Graduate Studies and program regulations and requirements.

#### 2.2 Meetings between Student and Supervisor

[2] The Postdoctoral Fellow Policy http://www.ucalgary.ca/postdoc/files/postdoc/University%20Policy.pdf defines a PDF as "An individual, normally within 5 years of completion of a doctoral degree or 10 years of completion of an MD, DDS, DVM or equivalent, who is engaged in a temporary and defined period of mentored advanced training to enhance the professional skills and research independence needed to pursue his or her chosen career path." The Postdoctoral Fellow Policy mandates that "assistance with the supervision of graduate students" requires "the agreement of the Faculty Supervisor."

A student and Supervisor have a shared responsibility to meet on a regular basis.

### 2.3 The Role of the Supervisor

The supervisor should act both as a general academic mentor, with emphasis on guidance, instruction, and encouragement of scholarship and research, and as a judge of the student's performance. Because of their own involvement in research and related professional activities, Supervisors should provide professional guidance and research stimulation to their students. A fundamental duty of the Supervisor is to impart to the student the skills necessary to plan and conduct original research.

Specifically, the Supervisor should:
Work with the student to establish a realistic timetable for the completion of the various requirements of the program of study; discuss with the student and establish mutual expectations for the student's vacation time;
Develop a relationship with the student conducive to research and intellectual growth;
Guide the student in the pursuit of knowledge and provide constructive criticism in support of the highest standards of research and professional development.

### 2.4 Participation of Supervisor in Thesis Preparation

The Supervisor is expected to provide frequent and prompt comments on drafts of the thesis and should attempt to be critically constructive and encouraging but the thesis must be the creation of the student.

### 2.5 Supervisory Provision for Leave of Absence (Approved by FGS Council: June 4, 2009)

A program and Supervisor must ensure that the student is provided with adequate supervision during a Supervisor's leave, potentially through the appointment of an interim Supervisor. Students should be informed well in advance about the Supervisor's plans for forthcoming leaves of absence. With current means of communication, continued supervision while on a research and scholarship leave is the expectation for faculty members. These arrangements must be communicated in writing to the Graduate Director, who bears the responsibility for ensuring continuity of supervision for students in his/her graduate program.

#### 2.5.1 Interim Supervisory Arrangements

When an interim Supervisor is appointed to cover a period of a Supervisor's absence, the regular Supervisor retains final responsibility for the adequate supervision of the student. Faculty members approved as interim Supervisors must indicate in writing to the Graduate Director their willingness to accept responsibility for the day-to-day supervision of such students.

### 2.6 The Supervisor and Setting up Examinations

The Supervisor is responsible for scheduling the thesis oral examination.

### 2.7 Suggested Procedures in the Event of Problems between Graduate Students and Their Supervisors

Students should first try to resolve problems with Supervisors by talking to the Supervisor. Supervisory Committee members might be able to give helpful advice in this situation. Problems that are not resolved in this fashion should be discussed with the Graduate Director, and then the Department Head or equivalent. If it appears that a solution cannot be reached, the student and/or the Graduate Director may consult the Faculty of Graduate Studies for advice about a resolution to the matter.

### 2.8 Procedures for the Curtailment of Supervisory Duties

The Dean of Graduate Studies approves the initial appointment of a faculty member to supervisory duties. If a complaint is made against a Supervisor, the Dean will first discuss the matter with the Department Head or equivalent, and then with the faculty member concerned. The issue may be resolved informally. If the Dean decides that a more formal approach is needed to resolve the dispute, the Dean will inform both the Head and the faculty member of his/her conclusions in writing. If the result of the Dean's investigation is curtailment of the supervisory duties of the faculty member, the Dean will inform the faculty member in writing.

### 2.9 Requirements for a Master's Supervisory Committee

A Supervisory Committee at the Master's level is not normally appointed.
The Faculty of Graduate Studies will recognize a formal Supervisory Committee at the Master's level only when program Calendar entries refer to this requirement. When such a committee is required by the program, the program must file an Appointment of Supervisor/Supervisory Committee form with the Faculty of Graduate Studies. A Master's Supervisory Committee will be governed by the rules applying to doctoral Supervisory Committees (see Article 3.0 in Handbook of Supervision and Examination Part III: Doctor of Philosophy / Doctor of Education Degree).
Members of a Supervisory Committee should provide support to both the student and the Supervisor by expanding the range of expertise and experience available to advise and assess the student. Members should provide constructive criticism and discussion of the student's ideas, methods and performance as the program develops; should be accessible to the student for consultation and discussion; should suggest other sources of information to the student; and must participate in examinations and in periodic meetings with the student and provide regular assessment of the student's progress as required by the program regulations.

## THE MASTER'S THESIS

### 3.0 Thesis Quality Requirements

The thesis should demonstrate that the candidate is acquainted with the published literature in the subject of the thesis; that appropriate research methods have been used; and that appropriate levels of critical analysis have been applied. The research embodied in the thesis should make some original contribution to knowledge in the field.
The general form and style of thesis may differ from program to program, but a thesis should be a coherent document. This means that if a thesis contains separate manuscripts, there needs also to be introductory and concluding chapters that explain how these separate manuscripts fit together into a unified body of research. If previously published materials are included, it should be made clear what exactly is the student's own work and what the contribution of other researchers is.

While it is expected that a portion of the thesis could be the basis for a publication, the Supervisor and examiners should recognize that even an excellent thesis may not be perfect in all respects. "Perfection" is not a prerequisite for acceptance of the thesis as a "partial fulfillment of the requirements for a degree." The thesis may vary in quality from passable to outstanding.

## EXAMINING COMMITTEES, EXAMINATIONS AND STANDARDS

### 4.0 Standards of Performance

### 4.1 Judgement of Student Performance

Supervisors and Graduate Directors must inform students on a regular basis about their academic progress. If a student's performance is judged to be below an acceptable level, this judgement should be expressed to the student formally and in writing at as early a stage in the program as possible. A student may be required to withdraw from the Faculty of Graduate Studies for reasons of "unsatisfactory progress" (see also section 5.3).

### 4.2 Annual Progress Report

The Supervisor and each continuing student must jointly submit an annual progress report on the student's performance. This form must be signed by the Supervisor, the Graduate Director, and the student, and must be forwarded to the Faculty of Graduate Studies. The student must sign the report after the Supervisor and the Graduate Director have completed their comments to acknowledge that he/she has reviewed these comments.

## 5.0 Faculty of Graduate Studies Examinations

### 5.1 Faculty Examination Requirements

Care should be taken to distinguish between Faculty of Graduate Studies examinations and Departmental or Program examinations. The Faculty of Graduate Studies requires a final oral examination of theses. Examiners may participate by teleconference or videoconference (including Voice over Internet Protocol services): telephone backup must be available for video conference examinations. Any requirement for a written comprehensive examination is at the discretion of the department.

### 5.2 Faculty Regulations for Thesis Examinations

The thesis oral examination is an examination of the Faculty of Graduate Studies. No changes in the composition of examination committees may be introduced without prior approval from an Associate Dean of Graduate Studies or the Dean of Graduate Studies. The Faculty of Graduate Studies must be informed of minor changes in the scheduling of the examination (e.g., for illness or weather). Changes of more than two weeks will need prior approval by the Faculty of Graduate Studies.

### 5.3 Program Examination Requirements and Standards

Program requirements may include examinations that are in addition to the Faculty of Graduate Studies requirements. Programs are entitled to set their own standards of adequate performance in such examinations, provided these are not in conflict with Faculty of Graduate Studies standards. When a student fails to meet either Faculty or program standards, the program may recommend to the Dean of Graduate Studies that the student be required to withdraw (See also section 4.2).

### 5.4 Communication of Examination Requirements to Students

Programs should provide their students, as early as possible, with information about the precise nature and form of program examinations and tests.

## 6.0 Thesis Oral Examinations

### 6.1 Right of Student to Submit and Defend Thesis

A student who has successfully completed all Faculty of Graduate Studies and program requirements has the right to submit and defend a thesis even if doing so may be contrary to the advice of the Supervisor.

### 6.2 Composition of the Thesis Oral Examination Committee

The thesis oral examination committee shall consist of the student's Supervisor and at least two other examiners, one of whom shall be external to the student's home department or program. If there is a Co-supervisor but not a formal Supervisory Committee, two other examiners are still required, one of whom shall be external to the program. If there is a formal Supervisory Committee, only one additional examiner external to the program is required. The composition of the committee must be recommended by the Graduate Director and approved by the Dean of Graduate Studies.

#### 6.2.1 The External Examiner

The external examiner must meet the following criteria:
If from within the University of Calgary, must have a Board appointment outside the student's program but within the professorial ranks, and have expertise in the student's research area or a closely related field;
If external to the University of Calgary, must have a well-established research reputation, expertise in the area of the student's research, and experience in evaluating theses at a graduate level.
In addition, the external examiner must:
Not have collaborated with the supervisor in the last five years;
Not be related to the student, nor have worked with the student;
Not have been a supervisor in the student's department or program for the last three years.
An external examiner who does not meet all the criteria is not necessarily precluded from serving on the examining committee, but the Graduate Director must provide the Dean of Graduate Studies with a memo explaining the circumstances. Non-Board appointees to examination committees may be designated as external examiners with the approval of the Dean of Graduate Studies.

#### 6.2.2 Non-Board Appointees on Examination Committees

Persons who are not Board appointees of the University of Calgary may be approved to serve on thesis oral examination committees. A recommendation to the Dean of Graduate Studies by the Graduate Program Director for such an appointment must be accompanied by a curriculum vitae.

#### 6.2.3 The Neutral Chair

The examination is chaired by a neutral member of the academic staff appointed by the Graduate Director. He/she is not a member of the examining committee and is non-voting.

#### 6.2.4 Responsibilities of the Supervisor and the Neutral Chair

The Supervisor arranges scheduling of the examination. The Neutral Chair presides over the thesis oral examination and reports the results to the student. The Neutral Chair gives the report to the Graduate Director who ensures that it is submitted to the Faculty of Graduate Studies within 24 hours of the examination.

### 6.3 Composition of Examination Committee for Re-take of Thesis Oral Examination

Normally, the composition of the examination committee will remain the same. Upon the recommendation of the Graduate Director and approval of the Faculty of Graduate Studies, an examiner may be replaced.
The deadlines for the recommendation of the examination committee are as for the original examination.

## 7.0 Scheduling the Thesis Oral Examination

### 7.1 Supervisor Responsibility

The Supervisor is responsible for scheduling the thesis oral examination.

### 7.2 Notice of Thesis Oral Examination

The official *Notice of Thesis Oral Examination* form, indicating the title of the thesis, the time and place of the examination, the names of the recommended examiners, and confirming that the candidate has completed all program requirements, endorsed by the Graduate Director, must be received in the Faculty of Graduate Studies office at least four weeks prior to the time of the examination. The membership of the examination committee must be approved by the Faculty

of Graduate Studies.

7.2.1 Posting the Notice of Thesis Oral Examination

A *Notice of Thesis Oral Examination* form, bearing the names, but not signatures of the student, the Supervisor, the Graduate Director and the Dean of Graduate Studies, or designate, must be posted at least two weeks before the date of the examination. The Graduate Director must ensure that copies of the *Notice* are sent to the student and to members of the examination committee.

7.2.2 Student Approval of Designated Area of Specialization

The format of the University degree parchment presented to successful candidates shows the degree, the department or area of study, and the approved area of specialization. Students should ensure that the approved area of specialization identified on the *Notice of Thesis Oral Examination* form is correct, before it is sent to the Faculty of Graduate Studies.

### 7.3 Form of Thesis

The thesis submitted to the members of the examination committee for final examination must be in all respects a final, complete copy and not a draft.

### 7.4 Thesis to Examiners

The student must ensure that the thesis is in the hands of the examiners at least three weeks prior to the proposed date of the oral examination. The examination begins when the thesis is distributed. The examiners should not discuss the thesis or their evaluation of it with each other (or anyone else) prior to the oral examination. The *Examiner's Report* is considered a confidential document and must not be shared with the candidate or the other examining committee members before the final decision of the examining committee.

### 7.5 Format of Final Thesis Oral Examination

Normally, final thesis oral examinations are open, but only the examiners may question the student.
The examiners' deliberations are private and confidential. Only the Neutral Chair, the examining committee, and, if present, the Department/Program Head and the Dean of Graduate Studies or the Dean's Representative may be present.

## 8.0 Conduct of Thesis Oral Examination

### 8.1 Examiner's Report on Thesis (Approved by FGS Council: Nov. 2, 2009)

Before the oral examination, each examiner is required to prepare an assessment of the thesis on the official *Examiner's Report on Thesis* form. The oral examination cannot proceed until all of the Examiners' Reports are submitted to the Neutral Chair. These assessments are to be submitted to the Neutral Chair of the examination committee before the oral examination begins. The assessments are CONFIDENTIAL: they are not to be made available to the student or to the examination committee before the final recommendation of the examination committee. After the examination, the Neutral Chair should submit the reports to the Graduate Director who ensures that they are forwarded to the Faculty of Graduate Studies. After the examination, the graduate program must make the *Examiners' Reports* available to the student, upon request.

### 8.2 Examination Regulations

8.2.1 Formal Examination

The oral examination is a formal examination, not an informal discussion with the candidate.

8.2.2 Questioning of the Candidate

No one other than an examiner (as identified on the *Notice of Thesis Oral Examination* form) is allowed to question the candidate. All examiners must be given an opportunity to question the candidate early in the examination, e.g., by rounds of questioning.

8.2.3 Length of Examination

The oral examination should not exceed two hours. This does not include deliberation time of the committee.

8.2.4 Editorial Comments on Thesis

Examiners' editorial comments on the thesis should not be discussed at the oral examination. It is recommended that each examiner hand the student a list of any such comments for post-examination final thesis revisions.

### 8.3 Suggested Examination Procedures

8.3.1 Opening Summary

It is common practice to ask the student to present a brief (up to fifteen minutes) opening summary of the thesis. Although this is not mandatory, students may appreciate the opportunity to introduce their research work and summarize its significance.

8.3.2 Questions to the Candidate

Questions to the candidate should be relevant to the subject matter of the thesis, and should be clearly and succinctly phrased in order to minimize doubt in the candidate's mind as to what is being asked. The student should be given reasonable time to answer. If the student has understood the question but cannot answer, the examiner should pass to another question and not attempt to extract an answer by prolonged interrogation. The Neutral Chair should guard against any tendency of examiners to interact with each other instead of concentrating on the examination of the candidate.

## 9.0 Post Thesis Oral Examination Procedures

### 9.1 Provisional Recommendations

At the end of the thesis oral examination, everyone except the Neutral Chair, the members of the examination committee, the Department/Program Head or designate and the Dean of Graduate Studies and/or Dean's representative, is required to withdraw from the room. Before any discussion of the candidate's performance, each examiner must identify, by secret ballot, whether he/she favours recommending a pass or fail on each of the thesis and the oral defence. This procedure provides the committee with a frame of opinion upon which a full discussion of the student's performance may then be based.

### 9.2 Official Examiners' Discussion

Following a count of the straw vote the Neutral Chair will facilitate a post-examination discussion in which the Department/Program Head and the Dean of Graduate Studies or their representatives may participate although they have no vote. At the conclusion of the discussion, each examiner must write his/her final recommendation on the official *Report of Master's Thesis Examination* form. Unanimous decisions are required for both the thesis and the oral defence. If the examiners are unable to achieve unanimity regarding one or both components, there must be no further discussion regarding that component of the examination and the Neutral Chair must immediately inform the Dean of "lack of unanimity". The final decision will be at the discretion of the Dean of Graduate Studies.

### 9.3 Recommendation of Examination Committee

Thesis oral examinations are designed to establish a level of achievement consistent with the standards of the Faculty of Graduate Studies as outlined in section 3, "Thesis Quality Requirements." The following section (9.4) defines the official Faculty recommendations to the Dean of Graduate Studies respecting outcomes of thesis oral examinations. In each case, the committee recommendation must be reported to the Dean on the official *Report of Master's Final Examination* form within one working day of the completion of the examination. Immediately following the conclusion of the examination, the Neutral Chair must report the outcome to the student.

### 9.4 Recommendations

Thesis examinations must be judged to be either acceptable or unacceptable with respect to the thesis itself and, with respect to the oral defence, if the thesis is judged acceptable.

#### 9.4.1 Recommendation for the Thesis

If the unanimous final decision is that the thesis conforms to the requirements for a Master's thesis (see section 3) then all members of the examination committee shall sign the signature page except the Supervisor, who will sign after reviewing and approving any necessary minor corrections on behalf of the committee.

If the unanimous final decision is that the underlying research reported in the thesis is judged to be sound, but the presentation of or analysis in the research requires attention that one or more members of the examination committee wish to review personally, then those members will not sign the approval page until they have seen and approved the revisions. Other members of the committee should sign immediately after the examination. The Report of the examination should specify who has withheld his/her signature.

If the examining committee unanimously determines that the underlying research is not acceptable, then the examination committee recommends a failed thesis to the Dean of Graduate Studies. The final decision will be at the discretion of the Dean of Graduate Studies. Should the Dean of Graduate Studies uphold the recommendation of "fail", the candidate will have a second opportunity to present and defend an acceptable thesis. No judgment should be made on the oral defence, because the revised thesis will need to be defended anew.

If the examiners fail to arrive at a unanimous final recommendation, the Neutral Chair must adjourn discussion on this component of the examination, and that same day inform the Dean of Graduate Studies of "lack of unanimity." The final decision will be at the discretion of the Dean of Graduate Studies.

For either a unanimous decision to fail the thesis or a lack of unanimity, within five working days the Neutral Chair must submit a written report to the Dean of Graduate Studies, describing the examination procedures and copy it to the Graduate Director. Within five working days, each examination committee member must provide a confidential written report to the Dean of Graduate Studies explaining the reasons for his/her recommendation and copy it to the Graduate Director and the Supervisor. After consultation with the Supervisor, the Graduate Director then summarizes the essential points in a written report to the student, copied to the Supervisor.

In the case of a failed thesis, whether by committee or Dean's decision, only one re-submission will be allowed and a new defence will be required. In view of the magnitude of the revisions required, a second oral exam must be held no sooner than six months and no later than twelve months from the date of the first examination. This new examination will normally be conducted by the original examination committee.

In reporting the results of the second examination, the committee will be limited to recommending either pass or fail. A recommendation for "fail" requires that each examiner submit within five working days a confidential written report to the Dean of Graduate Studies, copied to the Graduate Director, and the Supervisor detailing the reasons for his/her assessments. Within five working days, the Neutral Chair must also submit a written report of the examination procedures to the Dean of Graduate Studies, copied to the Graduate Director. If the Dean of Graduate Studies upholds the recommendation to fail, the student will be required to withdraw from the Faculty of Graduate Studies.

#### 9.4.2 Recommendation for the Oral Defence

If the unanimous final decision is that the oral defence is acceptable, the recommendation regarding the oral defence is a pass.

If the examining committee unanimously determines that the oral defence is not acceptable, then the examining committee recommends a failed oral defence to the Dean of Graduate Studies. The final decision will be at the discretion of the Dean of Graduate Studies. Should the Dean of Graduate Studies uphold the recommendation of "fail", the candidate will be allowed a second, final attempt to present an acceptable oral defence of the thesis.

If the examiners fail to arrive at a unanimous final recommendation, the Neutral Chair must adjourn discussion on this component of the examination, and that same day inform the Dean of Graduate Studies of "lack of unanimity." The final decision will be at the discretion of the Dean of Graduate Studies.

For either a unanimous decision to fail the oral defence or a lack of unanimity, within five working days the Neutral Chair must submit a written report to the Dean of Graduate Studies, describing the examination procedures and copy it to the Graduate Director. Within five working days, each examination committee member must provide a confidential written report to the Dean of Graduate Studies explaining the reasons for his/her recommendation and copy it to the Graduate Director and the Supervisor. After consultation with the Supervisor, the Graduate Director then summarizes the essential points in a written report to the student, copied to the Supervisor.

In the case of a failed oral defence, whether by committee or Dean's decision, the candidate will be given only one further opportunity to present an acceptable defence. The second oral examination will be scheduled and normally heard by the original examination committee not later than six months from the date of the first examination. Any necessary revisions to the thesis must be completed by the candidate and approved by the committee before the second oral examination is scheduled.

In reporting the results of the second oral examination, the committee will be limited to recommending either pass or fail. A recommendation for "fail" requires that each examiner submit within five working days a confidential written report to the Dean of Graduate Studies, copied to the Graduate Director, and the Supervisor detailing the reasons for his/her assessments. Within five working days, the Neutral Chair must also submit a written report of the examination procedures to the Dean of Graduate Studies, copied to the Graduate Director. If the Dean of Graduate Studies upholds the recommendation to fail, the student will be required to withdraw from the Faculty of Graduate Studies.

### 9.5. Dean's Action in Lack of Unanimity

When the Neutral Chair of a thesis oral examination does not report a unanimous recommendation, the Dean of Graduate Studies may consult with the Graduate Director, the Supervisor, and the examiners before making a decision. At his/her discretion, the Dean of Graduate Studies may consult with the student as well. A decision should normally be made within seven business days of receiving the required post-examination reports, and all persons involved informed in writing of the result of the decision.

### 9.6 Exam Procedural Irregularities UPDATED

Any procedural irregularities should be reported to the Dean of Graduate Studies within 5 working days of the examination date, regardless of the outcome of the exam.

### 9.7 Convocation Clearance UPDATED

The names of the candidates who have successfully completed the final thesis oral examination will not be added to the convocation list until the Faculty of Graduate Studies receives two unbound copies of the thesis and a *Departmental Clearance Form*. Students will continue to be assessed continuing fees until cleared for convocation.

## TRANSFERS

## 10.0 Transfers at the Master's Level

### 10.1 Application for Change of Area of Specialization

A student requires approval of both the Graduate Director and the Dean of the Faculty of Graduate Studies to transfer from one area of specialization to another, while remaining within the degree program.

### 10.2 Transfers from Thesis-based Master's Degree to Course-based Master's Degree

A student requires approval of both the Graduate Director and the Dean of the Faculty of Graduate Studies to transfer from a Thesis-based Master's Degree to a Course-based Master's Degree.

## 11.0 Transfers to Doctoral Programs

### 11.1 Transfer from Master's to Doctoral Programs

Program Heads may recommend outstanding Master's students for transfer to the doctoral program. Such recommendations must be endorsed by the proposed doctoral Supervisor and accompanied by the names of members of the proposed doctoral supervisory committee. The transfer must be approved by the Dean of Graduate Studies.

### 11.2 Course and Examination Requirements

Courses credited in the prior Master's program will be taken as fulfilling doctoral requirements where applicable, in accordance with program requirements for required doctoral course work. All students transferring from Master's to doctoral programs will be required to sit the doctoral candidacy examination.

### 11.3 Time Limits on Transfers

Transfers from Master's to doctoral programs must be completed within 24 months of the student's initial registration in the Faculty of Graduate Studies. All transfer students must attempt the candidacy examination within 36 months of first registration in the Faculty of Graduate Studies.

GRADUATE STUDIES | UNIVERSITY OF CALGARY

# HANDBOOK OF SUPERVISION AND EXAMINATION

## Part III: Doctor of Philosophy / Doctor of Education Degree (Approved by Graduate Council April 2, 2009)

## SUPERVISORS AND SUPERVISORY COMMITTEES

### 1.0 Selection of a Supervisor

#### 1.1 General Advice to Students

All students must have either an interim advisor or an approved Supervisor at the time of first registration, and a permanent Supervisor no later than the second annual registration. It would help the student in program planning if the selection of a Supervisor were completed as quickly as possible. Students are encouraged to think about and select their areas of specialization as early as possible, and preferably before beginning the program.

#### 1.2 Supervisor Selection

The initial selection of a Supervisor should be by mutual agreement between student and faculty member, and approved by the Graduate Director. Difficulties or conflicts in selecting or recommending a Supervisor should be referred promptly to the Dean by any of the persons involved.

##### 1.2.1 Supervisor Eligibility Requirements

Continuity of supervision throughout a graduate program is important to a student's success. Normally, faculty members with Continuing Board appointments in the professorial ranks are chosen as Supervisors. However, there are occasions when it is to the student's advantage for a program to recommend the appointment of a Supervisor who does not have a Continuing Board appointment. For example, an individual who holds an appointment that is Specific Term (Contingent, Limited Term, Term Certain), Clinical or Adjunct, or Honorary, or has Emeritus status, or is from outside the University, may be appointed Supervisor. In cases such as these, the Faculty of Graduate Studies requires assurance that the proposed Supervisor will be able to provide continuity.
The proposed Supervisor must understand the commitment expected in terms of time and funding and be familiar with current graduate program and Faculty of Graduate Studies regulations. The Graduate Director must ensure that supervision will be provided for the probable time period required for the completion of the degree program.
If the proposed Supervisor is someone from outside the graduate program who does not have a Continuing Board appointment, or is from outside the University of Calgary, a Co-supervisor must be appointed.
The Supervisor should be currently active in research in an area related to the student's interest. Faculty members working on their own graduate degrees cannot be approved in any supervisory capacity without special dispensation from the Dean. For detailed policy and the required forms, see http://www.grad.ucalgary.ca > Policies and Procedures.

##### 1.2.2 Conflict of Interest

The relationship between Supervisor and student is an academic one. Where other relationships exist or develop that might give the appearance of conflict of interest they must be immediately reported to the Graduate Director who can consult with an Associate Dean or the Dean if the Graduate Program Director is unable to resolve the situation. (See Graduate Studies Conflict of Interest Policy: http://www.grad.ucalgary.ca//policies/conflictofinterest ).

#### 1.3 Appointment of Co-supervisor

In addition to those cases noted above in which it is required that a Co-supervisor be appointed, a Co-supervisor may be appointed by the Graduate Director upon the written recommendation of the Supervisor and agreement of the student. The role of the Co-supervisor in this case is to provide supplementary guidance, instruction and research stimulation on a regular or extensive basis.

#### 1.4 Supervisor or Co-supervisor from Outside the Department, Program, or Faculty

A Supervisor or Co-supervisor may be from a department, program, or faculty other than the student's home department, program, or faculty. The recommendation must be endorsed by the student. The faculty member's home program should be notified by the relevant Graduate Director whenever the faculty member is asked to supervise or co-supervise outside the home program. Such an "external" Supervisor or Co-Supervisor must agree to be responsible to the Graduate Director of the student's home department in all matters related to the supervisory responsibilities.

#### 1.5 Continuity of Supervision

Students are entitled to continuity of supervision. In the case of the resignation from the University, illness or death of the Supervisor, the Graduate Director must make immediate arrangements to provide continuity of supervision pending the appointment of a new Supervisor.

#### 1.6 Supervisor Selection and Approval Deadlines

Regular students are required to have approved Supervisors within twelve months of initial registration. Doctoral students admitted as special case admissions must have an approved Supervisor and Supervisory Committee before admission.

### 2.0 Responsibilities of Supervisors

#### 2.1 Knowledge of Rules and Procedures

Supervisors should be familiar with the rules and procedures of the Faculty of Graduate Studies and program regulations and requirements.

#### 2.2 Meetings between Student and Supervisor

A student and Supervisor have a shared responsibility to meet on a regular basis.

### 2.3 The Role of the Supervisor

The Supervisor should act both as a general academic mentor, with emphasis on guidance, instruction, and encouragement of scholarship and research, and as a judge of the student's performance. Because of their own involvement in research and related professional activities, Supervisors should provide professional guidance and research stimulation to their students. A fundamental duty of the Supervisor is to impart to the student the skills necessary to plan and conduct original research.

Specifically, the Supervisor should:

Work with the student to establish a realistic timetable for the completion of the various requirements of the program of study; discuss with the student and establish mutual expectations for the student's vacation time;

Develop a relationship with the student conducive to research and intellectual growth;

Guide the student in the pursuit of knowledge and provide constructive criticism in support of the highest standards of research and professional development.

### 2.4 Participation of Supervisor in Thesis Preparation

The Supervisor is expected to provide frequent and prompt comments on drafts of the thesis and should attempt to be critically constructive and encouraging but the thesis must be the creation of the student.

### 2.5 Supervisory Provision for Leave of Absence (Approved by FGS Council: June 4, 2009)

A program and Supervisor must ensure that the student is provided with adequate supervision during a Supervisor's leave, potentially through the appointment of an interim Supervisor. In doctoral programs, the interim Supervisor should be a member of the Supervisory Committee. Students should be informed well in advance about the Supervisor's plans for forthcoming leaves of absence. With current means of communication, continued supervision while on a research and scholarship leave is the expectation for faculty members. These arrangements must be communicated in writing to the Graduate Director, who bears the responsibility for ensuring continuity of supervision for students in his/her graduate program.

#### 2.5.1 Interim Supervisory Arrangements

When an interim Supervisor is appointed to cover a period of a Supervisor's absence, the regular Supervisor retains final responsibility for the adequate supervision of the student. Faculty members approved as interim Supervisors must indicate in writing to the Graduate Director their willingness to accept responsibility for the day-to-day supervision of such students.

### 2.6 The Supervisor and Setting up Examinations

The Supervisor is responsible for scheduling the candidacy examination and the thesis oral examination.

### 2.7 Suggested Procedures in the Event of Problems between Graduate Students and Their Supervisors

Students should first try to resolve problems with Supervisors by talking to the Supervisor. Supervisory Committee members might be able to give helpful advice in this situation. Problems that are not resolved in this fashion should be discussed with the Graduate Director, and then the Department Head or equivalent. If it appears that a solution cannot be reached, the student and/or the Graduate Director may consult the Faculty of Graduate Studies for advice about a resolution of the matter.

### 2.8 Procedures for the Curtailment of Supervisory Duties

The Dean of Graduate Studies approves the initial appointment of a faculty member to supervisory duties. If a complaint is made against a Supervisor, the Dean will first discuss the matter with the Department Head or equivalent, and then with the faculty member concerned. The issue may be resolved informally. If the Dean decides that a more formal approach is needed to resolve the dispute, the Dean will inform both the Head and the faculty member of his/her conclusions in writing. If the result of the Dean's investigation is curtailment of the supervisory duties of the faculty member, the Dean will inform the faculty member in writing.

## 3.0 Doctoral Supervisory Committee

### 3.1 Composition of the Supervisory Committee

The Supervisor and Graduate Director must inform the Faculty of Graduate Studies of the Supervisory Committee composition no later than three months after the appointment of the Supervisor.

The Supervisory Committee should be constituted by the Supervisor in consultation with the student. It will normally consist of the Supervisor and two members, and must be approved by the Graduate Director and sent to the Faculty of Graduate Studies for information. Committee members may be external to the student's program. At least one of the members of the Supervisory Committee should have had supervisory experience at the doctoral level. If a Co-supervisor and a Supervisor are appointed, the Supervisory Committee will require two other members.

### 3.2 Non-Board Appointees on Supervisory Committee

Persons who are not Board appointees of the University of Calgary may be approved to serve on supervisory committees. A recommendation to the Dean by the Graduate Program Director for such an appointment must be accompanied by a curriculum vitae.

### 3.3 Duties of a Supervisory Committee

Members of a doctoral Supervisory Committee should provide support to both the student and the Supervisor by expanding the range of expertise and experience available to advise and assess the student. Members should provide constructive criticism and discussion of the student's ideas, methods and performance as the program develops; should be accessible to the student for consultation and discussion; should suggest other sources of information to the student; and must participate in examinations and in periodic meetings with the student and provide regular assessment of the student's progress as required by the program regulations.

# THE DOCTORAL THESIS

## 4.0 Thesis Quality Requirements

The doctoral thesis must embody original work conducted while in program, and must constitute a significant contribution to knowledge. It should contain evidence of critical understanding of the relevant literature. The material embodied in the thesis should merit publication.

The general form and style of thesis may differ from program to program but a thesis should be a coherent document. This means that if a thesis contains separate manuscripts, there needs also to be introductory and concluding chapters that explain how these separate manuscripts fit together into a unified body of research. If previously published materials are included, it should be made clear what exactly is the student's own work and what the contribution of other researchers is.

While it is expected that the thesis could be the basis for a publication, the Supervisor and examiners should recognize that even an excellent thesis might not be perfect in all respects. 'Perfection' is not a prerequisite for acceptance of the thesis as a "partial fulfilment of the requirements for the degree". The thesis may vary in quality from passable to outstanding.

For information on formatting, printing, binding and distribution of theses, see the *Thesis Guidelines* at http://www.grad.ucalgary.ca >Policies and Procedures > Thesis.

# EXAMINING COMMITTEES, EXAMINATIONS AND STANDARDS

## 5.0 Standards of Performance

### 5.1 Judgement of Student Performance

Supervisors and Graduate Directors must inform students on a regular basis about their academic progress. If a student's performance is judged to be below an acceptable level, this judgement should be expressed to the student formally and in writing at as early a stage in the program as possible. A student may be required to withdraw from the Faculty of Graduate Studies for reasons of "unsatisfactory progress" (see also section 6.2).

### 5.2 Annual Progress Report

The Supervisor and each continuing student must jointly submit an annual progress report on the student's performance. This form must be signed by the Supervisor, the Graduate Director, and the student, and must be forwarded to the Faculty of Graduate Studies. The student must sign the report after the Supervisor and the Graduate Director have completed their comments to acknowledge that he/she has reviewed these comments.

## 6.0 Faculty of Graduate Studies Examinations

### 6.1 Faculty Examination Requirements

The Faculty of Graduate Studies requires that candidates for doctoral degrees sit both an oral candidacy examination and a thesis oral examination. Examiners may participate by teleconference or video conference (including Voice over Internet Protocol services): telephone backup must be available for video conference examinations.

#### 6.1.1 Faculty Regulations for Candidacy Oral Examinations

Candidacy oral examinations are examinations of the Faculty of Graduate Studies. No changes in the composition of the examination committee may be introduced without prior approval from an Associate Dean of Graduate Studies or the Dean of Graduate Studies. The Faculty of Graduate Studies must be informed of changes in the scheduling of the examination.

#### 6.1.2 Faculty Regulations for Thesis Examinations

Thesis oral examinations are examinations of the Faculty of Graduate Studies. No changes in the composition of the examination committee may be introduced without prior approval from an Associate Dean of Graduate Studies or the Dean of Graduate Studies. The Faculty of Graduate Studies must be informed of minor changes in the scheduling of the examination (e.g., for illness or weather). Changes of more than two weeks will need prior approval by the Faculty of Graduate Studies.

### 6.2 Program Examination Requirements and Standards

Program requirements may include examinations that are in addition to the Faculty of Graduate Studies requirements. Programs are entitled to set their own standards of adequate performance in such examinations, provided these are not in conflict with Faculty of Graduate Studies standards. When a student fails to meet either Faculty or program standards, the program may recommend to the Dean of Graduate Studies that the student be required to withdraw. (See also section 5.1).

### 6.3 Communication of Examination Requirements to Students

Programs should provide their students, as early as possible, with information about the precise nature and form of program examinations and tests.

## 7.0 Admission to Candidacy

Admission to candidacy is an acknowledgement that a student is fully prepared to devote his/her full attention to the dissertation research. For admission to candidacy, the Faculty of Graduate Studies requires that (1) all mandatory course work has been completed,[3] (2) an oral candidacy examination has been successfully passed, and (3) a dissertation research proposal has been approved by the student's Supervisory Committee. Programs may require the examination and proposal to be completed in any order, including approval of the proposal within the examination.

Although the oral candidacy examination is the official Faculty of Graduate Studies examination, graduate programs have the option of adding a written component. If there is a written component, the period during which the written examination and the oral examination are conducted must not exceed one month. The written examination should be circulated among the examiners and may serve as a basis for questioning at the oral. If the student fails the written component of the candidacy examination, the oral examination should still go ahead as scheduled in order to give the candidate an opportunity to defend the written answers, as well as deal with other questions.

For further information, review *Guidelines: Chairing Oral Thesis and Candidacy Examinations*, at http://www.grad.ucalgary.ca > Policies and Procedures > Examinations.

### 7.1 Rationale for Candidacy Examinations

The candidacy examination should focus on the background knowledge of students in their discipline, as well as their preparedness to conduct research of high quality in their particular fields of study.

### 7.2 Program Guidelines and Regulations

Although the candidacy examination is a Faculty of Graduate Studies examination, individual programs determine the precise requirements. All programs must have written guidelines describing the examination regulations and the timing of the dissertation research proposal relative to the candidacy examination. These guidelines and regulations must be given to doctoral students as soon as they enter the program.

### 7.3 Assessment of the Candidacy Examinations

Assessment of the candidacy examination must take place immediately following the completion of the oral candidacy examination. This assessment should be based on the candidate's overall performance in all components of the examination.

### 7.4 Candidacy Examination and Course Work

All required course work must have been completed prior to the candidacy examination.[4] No further course work may be required of a student who has successfully completed the candidacy examinations, but a student may elect to complete additional courses subject to approval by the Graduate Director.

[3] Exceptions apply to students in Clinical Psychology (CPSY) and Applied Psychology (APSY).

[4] Exceptions apply to students in Clinical Psychology (CPSY) and Applied Psychology (APSY).

### 7.5 Deadlines for Admission to Candidacy

A student entering a doctoral program with a completed Master's degree must attempt the candidacy examinations and submit a research proposal acceptable to the Supervisory Committee no later than twenty-eight months after initial registration in the doctoral program. A student entering a doctoral program with a bachelor's degree, or transferring into a doctoral program from a Master's program before the Master's program is completed, must attempt the candidacy examinations and submit a research proposal acceptable to the Supervisory Committee no later than thirty-six months after initial registration in the Faculty of Graduate Studies.

### 7.6 Establishing the Candidacy Examination Committee

A written recommendation to the Dean of Graduate Studies on the composition of the candidacy examination committee must be received in the Faculty of Graduate Studies office at least four weeks before the scheduled date of the examination. The committee will not be approved by the Faculty of Graduate Studies earlier than three months before the planned examination date.

### 7.7 Composition of the Candidacy Examination Committee

Normally, the Candidacy Examination Committee consists of the Supervisory Committee plus two additional members recommended by the Graduate Director who shall ensure that no conflict of interest exists between the student or the Supervisor and the additional members of the examination committee. (See Graduate Studies Conflict of Interest Policy: http://www.grad.ucalgary.ca//policies/conflictofinterest . Normally, the Supervisor is a voting member, but a graduate program may choose to have the Supervisor attend as a non-voting observer. The *Graduate Calendar* notes programs that have chosen this option.

#### 7.7.1 Neutral Chair of the Candidacy Examination Committee

The examination is chaired by a member of the academic staff appointed by the Graduate Director. The Neutral Chair is not a member of the examining committee and is non-voting.

#### 7.7.2 Responsibilities of the Supervisor and the Neutral Chair

The Supervisor arranges scheduling of the examination. The Neutral Chair presides over the candidacy examination and reports the results to the student. The Neutral Chair gives the report to the Graduate Director, who ensures that it is submitted to the Faculty of Graduate Studies within 24 hours of the examination.

#### 7.7.3 Non-Board Appointees on Examination Committee

Persons who are not Board appointees of the University of Calgary may be approved to serve on candidacy examination committees. A recommendation to the Dean by the Graduate Director for such an appointment must be accompanied by a curriculum vitae.

### 7.8 Notice of Candidacy Oral Examination

The official *Notice of Candidacy Oral Examination* form must be received in the Faculty of Graduate Studies office at least four weeks before the time of examination. The form identifies the time and place of the examination, the names of the recommended members of the examination committee, and by the signature of the Graduate Director confirms that the candidate has completed course requirements.[5] The membership of the examination committee must be approved by the Faculty of Graduate Studies.

### 7.9 Attendance at Candidacy Oral Examinations

The candidacy oral examination is a formal examination limited to the examination committee and the student. The Dean of Graduate Studies or Dean's representative and the Department Head or equivalent, or designate, may attend without prior notice.

## 8.0 Conduct of Candidacy Oral Examination

### 8.1 Examination Regulations

No one other than a member of the examination committee is allowed to question the candidate. All examiners should be given an opportunity to question the candidate during the early part of the examination, e.g., by rounds of questioning.

### 8.2 Suggested Examination Procedure

Questions to the candidate should be clear and succinct. The student should be given reasonable time to answer. If the student has understood the question and cannot answer, the examiner should pass to another question and not attempt to extract an answer by prolonged interrogation, or by leading the candidate. The chair should guard against any tendency of examiners to interact with each other instead of concentrating on the examination of the candidate.

### 8.3 Length of Examination

The candidacy examination should not exceed two hours. This does not include the deliberation time of the Committee.

## 9.0 Post Candidacy Oral Examination Procedures

### 9.1 Official Examiners' Discussion

At the end of the candidacy examination, the student is asked to withdraw from the room. If the program has chosen to allow the Supervisor to attend the examination as a non-voting observer, at the end of the candidacy examination the student and the Supervisor are asked to withdraw from the room. Before any discussion of the candidate's performance, each examiner must identify, by secret ballot, which recommendation (pass/fail) he/she favours. This procedure provides the committee with a frame of opinion upon which to base a full discussion of the student's performance. The examiners then conduct a post-examination discussion, in which the Department Head or equivalent, or designate (e.g., Graduate Director), and the Dean of Graduate Studies or the Dean's representative may participate, although they have no vote.

[5] Exceptions apply to students in Clinical Psychology (CPSY) and Applied Psychology (APSY).

### 9.2 Recommendation of the Candidacy Examination Committee

After the final vote, each examiner must record a recommendation of pass or fail on the official Faculty of Graduate Studies *Report of Candidacy Oral Examination* form. Every effort should be made to reach a unanimous recommendation. Should the outcome of the final vote include one negative vote, the candidate will pass. Should the outcome include two or more negative votes, the committee's recommendation to the Dean of Graduate Studies will be "fail".
The final decision will be at the discretion of the Dean of Graduate Studies. Should the Dean of Graduate Studies uphold the recommendation of "fail," the student will be allowed a retake of the examination. Within five working days of the failed examination, the Neutral Chair must submit a written report of the examination procedures to the Dean of Graduate Studies and copy it to the Graduate Director. Within five working days of the examination each committee member must provide a confidential written report to the Dean of Graduate Studies explaining the reasons for his/her vote and copy it to the Graduate Director and the Supervisor. After consultation with the Supervisor, the Graduate Director then summarizes the essential points to the student, copied to the Supervisor.
The Neutral Chair must inform the student of the committee's recommendation immediately following the vote of the examination committee. The Neutral Chair will record the final recommendation of pass or fail on the *Report of Candidacy Oral Examination* form which must be submitted to the Dean of Graduate Studies within one working day of the completion of the examination.

### 9.3 Re-take of Candidacy Examination

Only one re-take of a candidacy examination will be permitted. The re-take must take place no sooner than two months and no later than six months from the date of the first examination. Normally the composition of the committee will remain the same. In reporting the results of the second examination, the committee will be limited to recommending either a pass (i.e., no more than one negative vote), or fail. A recommendation of "fail" requires that, within five working days, each examiner must submit a confidential written report to the Dean of Graduate Studies, copied to the Graduate Director and the Supervisor, detailing the reasons for his/her vote. Within five working days, the Neutral Chair must also submit a written report of the examination procedures to the Dean of Graduate Studies, copied to the Graduate Director. If the Dean of Graduate Studies upholds the recommendation to fail, the student will be required to withdraw from the Faculty of Graduate Studies.

## 10.0 Thesis Oral Examinations

### 10.1 Right of Student to Submit and Defend Thesis

A student who has successfully completed all Faculty of Graduate Studies and program requirements has the right to submit and defend a thesis even if doing so may be contrary to the advice of the Supervisor.

### 10.2 Composition of the Thesis Oral Examination Committee

The thesis oral examination committee shall consist of the student's Supervisory Committee and at least two other examiners, one of whom shall be external to the student's home program and the other external to the University. The composition of the committee must be approved by the Dean, upon the recommendation of the Graduate Director. The Dean may approve a recommendation that the examiner external to the University not attend the thesis oral examination in person, but participate electronically, by teleconference or videoconference. In rare cases, the Dean may approve a recommendation that the examiner external to the University not participate in the oral examination in person, but furnish the examination committee with a list of questions to be put to the candidate together with a detailed appraisal of the thesis. When acting in this capacity, the examiner external to the University is designated the external reader.

#### 10.2.1 Examiner External to the University

The Graduate Director must recommend the examiner external to the University to the Dean at least six weeks before the proposed date of the examination on the form *Approval of External Examiner or Reader,* accompanied by a curriculum vitae. For further guidelines on external examiners and readers, refer to http://www.grad.ucalgary.ca > Policies and Procedures > Examination.

#### 10.2.2 Relationship of the Examiner External to the University to the Student

In order to ensure impartiality, the proposed Examiner must not be a close personal friend of the candidate's Supervisor, have collaborated with the Supervisor in the last five years, be closely related to the candidate, nor have worked with the candidate, and must not have been a Supervisor in the candidate's graduate program for the last three years. If any of the criteria are not met, the proposed Examiner is not necessarily precluded from serving, but the graduate program must clearly explain the circumstances to the Faculty of Graduate Studies.

#### 10.2.3 Non-Board Appointees on Examination Committees

Persons who are not Board appointees of the University of Calgary may be approved to serve on thesis oral examination committees. A recommendation to the Dean of Graduate Studies by the Graduate Director for such an appointment must be accompanied by a curriculum vitae.

#### 10.2.4 The Neutral Chair

The examination is chaired by a neutral member of the academic staff appointed by the Graduate Director. He/she is not a member of the examining committee and is non-voting.

#### 10.2.5 Responsibilities of the Supervisor and the Neutral Chair

The Supervisor arranges scheduling of the examination. The Neutral Chair presides over the thesis oral examination and reports the results to the student. The Neutral Chair gives the report to the Graduate Director who ensures that it is submitted to the Faculty of Graduate Studies within 24 hours of the examination.

### 10.3 Composition of Examination Committee for Re-take of Thesis Oral Examination

Normally, the composition of the examination committee will remain the same. Upon the recommendation of the Graduate Director and approval of the Faculty of Graduate Studies, an examiner may be replaced.

#### 10.3.1 Appointment of Examination Committee for Re-take of Examination

The *Notice of Thesis Oral Examination* must be received in the Faculty of Graduate Studies office at least four weeks prior to the time of the examination. Should a new examiner external to the University be recommended, the Faculty of Graduate Studies must receive the recommendation at least six weeks before the proposed date of the examination on the form *Approval of External Examiner or Reader*, accompanied by a curriculum vitae.

## 11.0 Scheduling the Thesis Oral Examination

### 11.1 Supervisor Responsibility

The Supervisor is responsible for all steps in setting up the thesis oral examination.

### 11.2 Notice of Thesis Oral Examination

The official *Notice of Thesis Oral Examination* form, indicating the title of the thesis, the time and place of the examination, the names of the recommended members of the examination committee, and confirming that the candidate has completed all program requirements[6] to proceed to oral examination, endorsed by

[6] Exceptions apply to students in Clinical Psychology (CPSY) and Applied Psychology (APSY).

the Graduate Program Director, must be received in the Faculty of Graduate Studies office at least four weeks prior to the time of the examination. The membership of the examination committee must be approved by the Faculty of Graduate Studies.

11.2.1 Posting the Notice of Thesis Oral Examination

A *Notice of the Thesis Oral Examination* form, bearing the names, but not signatures of the student, the Supervisor, the Graduate Director and the Dean of Graduate Studies, or designate, must be posted at least two weeks before the date of the examination. The Graduate Director must ensure that copies of the *Notice* are sent to the student and to members of the examination committee.

11.2.2 Student Approval of Designated Area of Specialization

The format of the University degree parchment presented to successful candidates shows the degree, the department or area of study, and the approved area of specialization. Students should ensure that the approved area of specialization identified on the *Notice of the Thesis Oral Examination* form is correct, before it is sent to the Faculty of Graduate Studies.

### 11.3 Form of Thesis

The thesis submitted to the members of the examination committee for final examination must be in all respects a final, complete copy and not a draft.

### 11.4 Thesis to Examiners

The student must ensure that the thesis is in the hands of the examiners (including the examiner external to the University) at least three weeks prior to the proposed date of the oral examination. The examination begins when the thesis is distributed. The examiners should not discuss the thesis or their evaluation of it with each other (or anyone else) prior to the oral examination. The *Examiner's Report* is considered a confidential document and must not be shared with the candidate or the other examining committee members before the final decision of the examining committee.

### 11.5 Format of Final Thesis Oral Examination

Normally, final thesis oral examinations are open, but only the examiners may question the student. The examiners' deliberations are private and confidential. Only the Neutral Chair, the examining committee, and, if present, the Department/Program Head and the Dean of Graduate Studies or the Dean's Representative may be present.

## 12.0 Conduct of Thesis Oral Examination

### 12.1 Examiner's Report on Thesis (Approved by FGS Council: Nov. 2, 2009)

Before the oral examination, each examiner is required to prepare an assessment of the thesis, on the official *Examiner's Report on Thesis* form. The oral examination cannot proceed until all of the Examiners' Reports are submitted to the Neutral Chair. These assessments are to be submitted to the Neutral Chair of the examination committee before the oral examination begins. The assessments are CONFIDENTIAL: they are not to be made available to the student or to the examination committee before the final recommendation of the examination committee. After the examination, the Neutral Chair should submit the reports to the Graduate Director who ensures that they are forwarded to the Faculty of Graduate Studies. After the examination, the graduate program must make the Examiners' Reports available to the student, upon request.

### 12.2 Examination Regulations

12.2.1 Formal Examination

The oral examination is a formal examination, not an informal discussion with the candidate.

12.2.2 Questioning of the Candidate

No one other than an examiner (as identified on the *Notice of Thesis Oral Examination* form) is allowed to question the candidate. All examiners must be given an opportunity to question the candidate early in the examination, e.g., by rounds of questioning.

12.2.3 Length of Examination

Ordinarily, the oral examination should not exceed two hours. This does not include deliberation time of the committee.

12.2.4 Editorial Comments on Thesis

Examiners' editorial comments on the thesis should not be discussed at the oral examination. It is recommended that each examiner hand the student a list of any such comments for post-examination final thesis revisions.

### 12.3 Suggested Examination Procedures

12.3.1 Opening Summary

It is common practice to ask the student to present a brief (up to fifteen minutes) opening summary of the thesis. Although this is not mandatory, students may appreciate the opportunity to introduce their research work and summarize its significance.

12.3.2 Questions to the Candidate

Questions to the candidate should be relevant to the subject matter of the thesis, and should be clearly and succinctly phrased in order to minimize doubt in the candidate's mind as to what is being asked. The student should be given reasonable time to answer. If the student has understood the question but cannot answer, the examiner should pass to another question and not attempt to extract an answer by prolonged interrogation. The chair should guard against any tendency of examiners to interact with each other instead of concentrating on the examination of the candidate.

## 13.0 Post Thesis Oral Examination Procedures

### 13.1 Provisional Recommendations

At the end of the thesis oral examination, everyone except the Neutral Chair, the members of the examination committee, the Department/Program Head or designate and the Dean of Graduate Studies and/or Dean's representative, is required to withdraw from the room. Before any discussion of the candidate's performance, each examiner must identify, by secret ballot, whether he/she favours recommending a pass or fail on each of the thesis and the oral defence. This procedure provides the committee with a frame of opinion upon which a full discussion of the student's performance may then be based.

### 13.2 Official Examiners' Discussion

Following a count of the straw vote the Neutral Chair will facilitate a post-examination discussion, in which the Department/Program Head and the Dean of Graduate Studies or their representatives may participate, although they have no vote. At the conclusion of the discussion, each examiner must write his/her final recommendations on the official *Report of Doctoral Thesis Examination* form. Unanimous decisions are required for both the thesis and the oral defence. If the examiners are unable to achieve unanimity regarding one or both components, there must be no further discussion regarding that component of the examination and the Neutral Chair must immediately inform the Dean of Graduate Studies of "lack of unanimity." The final decision will be at the discretion of the Dean of Graduate Studies.

### 13.3 Recommendation of Examination Committee

Thesis oral examinations are designed to establish a level of achievement consistent with the standards of the Faculty of Graduate Studies as outlined in section 4, "Thesis Quality Requirements." The following section (13.4) defines the official Faculty recommendations to the Dean of Graduate Studies respecting outcomes of thesis oral examinations. In each case, the committee recommendations must be reported to the Dean on the official *Report of Doctoral Final Examination* form within one working day of the completion of the examination. Immediately following the conclusion of the examination, the Neutral Chair must report the outcome to the student.

### 13.4 Recommendations

Thesis examinations must be judged to be either acceptable or unacceptable with respect to the thesis itself and, with respect to the oral defence, if the thesis is judged acceptable.

#### 13.4.1 Recommendation for the Thesis

If the unanimous final decision is that the thesis conforms to the requirements for a doctoral thesis (see section 4) then all members of the examination committee shall sign the signature page except the Supervisor, who will sign after reviewing and approving any necessary minor corrections on behalf of the committee.

If the unanimous final decision is that the underlying research reported in the thesis is judged to be sound, but the presentation of or analysis in the research requires attention that one or more members of the examination committee wish to review personally, then those members will not sign the approval page until they have seen and approved the revisions. Other members of the committee should sign immediately after the examination. The Report of the examination should specify who has withheld his/her signature.

If the examining committee unanimously determines that the underlying research is not acceptable, then the examination committee recommends a failed thesis to the Dean of Graduate Studies. The final decision will be at the discretion of the Dean of Graduate Studies. Should the Dean of Graduate Studies uphold the recommendation of "fail", the candidate will have a second opportunity to present and defend an acceptable thesis. No judgment should be made on the oral defence, because the revised thesis will need to be defended anew.

If the examiners fail to arrive at a unanimous final recommendation, the Neutral Chair must adjourn discussion on this component of the examination, and that same day inform the Dean of Graduate Studies of "lack of unanimity." The final decision will be at the discretion of the Dean of Graduate Studies.

For either a unanimous decision to fail the thesis or a lack of unanimity, within five working days the Neutral Chair must submit a written report to the Dean of Graduate Studies, describing the examination procedures and copy it to the Graduate Director. Within five working days, each examination committee member must provide a confidential written report to the Dean of Graduate Studies explaining the reasons for his/her recommendation and copy it to the Graduate Director and the Supervisor. After consultation with the Supervisor, the Graduate Director then summarizes the essential points in a written report to the student, copied to the Supervisor.

In the case of a failed thesis, whether by committee or Dean's decision, only one re-submission will be allowed and a new defence will be required. In view of the magnitude of the revisions required, a second oral exam must be held no sooner than six months and no later than twelve months from the date of the first examination. This new examination will normally be conducted by the original examination committee.

In reporting the results of the second examination, the committee will be limited to recommending either pass or fail. A recommendation for "fail" requires that each examiner submit within five working days a confidential written report to the Dean of Graduate Studies, copied to the Graduate Director, and the Supervisor detailing the reasons for his/her assessments. Within five working days, the Neutral Chair must also submit a written report of the examination procedures to the Dean of Graduate Studies, copied to the Graduate Director. If the Dean of Graduate Studies upholds the recommendation to fail, the student will be required to withdraw from the Faculty of Graduate Studies.

#### 13.4.2 Recommendation for the Oral Defence

If the unanimous final decision is that the oral defence is acceptable, the recommendation regarding the oral defence is a pass.

If the examining committee unanimously determines that the oral defence is not acceptable, then the examining committee recommends a failed oral defence to the Dean of Graduate Studies. The final decision will be at the discretion of the Dean of Graduate Studies. Should the Dean of Graduate Studies uphold the recommendation of "fail", the candidate will be allowed a second, final attempt to present an acceptable oral defence of the thesis.

If the examiners fail to arrive at a unanimous final recommendation, the Neutral Chair must adjourn discussion on this component of the examination, and that same day inform the Dean of Graduate Studies of "lack of unanimity." The final decision will be at the discretion of the Dean of Graduate Studies.

For either a unanimous decision to fail the oral defence or a lack of unanimity, within five working days the Neutral Chair must submit a written report to the Dean of Graduate Studies, describing the examination procedures and copy it to the Graduate Director. Within five working days, each examination committee member must provide a confidential written report to the Dean of Graduate Studies explaining the reasons for his/her recommendation and copy it to the Graduate Director and the Supervisor. After consultation with the Supervisor, the Graduate Director then summarizes the essential points in a written report to the student, copied to the Supervisor.

In the case of a failed oral defence, whether by committee or Dean's decision, the candidate will be given only one further opportunity to present an acceptable defence. The second oral examination will be scheduled and normally heard by the original examination committee not later than six months from the date of the first examination. Any necessary revisions to the thesis must be completed by the candidate and approved by the committee before the second oral examination is scheduled.

In reporting the results of the second oral examination, the committee will be limited to recommending either pass or fail. A recommendation for "fail" requires that each examiner submit within five working days a confidential written report to the Dean of Graduate Studies, copied to the Graduate Director, and the Supervisor, detailing the reasons for his/her assessments. Within five working days, the Neutral Chair must also submit a written report of the examination procedures to the Dean of Graduate Studies, copied to the Graduate Director. If the Dean of Graduate Studies upholds the recommendation to fail, the student will be required to withdraw from the Faculty of Graduate Studies.

### 13.5 Dean's Action in Lack of Unanimity

When the Neutral Chair of a thesis oral examination does not report a unanimous recommendation, the Dean of Graduate Studies may consult with the Graduate Director, the Supervisor, and the examiners before making a decision. At her/his discretion, the Dean of Graduate Studies may consult with the student as well. A decision should normally be made within seven business days of receiving all the required post-examination reports, and all persons involved informed in writing of the result of the decision.

### 13.6 Exam Procedural Irregularities UPDATED

Any procedural irregularities should be reported to the Dean of Graduate Studies within 5 working days of the examination date, regardless of the outcome of the exam.

### 13.7 Convocation Clearance UPDATED

The names of the candidates who have successfully completed the final thesis oral examination will not be added to the convocation list until the Faculty of Graduate Studies receives two unbound copies of the thesis and a *Departmental Clearance Form*. Students will continue to be assessed continuing fees until cleared for convocation.

## TRANSFERS

## 14.0 Transfers Within Program

### 14.1 Application for Change of Area of Specialization

A student may apply through the graduate program to the Dean for permission to transfer from one area of specialization to another while remaining within the degree program. Such application must be made prior to the candidacy examination.

## 15.0 Transfers to Master's Programs

### 15.1 Transfer from Doctoral to Master's Program

A transfer from a doctoral program to a Master's program, within closely related areas of specialization, may be recommended where, in the opinion of the Graduate Director and the Supervisor, such a transfer is in the best interest of the student. Such application should normally be made before the candidacy examination. Transfers may be approved if the student is unsuccessful in the candidacy oral examination on the first attempt. The Dean of Graduate Studies and the Graduate Director of the Master's program to which the student transfers must approve the transfer.

### 15.2 Course and Examination Requirements

Courses credited to the doctoral program may be accepted as fulfilling Master's course requirements where applicable, in accordance with program regulations for required Master's course work. Such a student must complete all requirements for the Master's degree.

### 15.3 Time Limits on Transfers

Transfers from a doctoral to a Master's program should normally be completed no later than the beginning of the student's third annual registration year. All transfer students must complete the Master's degree program within their fourth registration year.

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# HANDBOOK OF SUPERVISION AND EXAMINATION

## Part IV: Policy Governing the Relationship Between Supervisor and Student (Approved by Graduate Council May 7, 2009)

### Introduction

This document addresses the nature of supervisory relationships between graduate students and their Supervisors at the University of Calgary and clarifies the mutual obligations of all parties involved in the graduate supervision process. This document applies to supervisory relationships in both thesis and, where applicable, course-based programs.

This document is divided into two parts. Part One outlines the responsibilities of the Faculty of Graduate Studies (FGS), the graduate program, the Supervisor, and the student. Part Two focuses upon the process that should be followed if conflicts arise between a student and Supervisor.

PART ONE

### The Faculty of Graduate Studies

Specific responsibilities of the Faculty of Graduate Studies with regard to graduate supervision are as follows:

(a) to act as an advocate for graduate students and graduate programs within and outside the university, and to seek to establish and maintain a climate which promotes academic excellence and expeditious completion of graduate programs;
(b) to offer mechanisms for the resolution of graduate student/Supervisor disputes and other supervisory issues which cannot be settled at the program level;
(c) to advise regarding intellectual property, publication of materials, equity issues, scholarly integrity and other relevant policies and procedures at the University of Calgary

### The Graduate Program

The role of the graduate program is to create a supportive environment within which scholarly work by graduate students can prosper, to provide available resources to support graduate students, and to resolve problems in an expeditious manner. Specific responsibilities are as follows:

(a) to make available to faculty and students a graduate student handbook or collected documents that include current course information, areas of expertise of faculty members, program requirements, funding policies, teaching assistantships, appeal mechanisms, and procedures for progress and completion of Master's and doctoral programs;
(b) to make available to students relevant non-confidential information on potential Supervisors (e.g., number of current graduate students, funding, time to completion of previous students);
(c) to set up procedures that match students and Supervisors, with the matching to be completed as quickly as possible and in all cases within twelve months of initial registration; a student should not be admitted unless an appropriate Supervisor is available;
(d) to make available a mail delivery point and, wherever possible, desk space;
(e) to monitor progress of the student through ensuring that Annual Progress Reports are completed on time, and to ensure that the student and Supervisor understand that the Annual Progress Report is a critical component of documenting whether the student's performance is satisfactory;
(f) to inform FGS promptly should there be unresolved concerns about either the Supervisor's effectiveness or the student's performance;
(g) to establish clear and fair procedures for such matters as funding, teaching assistantships, and examinations;
(h) to ensure compliance with University of Calgary policies regarding ownership and utilization of data;
(i) to ensure that supervising arrangements are made when research supervisors are absent;
(j) to ensure that the graduate program is free from harassment and discrimination, and that the program's policies and procedures can accommodate diverse student needs and special circumstances;
(k) to ensure that international students and their Supervisors are made aware of current legislative requirements as defined by Citizenship and Immigration Canada (http://www.cic.gc.ca/) so that applicable student visas and employment authorizations are applied for in a timely fashion and maintained throughout the period of registration in the program;
(l) to ensure that current information is made available to eligible students in regard to deadlines and procedures for awarding graduate and postdoctoral fellowships, GAT's, GTF's, and other graduate funding;
(m) to encourage the interaction of graduate students with other students and faculty, and the development of a professional identity through research seminars, posting of conferences, and other means;
(n) to maintain an atmosphere conducive to creativity and productivity, and to provide mechanisms for resolving problems which may arise between graduate students and their Supervisors or members of Supervisory Committees;
(o) to provide an avenue whereby students can inform the program of areas where it might be improved.

### The Supervisor

The role and responsibilities of the Supervisor are outlined in Article 2 of the Doctoral and Master's Thesis-based Handbooks. Specific practices constituting good supervision include the following:

(a) to assist the student with the selection and planning of a suitable and manageable research topic with due consideration of the resources necessary for completion of the research project;
(b) to accommodate reasonable demands (e.g., teaching assistantships) or special circumstances or needs of the student that affect the student's progress;
(c) to be accessible to the student for consultation and discussion of the student's academic progress and research. The frequency of the meetings will vary according to the discipline and the nature and stage of the project, but normally interaction, which may be electronic, should occur at least once per month;
(d) to respond in a timely manner to written work submitted by the student with constructive suggestions for improvement. The turnaround time for comments on written work should not normally exceed three weeks;
(e) to achieve consensus and resolve differences when there is conflicting advice or when there are different expectations on the part of co-supervisors or members of the Supervisory Committee;

(f) to be familiar with the rules and procedures of the Faculty of Graduate Studies, and the graduate program, including the chronological sequence of events and deadline dates in a student's program;
(g) to assist the student to be aware of current program requirements, deadlines, sources of funding, and general expectations of examinations;
(h) to help ensure that the research environment is safe, healthy and free from harassment, discrimination and conflict;
(i) to encourage the student to make presentations of research results within the University and to outside scholarly or professional bodies as appropriate;
(j) to acknowledge the contributions of the student in presentations and in published material, including joint authorship, if appropriate;
(k) to discuss with the student the Intellectual Property Checklist (available at http://grad.ucalgary.ca/files/grad/ip_awareness_checklist.pdf) and conform to University and other policies regarding intellectual property, scholarly integrity, and other policies applicable to the research environment.

### The Student

In undertaking a graduate program, graduate students make a commitment to devote the time, effort and energy necessary to engage in scholarship. Students should demonstrate initiative in their research, recognize that their Supervisors are responsible for providing guidance as well as evaluating their performance, and be receptive to suggestions and criticisms about their scholarly performance. Whether in a course-based or thesis-based program, students must comply with the rules, procedures and standards in place in the program and at the University and should be familiar with the regulations regarding academic and non-academic matters as per the University Calendars. Specific responsibilities are as follows:

(a) to gain the background knowledge and skills needed to pursue the research project successfully;
(b) to work with the Supervisor on the establishment of a realistic timetable for the completion of the various requirements of the program of study, and to adhere to the timetable and to meet deadlines;
(c) to meet with the Supervisor and Supervisory Committee when requested and to report fully and regularly on progress and on results, and to consider and respond to advice and criticisms received from the Supervisor and the other members of the Supervisory Committee. The frequency of meetings with the Supervisor will vary according to the discipline and the nature and stage of the project, but normally interaction, which may be electronic, should occur at least once per month;
(d) to work with the Supervisor to ensure that appropriate ethics approval is obtained prior to conducting research on animals or humans;
(e) to provide accurate and honest reporting of research results and to uphold ethical norms in research methodology and scholarship;
(f) to discuss with the Supervisor the Intellectual Property Checklist (available at http://grad.ucalgary.ca/files/grad/ip_awareness_checklist.pdf) and conform to University, and other policies regarding intellectual property, scholarly integrity, and other policies applicable to the research environment;
(g) to discuss with the Supervisor faculty and program requirements, including those related to deadlines, thesis or dissertation style, course requirements, and conflict of interest;
(h) to discuss with the Supervisor the responsible use of resources, and to assist in obtaining additional resources for the research;
(i) to bring to the attention of the Supervisor other responsibilities and the estimated time commitment (e.g., teaching assistantships) or special circumstances or needs that affect program progress;
(j) to bring to the attention of the Supervisor any matters of conflicting advice or expectations on the part of members of the Supervisory Committee;
(k) to recognize that the Supervisor and other members of the Supervisory Committee may have other teaching, research and personal obligations which may preclude immediate responses;
(l) to work with the Supervisor to meet agreed performance standards and deadlines of the funding organization when financing has been provided under a contract or grant;
(m) to acknowledge the contributions of the Supervisor and others in presentations and in published material, including joint authorship, if appropriate;
(n) to help ensure that the research environment is safe, healthy and free from harassment, discrimination and conflict;
(o) to act responsibly upon conclusion of the project by leaving a clean work space, returning borrowed materials, and providing the Supervisor with appropriate documentation of software, data, experimental procedures so that others may continue the research.

## PART TWO

### Resolving Problems Between Students and Supervisors

The relationship between the student and Supervisor is central to graduate education, and is normally close and long-lasting. If the relationship between a student and a Supervisor breaks down, the program has a responsibility to mediate. This is more likely to be successful if attended to as early as possible. Since it is the responsibility of the Graduate Director to arrange for the necessary consultation and mediation, the Graduate Director should be consulted as soon as the conflict becomes apparent. If supervision problems cannot be resolved within the graduate program, the relevant Associate Dean and/or Dean of the Faculty of Graduate Studies may assist.

Should no satisfactory resolution be obtained through consultation and mediation, the Graduate Director may, with well documented and justifiable reasons, recommend that the Supervisor be changed.

It is the responsibility of the graduate program and the Faculty of Graduate Studies to ensure that the student receives an opportunity for an academic experience that includes the proper supervision of the student's program and thesis (if applicable). Although the graduate program delivers the academic and supervisory component, the Faculty of Graduate Studies must work closely with all parties to ensure that the responsibilities are met. If the best arrangements of the graduate program and the Faculty of Graduate Studies fail to meet the expectations of the student, then no more can be done within that graduate program and the student may decide that the supervisory arrangement is untenable. At such time, the option to apply to another graduate program should be explored or, if that fails, the student may choose to withdraw without prejudice.

It may be that the student is unwilling to accept the supervision provided, or wishes to switch topics from that which was originally indicated at the time of admission. The graduate program and the Faculty of Graduate Studies have no responsibility to agree to alternate supervisory arrangements if they cannot reasonably be accommodated. The graduate program should consult with the Faculty of Graduate Studies and then inform the student clearly about what supervisory arrangements will, or will not, be provided. The graduate program should also clarify whether changing the Supervisor requires approval of a new dissertation proposal. If the student disagrees, the option to withdraw or apply to another graduate program without prejudice remains open. If the student chooses to continue but refuses to accept the supervision provided, then the student is not fulfilling the academic requirement of having a Supervisor (or Supervisory Committee). Therefore, the student may, on academic grounds, be required to withdraw. This is a serious action, and should not be taken unless the graduate program and the Faculty of Graduate Studies have explored with the student all other reasonable solutions.

In some cases, there may be no academic reason for requiring a student to withdraw, but the student's actions (e.g., disruptive or abusive behavior) may lead to the breakdown of effective supervision. In such instances, the graduate program shall refer to the University policy on Non-Academic Misconduct or other University policies.

Acknowledgements
This section benefitted significantly from the University of British Columbia document entitled Guidelines for the Various Parties involved in Graduate Student Thesis Research and the University of Alberta's FGSR Graduate Manual.

## Fees and Expenses

Fees

All graduate students pay both general and tuition fees each year. The tuition fees listed below are effective 1 May 2010 to 30 April 2011, and are subject to change without notice.

### Tuition Fees

All students are assessed tuition fees. Tuition and general fees must be paid no later than the deadline date indicated for the annual registration month. For information on how to pay your fees, please visit the website at www.ucalgary.ca/registrar/node/301

Thesis-based students: All students in the first year of a thesis-based degree (Master's or doctoral) program are assessed program fees*.

| | |
|---|---|
| Canadian citizens and permanent residents (all programs except the MBA program): | $ 5,439.90 |
| MBA thesis students: | $ 11,148.36 |
| International students (all programs except the MBA program): | $ 12,347.34 |
| International MBA thesis students: | $ 24,598.68 |
| Continuing fees for Canadian citizens and Permanent Residents per year, pro-rated over four terms are: | $ 1,582.68 |
| Continuing fees for International students per year are: | $ 3,591.90 |

Visiting Students who take courses are assessed general fees and tuition fees on a per course basis. Visiting students who are doing research but are not taking courses are assessed general fees and a tuition fee equivalent to one graduate half course.

*

All students in a Doctor of Philosophy degree are assessed program fees until the term immediately following successful completion of a candidacy exam (Spring/Summer are counted as one term). In all subsequent years, students will be assessed continuing fees. All program and continuing fees are pro-rated over four terms: one-third in Fall, one-third in Winter, one-sixth in Spring and one-sixth in Summer as seen in the table below. Refer to the Faculty of Graduate Studies Calendar or contact your department/program for the manner in which your fees will be assessed in subsequent years.

Course-based students: Students in most course-based Master's programs pay tuition fees on a per course basis, in the first and in subsequent years. At the time of annual registration, each student is assessed a registration deposit equivalent to the fee for a graduate half-course, whether or not the student has registered in a course. This registration deposit is required to maintain registration in the student's program and is non-refundable. However, the fee is credited to the first course the student takes in the registration year.

| | |
|---|---|
| Canadian citizens and permanent residents: | |
| Graduate Half-Course Fee (except MBA) | $ 695.16 |
| MBA Half-Course Fee | $ 1,266.60 |
| Students in course- based programs who audit courses pay half of the above fees | |
| International Students: | |
| Graduate Half-Course Fee | $ 1,578.12 |
| MBA Half- Courses | $ 2,801.70 |
| Students in course-based programs who audit courses pay half of the above fees. | |

## General Fees

All graduate students are assessed general fees, which are subject to change without notice, each year.
General fees are tied to the student registration date and so will see any increases at the next annual registration. Campus recreation and athletics increases are effective as of Spring 2010, all other increases, including the student services fee, take effect in September or the date of annual registration following. For example, a January registrant will not see the higher general fees shown until next January.

| | Full-Time | Part-Time | |
|---|---|---|---|
| | | | |
| Graduate Students' Association (GSA)** | $110.92 | $92.44 | All students |
| Group Insurance | $11.00 | | Full-time students only |
| Extended Health Insurance<br>Dental Insurance | $264.00<br>$181.50 | | Each student is responsible for his/her own basic health care coverage and must be enrolled in a provincial health plan or its equivalent. The Graduate Student Association arranges an extended health and dental benefit plan which is compulsory for full-time students who are automatically enrolled unless proof of alternative coverage (i.e., Blue Cross, Clarica), with his/her name on it, is submitted to the GSA (MacEwan Student Centre Room 350) before the fee payment deadline. Family Coverage must be applied for before the fee deadline.<br>Part-time students are automatically excluded from the Health and Dental Plan, but may apply to the GSA to purchase this coverage. Application must be made before the fee payment deadline. |
| UPASS<br>(Spring 2010, and Summer 2010 Initial and Anniversary Terms) | $255.00 | | Full-time students only. |
| UPASS<br>(Fall 2010, Winter 2011, Spring 2011, and Summer 2011 Initial and Anniversary Terms) | $315.00 | | Full-time students only. |
| Athletics | $46.49 | $46.49 | |
| Campus Recreation | $101.58 | $101.58 | |
| | | | |
| Graduate Bursary Donation* | $10.00 | $10.00 | Optional |
| Student Services fee ($450) In 2010 $300 will be instantly rebated. | $150.00 | $50.00 | |
| TOTAL | $1,170.49 | $400.51 | |

*Must Opt-out in writing through the Faculty of Graduate Studies before the Fee Payment deadline of your Annual Registration.
** Must Opt-out online, or by sending the appropriate form and documentation to the Graduate Students Association before the Fee Payment deadline of your Annual Registration.

Late Charges
Students who do not register by the fee payment deadline will be assessed a late registration fee of $60.
Students who make course changes (i.e., additions or substitutions) after the fee payment deadline will be assessed a fee of $60 for each Change of Registration form.

Students in course-based programs are assessed tuition fees by course, based on the level of the course.
Each year, at the time of the student's annual registration, each course-based student is assessed a non-refundable tuition fee equivalent to a graduate half-course, whether or not the student has registered in a course. This fee will be credited to the first half-course taken in the registration year.

Please note that differential fees are assessed for MBA courses offered by the Haskayne School of Business, for undergraduate courses in the Faculty of Medicine and for undergraduate courses in the Faculty of Law. All students who take these courses are required to pay the differential fee. Students in thesis programs who take courses with differential fee assessments will be required to pay the differential fee assessment in addition to their normal program or continuing fees.

Students who audit courses pay half the current course fees. For courses with a differential fee assessment, for example, MBA courses, a student who audits a course pays half the current course fee + half the current differential fee.

## Program-Specific Fees

In addition to the program-specific fees listed below, courses offered off-campus or through distance delivery methods may have tuition charges that differ from the normal tuition policy.

| | Canadian/Permanent Resident | International |
|---|---|---|
| Doctor of Education (distance delivery) | | |
| Year 1 - 4 (per 12 month year) Program Fee | $ 10,914.00 | $14,189.70 |
| Continuing (per 12 month year, yrs 5+) | $ 3,930.00 | $ 5,107.48 |
| | | |
| Master of Architecture | | |
| Foundation Year (Fall + Winter term) | $5,160.90 | $11,715.40 |
| 2010-2011 Year 1 (Fall + Winter term) | $7,020.22 | $15,937.12 |
| 2010-2011 Year 2 (Fall + Winter term) – students entering before September 2010 | See “course-based fees”. | See “course-based fees”. |
| | | |
| Master of Counselling (Distance Delivery) | | |
| Annual Program Fee | $1,534.68 | N/A |
| 1 half course (3 units) | $1,178.13 | N/A |
| | | |
| MSC in Sustainable Energy Development | | |
| 1 half course (3 units) | $1,740.00 | $2,755 |
| | | |
| Master of Public Policy | | |
| Program Fee | $20,000 | $30,000 |

For additional information on fees and payment plans please see: http://www.grad.ucalgary.ca/fees

### Transfers between Course-based and Thesis-based Master’s Programs

A student transferring from a thesis-based route to a course-based route within a program will be assessed according to the tuition policy for course-based programs from the first term of registration in the course-based program.

A student who has completed five or fewer half-courses or equivalent in a course-based route will be assessed program fees for one year from the date of transfer to a thesis route within the program. Continuing fees will be assessed for subsequent years. A student who has completed six or more half-courses or equivalent in a course-based route will be assessed continuing fees from the date of transfer into a thesis-based route within the program.

### Courses taken extra-to-program

A student, in a thesis-based or a course-based program, who wishes to take a course that is extra to his/her degree program, will be assessed extra fees per course in addition to the regular graduate tuition assessment.

Extra-to-program courses will not count toward the current graduate degree, but students should be aware that they will be included in all grade point average calculations on the transcript. Fees paid for extra-to-program courses will not be credited toward payment of full course fees.

Fee credit will not be given for extra-to-program courses that are subsequently used for unclassified studies or in any degree, diploma or certificate program.
Registration in any course is subject to departmental approval.

Any appeals regarding fee assessment must be made to the Graduate Associate Registrar (Student Services) within six months of the fee assessment.

## Fee Adjustments and Refunds

A student who withdraws from the Faculty of Graduate Studies and subsequently seeks admission into a different program at the University of Calgary will not receive credit for previously paid fees.

Students have until the registration deadlines listed for the term in this calendar, to make course additions and deletions without penalty.

Students who make course changes after the registration deadline will be assessed a $60 late fee for each *Change of Course Registration* form processed.

After the fee payment deadline, a student may withdraw from a course up to the last day of lectures, but no refund of any portion of the tuition fees will be made.
A course-based student is assessed a minimum tuition fee equivalent to a graduate half-course tuition fee at the time of his/her annual registration. If the student cancels program registration before the fee payment deadline for his/her annual registration term, the tuition fees will be refunded. If the student withdraws from program after the fee payment deadline, the minimum tuition fee will not be refunded whether or not the student has registered in a course for that term. A course-based student who withdraws from a course before the deadline for fee payment will receive a refund of the tuition fees only if he/she has already taken at least one half-course within that registration year.

Thesis-based students who withdraw from individual courses will not have any changes made to their fee assessment for the year.

Thesis-based students who withdraw from a graduate program will have tuition fees pro-rated to the end of the term in which they withdraw. If the student cancels program registration before the fee payment deadline for his/her annual registration term, the tuition fees will be refunded.

General fees are not refunded following the fee payment deadline.

## Payment and Collection of Fees

For information on how to pay your fees, please visit http://www.ucalgary.ca/registrar/fees/
Graduate students receiving funding through the university of Calgary may apply for a Payment Plan which arranges the fee payment to be spread over a period of time.
Students may pay their fees by cash, cheque, money order or debit card using the following methods:

- Mail a cheque or money order to the Enrolment Services (117 MacKimmie Library Block, University of Calgary, 2500 University Drive N.W., Calgary, Alberta T2N 1N4)
- Through Telephone/Internet Banking Services. The University of Calgary is listed with the Canadian Imperial Bank of Commerce, Bank of Montreal, Royal Bank, Scotiabank and TDCanada Trust
- In person at the U of C Service Stop (Monday to Friday, 09:30-4:30; Thursday, 10:00-4:30)
- If fees are paid from some form of student assistance, it is the responsibility of the student to advise the Fee Advisor and to produce a letter from the source of the assistance as confirmation. This must be done before the fee payment deadline to avoid penalty.
- If fees are to be paid from government student loans, application must be made through the University of Calgary Student Awards and Financial Aid Office to ensure automatic deferral of payment of fees. If assistance is being provided from a source other than government loans, a letter from the source concerned must be presented to the U of C Service Stop prior to the prescribed fee deadline date.
- Students receiving disbursement of their student loan in one installment will have both Fall and Winter Session fees deducted from the single installment plus any other outstanding debts owing to the University (i.e., room and board, student emergency loans, fines, etc.). Students receiving disbursement of their loan in two installments will have Fall Session fees deducted from the first installment and Winter Session fees deducted from either or both of the installments.

If financial assistance is refused, the fees must be paid within ten days. The letter of refusal from Alberta Learning Student Finance must be produced to avoid the late payment penalty. It should be noted that students will not have their registration cancelled if financial assistance is refused and such students will be liable for tuition and general fees owing for the session.

General fees must be paid no later than the deadline indicated in the Academic Schedule for the student's annual registration month.

Program and continuing fees are collected as follows:

| | |
|---|---|
| 4/12 in Fall | 2/12 in Spring |
| 4/12 in Winter | 2/12 in Summer |

Course-based students' fees must be paid in full by the deadline in the Academic Schedule for the annual registration semester and for each semester in which courses are being taken.

The last date for the payment for late registrants is 10 days after assessment.

A $60 penalty and an administration fee of $10 may be charged on any payments made or post-marked after the specified deadline. If the fees are not paid by the date specified in the Academic Schedule, registration may be subject to cancellation. Future registration will not be accepted until the account has been settled and the reinstatement fee has been paid.

## Delinquent Student Accounts

This policy applies to any student enrolled in a graduate program at the University of Calgary. A student who is having difficulty meeting his/her financial obligations is encouraged to consult with Student Awards and Financial Aid, or the Counselling and Student Development Centre.

Any student with an overdue debt to any unit of the University of Calgary, including any administrative department and the Students' Union or Graduate Students' Association, will not be allowed to register, graduate or receive transcripts of grades, and may be denied access to other University services until the outstanding account is settled in full, or an acceptable arrangement has been made.

## Degree Regulations Summary

No more than one-half of a regular graduate student's required program of course work can be at the 500-level. Programs requiring a larger ratio of undergraduate courses must receive approval of the Dean of Graduate Studies at the time of admission. Some programs may not allow any courses at the undergraduate level. For further information, see individual program descriptions.

The various deadline dates pertaining to Oral Examinations are set out in the Academic Schedule and in the *Handbook of Supervision and Examination* included in this calendar and posted at http://www.grad.ucalgary.ca//policies/handbooks.

Oral candidacy examinations are mandatory in all doctoral programs.

Most degree programs have a final oral examination or other capstone exit requirement. Please refer to the individual program descriptions for details.

| Degree | Thesis-based | Course-based | Full-time Requirement | Course Requirement (Full-course equivalents) | Maximum Years to Completion |
|---|---|---|---|---|---|
| PhD | ✓ | | See Program Details | See Program Details | 6 |
| PhD/MBA | ✓ | | | | |
| EdD | ✓ | | Twelve Months | 4 | 6 |
| MA | ✓ | ✓ | See Program Details | See Program Details | Thesis-based: 4<br>Course-based: 6 |
| MSc | ✓ | ✓ | See Program Details | See Program Details | Thesis-based: 4<br>Course-based: 6 |
| MSc/MBA | ✓ | | | | |
| LLB/MBA | | ✓ | Two terms, normally consecutive | See Program Details | 4 |
| LLM | ✓ | | Two consecutive terms | 1.5 | 3 |
| MBT | | ✓ | No | 4.5 | 6 |
| MBT/MBA | | ✓ | See Program Details | See Program Details | 6 |
| MBA | ✓ | ✓ | Thesis-based: 2 consecutive terms | Thesis-based: 4<br>Course-based: 7.5 | Thesis-based: 5<br>Course-based: 6 |
| MC | | ✓ | No | 6 | 6 |
| MCE | | ✓ | Year One and Year Two – Three-week Spring or Summer Institute on campus | 6 | 6 |
| MCM | | ✓ | No | 6 | 6 |
| MCS | | ✓ | No | 6 | 6 |
| | | | | | |
| MEd | | ✓ | No | 6 | 6 |
| MEng | ✓ | ✓ | No | Thesis-based: 2–4<br>Course-based: 5-6 | Thesis-based: 4<br>Course-based: 6 |
| MFA (Art) | ✓ | | Two consecutive years | 3 | 4 |
| MFA (Drama) | ✓ | | No | 4.5 | 5 |
| MGIS | | ✓ | No | 5 | 6 |
| MKin | | ✓ | No | 5 | 6 |
| MMus | ✓ | | No | 2 – 3 | 5 |
| MN | ✓ | ✓ | Thesis-based: 2 years<br>Course-based: No | Thesis-based: 3.5<br>Course-based: 6 | Thesis-based: 4<br>Course-based: 6 |
| MPP | | ✓ | Yes | 6.5 | 4 |
| MSW | ✓ | ✓ | No | Thesis-based: 4.5<br>Course-based: 5 | Thesis-based: 4<br>Course-based: 6 |
| MSW/MBA | | ✓ | See Program Details | See Program Details | 7 |
| MSS | ✓ | ✓ | See Program Details | Thesis-based: 3<br>Course-based: 6 | Thesis-based: 4<br>Course-based: 6 |
| MD/Master's | ✓ | | See Program Details | See Program Details | 5 |
| MD/PhD | ✓ | | See Program Details | See Program Details | 8 |

Note: the general summary table is for quick reference only and the regulations details in the full Program entry in this Calendar supersede the summary table.

# Program Details

## Combined Programs

A combined degree program enables highly motivated students to complete two complete degree programs simultaneously. A combined program may include a professional undergraduate degree, such as the Bachelor of Laws (LLB) or the Doctor of Medicine (MD), and a graduate degree, such as a Master of Business Administration (MBA) or Master of Science (MSc), or two graduate degrees, such as the Master of Social Work (MSW) and the Master of Business Administration (MBA).

Interested applicants must apply and be accepted to each individual program separately, then apply to the combined program. Acceptance into both individual programs does not automatically mean acceptance into the combined program. Students must graduate in both degrees simultaneously.

## Leaders In Medicine

The *Leaders in Medicine* program at the University of Calgary offers students the opportunity to earn simultaneously both a Doctor of Medicine (MD) degree and a graduate degree (PhD, MSc, MA, MBA, etc.) The objective of *Leaders in Medicine* is to train clinicians for a diverse range of careers ranging from academic medical research to the design, management and implementation of health care delivery systems. Individuals trained in *Leaders in Medicine* can expect to develop a unique academic approach to their clinical experiences as well as bring a clinical perspective to their research.

Students in *Leaders in Medicine* will be jointly enrolled in the MD program and in any of the graduate programs offered by the Faculty of Graduate Studies. Although the most common graduate programs participating in Leaders in Medicine are the seven offered by the Faculty of Medicine (Biochemistry and Molecular Biology; Cardiovascular/Respiratory Sciences; Community Health Sciences; Gastrointestinal Sciences; Medical Science; Microbiology and Infectious Diseases; Neuroscience), students from other programs, including Philosophy and Engineering, have taken part.

Students wishing to apply to *Leaders in Medicine* should have an excellent academic record and strong motivation towards a career in academic medicine. Previous research experience is highly desirable. Applicants must apply separately to the Faculty of Medicine for the MD program and to the selected graduate program in the Faculty of Graduate Studies, and be recommended for admission by each program. Prospective applicants must also complete a supplemental application for the *Leaders in Medicine* program: forms may be obtained from the Graduate Sciences Education Office (Faculty of Medicine). Students may also apply for the combined degree program during the first two years of either the MD or the graduate program. Expected completion time is four to five years for the MD/Masters programs and six to seven years for MD/PhD programs. Maximum completion time is six years for the MD/Masters program and eight years for the MD/PhD program.

For more information, contact:
Leaders in Medicine, Health Sciences Centre, Room G329
Telephone: (403) 210-9572 Fax: (403) 210-8109
E-mail: mdgrad@ucalgary.ca or visit the website http://medicine.ucalgary.ca/grad/mdlim

## Master of Social Work/Master of Business Administration (MSW/MBA)

The Master of Social Work/Master of Business Administration (MSW/MBA) program is designed to prepare students for competent and visionary management of human service organizations. This program is available only to full-time, course-based Master's students in the Leadership in the Human Services specialization in the Faculty of Social Work. The combined program shortens the time for completion of the two degrees from three academic years to two 12-month years. See the program descriptions for the Faculty of Social Work and the Haskayne School of Business for further information.

## Master of Biomedical Technology/Master of Business Administration (MBT/MBA)

The Master of Biomedical Technology/Master of Business Administration (MBT/MBA) program provides students with managerial skills as well as essential scientific skills and competencies for successful careers in biotechnology business. The combined degree program is targeted at graduate students who are interested in a dual skill set to prepare them for biotechnology jobs in industry, research and government at all levels from the bench to the boardroom. The combined degree allows students to obtain both degrees in a shorter time frame than would be possible taking each degree separately. See the program descriptions for the Master of Biomedical Technology program and the Haskayne School of Business for further information.

### Bachelor of Laws/Master of Business Administration (LLB/MBA)

The Bachelor of Laws/Master of Business Administration (LLB/MBA) program enables students to complete an undergraduate degree in law while studying for a graduate degree in business. This program is open only to students enrolled in the Haskayne MBA program on a full-time basis. See the program descriptions for the Faculty of Law and the Haskayne School of Business for further information.

### Master of Science/Master of Business Administration (MSc/MBA)

The combined MSc/MBA program offers students a course-based Master's degree that provides a business background with a science degree in which a project with commercial viability is pursued as a thesis project. The program is focused on the education of Life Sciences, Information and Communication Technology (ICT), Energy Sector, Nanotechnology, and other industry-oriented entrepreneurial students in the area of applied research and business development. The program is available to students in the faculties of Kinesiology, Medicine, Science, and the Schulich School of Engineering.

### Doctor of Philosophy/Master of Business Administration (PhD/MBA)

The combined PhD/MBA program provides students with a focused, multidisciplinary program that has a solid foundation for their faculty discipline and provides them with the skills and knowledge to bridge the gap between scientific/engineering methods and procedures and the business application of that knowledge. The program is available to students in the faculties of Kinesiology, Medicine, Science, and the Schulich School of Engineering.

# INTERDISCIPLINARITY AT UNIVERSITY OF CALGARY

## Interdisciplinary Specialization

Most graduate programs include some interdisciplinary work. The following interdisciplinary sub-specializations have been formalized by the programs involved to facilitate the study and research capability:
Biological Anthropology (Anthropology, Archaeology and Medical Science)
Clinical Research (Kinesiology, Medicine, Nursing, Social Work)
Computational Media Design (Art, Computer Science, Environmental Design)
Energy and Environmental Systems (Engineering, Environmental Design, Management, Law, Sciences, Social Sciences)
Engineering, Energy, and the Environment (Engineering, Centre for Environmental Engineering Research and Education)
Environmental Engineering (Engineering, Centre for Environmental Engineering Research and Education)
Israel Studies (History, Political Science, English, Religious Studies and Centre for Military and Strategic Studies)
Reservoir Characterization (Chemical and Petroleum Engineering and Geology and Geophysics)
Please see the listings in the Programs & Course Descriptions and the Interdisciplinary Specializations sections of this Calendar for more information on programs and specializations in the Faculty of Graduate Studies.

## Courses of Instruction

This section contains the descriptions of courses offered at the University of Calgary. The courses are arranged in alphabetical order by course title and not by abbreviation. In order to better understand the notations used throughout this section; an illustrated example of a course description is provided.

All courses listed are not necessarily offered every year and students should consult the Schedule of Classes for an official listing of those courses that will be offered in a given session.

Since this Calendar is published a considerable time before the opening of the academic year, the University reserves the right to make whatever changes circumstances may require including the cancellation of a particular course.

Note: University of Calgary Undergraduate students are permitted to register in graduate level courses (600-level) only with permission of both their Faculty and the Department offering the course. Undergraduate students are not normally permitted to take courses numbered 700-level or above.

Medical Science 609 H(3-2T)
(Biochemistry 609)

Gene Expression

The flow of genetic information from DNA to final protein product. The subject will be covered in two courses offered in alternating years: gene structure and regulation of transcription, including gene structure and organization, chromatin structure, regulation of transcription and post-translational processing; and the activity of genes during development including stored messenger ribonucleoprotein particles and translational control in gametes, the switch from maternal to zygote genome control of development in early embryos and the molecular basis of morphogenesis and differentiation.

609.01. Gene Structure and Regulation of Transcription

609.02. Genes and Development

Prerequisite: Medical Science 537 (Biochemistry 537) or equivalent.

Note: Credit for both Medical Science 609.02 and 751.14 will not be allowed.

### Course Numbers:

The number of the course indicates the level of the course.

- Junior level: 200's
- Senior level: 300's and 400's
- Upper level undergraduate: 500's
- Graduate level: 600's and 700's

### Hours of Instruction:

- M — More than a full course; refer to individual course description for hours.
- F(3-3) — Full course; equivalent of 3 hours of lectures and 3 hours of lab each week for 2 sessions.
- F(3-1S-3) — Full course; equivalent of 3 hours of lectures, 1 seminar hour, and 3 hours of lab each week for 2 sessions.
- Q(3-0) — Quarter-course; equivalent of 3 hours of lectures each week for 1 half session.
- H(3-3/2) — Half-course; equivalent of 3 hours of Lectures every week and 3 hours of lab every other week for 1 session.
- E(0-3) — Eighth-course; equivalent of 3 hours of lab each week for one quarter session.

The figures "S" or "T" attached to a number signify seminar or tutorial hours.

**Cross-Listed Courses:**
Courses which are listed under two Departments and which can be taken for credit from either Department, but not both. The credit is determined by the student's registration.

**Prerequisite:**
Must be completed before registering in this class.

**Corequisite:**
Must be completed at the same time as this class.

**Not Included in GPA:**
A course with this notation is graded as CR (Completed Requirements) or F (Fail). The course is not included in the calculation of the grade point average.

Certain courses carry the notation "Not open to students with credit in course number XXX" or "Credit for both course number XXX and course number XXX will not be allowed." Students may take these courses if they wish, but credit for both courses will not be granted towards their degree.

# PROGRAM ABBREVIATIONS (Undergraduate and Graduate)

### Faculty of Communication and Culture

| | |
|---|---|
| African Studies | AFST |
| Canadian Studies | CNST |
| Central and East European Studies | CEST |
| Communications Studies | COMS |
| Culture and Society | CUSP |
| Development Studies | DEST |
| East Asian Studies | EAST |
| Film | FILM |
| General Studies | GNST |
| Law and Society | LWSO |
| Museum and Heritage Studies | MHST |
| Northern Planning and Development Studies | NPDS |
| Science, Technology and Society | STAS |
| South Asian Studies | SAST |
| Women's Studies | WMST |

### Faculty of Education

| | |
|---|---|
| Applied Psychology | APSY |
| Campus Alberta Applied Psychology | CAAP |
| Continuing Education | CTED |
| Education Teacher Preparation | EDTP |
| Educational Research | EDER |

### Faculty of Environmental Design

| | |
|---|---|
| Environmental Design | EVDS |
| Environmental Design Architecture | EVDA |
| Environmental Design Planning | EVDP |

### Faculty of Fine Arts

| | |
|---|---|
| Art | ART |
| Art History | ARHI |
| Dance | DNCE |
| Drama | DRAM |
| Fine Arts | FINA |
| Music Education | MUED |
| Music History and Literature | MUHL |
| Music Performance | MUPF |
| Music | MUSI |
| Music Theory and Composition | MUTC |

### Haskayne School of Business

| | |
|---|---|
| Accounting | ACCT |
| Business and Environment | BSEN |
| Energy Management | ENMG |
| Entrepreneurship and Innovation | ENTI |
| Finance | FNCE |
| Human Resources and Organizational Dynamics | HROD |
| Management Information Systems | MGIS |
| Management Studies | MGST |
| Marketing | MKTG |
| Operations Management | OPMA |
| Petroleum Land Management | PLMA |
| Risk Management and Insurance | RMIN |
| Strategy and Global Management | SGMA |
| Tourism Management | TOUR |

### Faculty of Humanities

| | |
|---|---|
| Chinese | CHIN |
| Comparative Literature | COLT |
| East Asian Language Studies | EALS |
| English | ENGL |
| French | FREN |
| German | GERM |
| Greek | GREK |
| Greek and Roman Studies | GRST |
| Hindi | HNDI |
| Humanities | HUMN |
| Italian | ITAL |
| Japanese | JPNS |
| Latin | LATI |
| Philosophy | PHIL |
| Religious Studies | RELS |
| Romance Studies | ROST |
| Russian | RUSS |
| Spanish | SPAN |
| Slavic | SLAV |
| Term Abroad Program | TAP |

### Faculty of Kinesiology

| | |
|---|---|
| Athletic Therapy | ATTH |
| Dance Education | DCED |
| Kinesiology | KNES |
| Outdoor Pursuits | ODPU |
| Physical Education | PHED |
| Physical Education Activity Theory | PEAT |

### Faculty of Law

| | |
|---|---|
| Law | LAW |

### Faculty of Medicine

| | |
|---|---|
| Health and Society | HSOC |
| Biochemistry and Molecular Biology | MDBC |
| Biomedical Technology | MDBT |
| Community Health Sciences | MDCH |
| Cardiovascular/Respiratory Sciences | MDCV |
| Gastrointestinal Sciences | MDGI |
| Immunology | MDIM |
| Microbiology and Infectious Diseases | MDMI |
| Medical Science | MDSC |
| Medicine | MDCN |
| Neuroscience | MDNS |

### Faculty of Nursing

| | |
|---|---|
| Nursing | NURS |
| Nursing Offsite | NUOS |

### Schulich School of Engineering

| | |
|---|---|
| Biomedical Engineering | BMEN |
| Chemical Engineering | ENCH |
| Civil Engineering | ENCI |
| Computer Engineering | ENCM |
| Electrical Engineering | ENEL |
| Engineering, Energy and Environment | ENEE |
| Engineering | ENGG |
| Environmental Engineering | ENEN |
| Geomatics Engineering | ENGO |
| Manufacturing Engineering | ENMF |
| Mechanical Engineering | ENME |
| Petroleum Engineering | ENPE |
| Software Engineering for Engineers | ENSF |

### Faculty of Science

| | |
|---|---|
| Chemistry | CHEM |
| Computer Science | CPSC |
| Nanoscience | NANS |
| Science | SCIE |

### Department of Biological Sciences

| | |
|---|---|
| Biology | BIOL |
| Biological Sciences | BISI |
| Ecology | ECOL |
| Cellular, Molecular and Microbial Biology | CMMB |
| Marine Science | MRSC |
| Zoology | ZOOL |

### Department of Geoscience

| | |
|---|---|
| Geology | GLGY |
| Geophysics | GOPH |

### Department of Mathematics and Statistics

| | |
|---|---|
| Actuarial Science | ACSC |
| Applied Mathematics | AMAT |
| Mathematics | MATH |
| Pure Mathematics | PMAT |
| Statistics | STAT |

### Department of Physics and Astronomy

| | |
|---|---|
| Astronomy | ASTR |
| Astrophysics | ASPH |
| Medical Physics | MDPH |
| Nanoscience | NANS |
| Physics | PHYS |
| Space Physics | SPPH |

### Faculty of Social Sciences

| | |
|---|---|
| Anthropology | ANTH |
| Archaeology | ARKY |
| Clinical Psychology | CPSY |
| Economics | ECON |
| Geography | GEOG |
| History | HTST |
| International Relations | INTR |
| Israel Studies | ISST |
| Linguistics | LING |
| Native Languages | NTVE |
| Political Science | POLI |
| Psychology | PSYC |
| Social Sciences | SOSC |
| Sociology | SOCI |
| Strategic Studies | STST |
| Urban Studies | UBST |

### Faculty of Social Work

| | |
|---|---|
| Social Work | SOWK |

### Faculty of Veterinary Medicine

| | |
|---|---|
| Veterinary Medical Sciences | VMS |
| Veterinary Medicine | VETM |

### School of Public Policy

| | |
|---|---|
| Public Policy | PPOL |

### Collaborating Faculties

| | |
|---|---|
| Architectural Studies (CC, EV) | ARST |
| Arts and Science Honours (HU, SC, SS) | ASHA |
| Biochemistry (MD, SC) | BCEM |
| Computational Media Design (FA, SC, EV) | CMD |
| Community Rehabilitation (ED, SW) | CORE |
| East Asia (CC, HU, SS) | ETAS |
| Earth Science (SC, SS) | EASC |
| Environmental Science (SC, SS) | ENSC |
| Indigenous Studies (CC, FA, HU, SS, SW) | INDG |
| Innovation (CC, EN, HA, HU, SC, SS) | INNO |
| Language (ED, HU, SS) | LANG |
| Latin American Studies (CC, HU, SS) | LAST |
| Software Engineering (EN, SC) | SENG |
| South Asian Studies (HU,SS) | SASO |
| Sustainable Energy Development (EN, EV, LA, HA) | SEDV |
| Transportation Studies (EN, SS) | TRAN |

### Interdisciplinary Specializations

| | |
|---|---|
| Biological Anthropology | BANT |
| Clinical Research | CLIN |
| Energy and Environmental Systems | EESS |
| Interdisciplinary Graduate Program | IGP |
| Reservoir Characterization | RSCH |

### Other

| | |
|---|---|
| Academic Writing | ACWR |
| Co-operative Education | COOP |
| English For Academic Purposes | Program EAPP |
| Internship | INTE |
| University | UNIV |

# PROGRAMS & COURSE DESCRIPTIONS

## ANTHROPOLOGY ANTH

### Contact Info

Location: Social Sciences Building, Room 854
Faculty number: (403) 220-6517
Fax: (403) 284-5467
E-mail address: boydj@ucalgary.ca
Web page URL: http://anth.ucalgary.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), thesis-based

Students in the Departments of Anthropology and Archaeology and the Faculty of Medicine may choose an interdisciplinary specialization in Biological Anthropology. For further information on the Biological Anthropology (Interdisciplinary) specialization, see the separate listing in this Calendar.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

#### Master of Arts

a) A minimum grade point average of 3.30 or higher on a four-point scale
b) An example of the applicant's written work: a term paper, research paper or other writing which the applicant considers representative of his or her best work
c) A concise statement outlining the applicant's academic interests and reasons for wishing to pursue graduate work in this Department. The thesis research area should be clearly identified.
d) Completion of Departmental Information form
e) Two Letters of Reference

#### Doctor of Philosophy

a) A minimum grade point average of 3.40 or higher on a four-point scale
b) Two Letters of Reference

### 3. Application Deadline

The deadline for the submission of complete applications is 1 February for September admission.

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to the required level for admission.

### 5. Program/Course Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the Department requires:

#### Master of Arts

Candidates for the MA degree are normally required to complete a minimum of two full course equivalents in Anthropology at the 600-level. At the discretion of the Graduate Studies Committee, students with deficient background may be required to take a total of two and one-half course equivalents of course work in Anthropology. The following courses are required of all Master's students: Anthropology 603, 605, 611 or 613, 631 or 635.

#### Doctor of Philosophy

a) A specialization of either primatology, or social and cultural anthropology
b) Anthropology 701, a reading course in the student's substantive area. Beyond that, the supervisory committee will individually tailor each student's course requirements to the student's particular needs.
c) For social and cultural anthropology, fieldwork outside the student's broad cultural milieu for a minimum of one year. Students in primatology will be required to collect primary data via experimental and/or observational research on wild or captive primate populations for a period of not less than twelve months.
d) Demonstrated proficiency in a language other than English. Normally, in the course of the doctoral program, competent faculty in other Departments will evaluate the student's linguistic competence, principally in reading and writing.

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

### 8. Time Limit

Expected completion time is two years for the Master of Arts degree and four years for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Arts degree and six years for the doctoral degree.

### 9. Supervisory Assignments

A supervisor is assigned to each student upon entering the program.

### 10. Required Examinations

The doctoral candidacy examination has a written and an oral component, and examines areas of knowledge determined by the supervisory committee in consultation with the student.

Questions on the research proposal will not be included in the oral candidacy examination.

Final thesis oral examinations are open.

### 11. Research Proposal Requirements

Students are required to submit and successfully defend a research proposal fourteen months after initial registration. The defence is open to interested faculty members and graduate students of the Anthropology Department.

### 12. Special Registration Information

None

### 13. Financial Assistance

Financial assistance in the form of research and teaching assistantships is available to qualified students. Information on awards can be obtained from the Department office or in the Awards and Financial Assistance section of this Calendar. All students are strongly encouraged to seek external financial assistance for the program, as the Department of Anthropology cannot guarantee the availability of financial assistance.
Students applying for the Open Scholarship Competition must submit their applications to the Department by January 25.

### 14. Other Information

A complete description of the rules and regulations, and the facilities available to Anthropology graduate students, is available on line at: http://anth.ucalgary.ca/graduate.

### 15. Faculty Members/Research Interests

Faculty members and their research interests can be found at http://anth.ucalgary.ca/people.

#### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

**Anthropology 501** H(3-0)

*Conference Course in Anthropology*
Arranged for various topics of anthropology on the basis of special interest and need.
Prerequisite: Anthropology 203 or consent of the Department.
MAY BE REPEATED FOR CREDIT

**Anthropology 505** H(3-0)

*Conference Course in Primatology*
Arranged for various topics of primatology on the basis of special interests and need.
Prerequisites: Anthropology 311 and one additional senior primatology course and consent of the Department.
MAY BE REPEATED FOR CREDIT

**Anthropology 523** H(3-0)
(Archaeology 523) (Geography 523)

*Human Ecological Systems*
The development of human ecology, its current directions and application of analytical techniques as they apply to anthropology, archaeology and geography.
Prerequisite: Consent of the Department.
Note: Not open to students with credit in Anthropology 609, Archaeology 609, and Geography 609.

**Anthropology 535** H(3-0)

*History and Theory in Primatology and Physical Anthropology*
Historical and theoretical survey of ideas about the biological bases of human and non-human primate social behaviour. Impacts of the theoretical models of the modern synthesis, ethology, behavioural ecology, socio-ecology, and sociobiology or the study of human and non-human primates.
Prerequisites: Anthropology 311 plus one of the following: Anthropology 413, 435 or 451.

**Anthropology 541** H(3-0)

*Field Study in Social and Cultural Anthropology*
Research projects carried out off campus, under the supervision of a member of academic staff, and resulting in a graded project report.
Prerequisite: Consent of the Department.

Anthropology 552 F(3-3)

*Field Studies in Primatology*
Intensive training and practice in field methods of observational primate behaviour or behavioural ecology.
Prerequisites: Anthropology 351 and consent of the Department.
Corequisite: Anthropology 553 or consent of the Department.
Note: Normally offered during Spring Session.
MAY BE REPEATED FOR CREDIT

Anthropology 553 H(3-3)

*Primate Behavioural Research Design*
Design of a research project, including the identification and operationalization of a research question and the collection and analysis of data.
Prerequisites: Anthropology 552 and consent of the Department.
Note: Normally offered during Spring Session.
MAY BE REPEATED FOR CREDIT

Anthropology 571 H(3-0)

*Advanced Seminar in Primatology*
Current theoretical and methodological issues will be explored in a discussion based seminar format.
Prerequisite: Anthropology 413 and consent of the Department.

Anthropology 573 H(3-0)

*Advanced Seminar in Social and Cultural Anthropology*
Current theoretical and methodological issues will be explored in a discussion based seminar format, with the possibility of development of a research project.
Prerequisite: Anthropology 411 and consent of the Department.

Anthropology 589 H(3-0)
(Archaeology 589)

*Nutritional Anthropology*
The study of human dietary practices from biological and cultural perspectives. Subjects covered include the development of nutritional anthropology, principles of nutrition, principles of ecology, diet from an evolutionary, comparative and historic perspective, the impact of under nutrition on human physiology, and behaviour and methods in nutritional anthropology.
Prerequisite: Anthropology 201 or Archaeology 203 or Archaeology 305, and consent of the Department.

Graduate Courses

Anthropology 601 H(3-0)

*Conference Course in Anthropology*
A specialized area of Anthropology selected on the basis of particular interest and need.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Anthropology 603 H(3S-0)

*Thesis Development*
A reading and conference course in the student's substantive area conducted jointly by at least two faculty members.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Anthropology 605 H(3-0)

*Professional Skills for Anthropologists*
Training and practice in research/teaching skills: grantsmanship, conference and classroom presentations, academic publishing, job interviews.
Prerequisite: Consent of the Department.
Note: Not open to students with credit in Anthropology 601.90 or the equivalent.
NOT INCLUDED IN GPA

Anthropology 611 H(3-0)

*Methods in Anthropological Research*
A variety of topics relevant to research and the logic of inquiry in Anthropology.
Prerequisite: Consent of the Department.

Anthropology 613 H(3-0)

*Current Issues in Methodology in Primatology*
A variety of topics relating to aspects of data collection and data analysis in primatology, with a focus on ecological and behavioural data.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Anthropology 631 H(3-0)

*Anthropological Theory*
Prerequisite: Consent of the Department.

Anthropology 635 H(3-0)

*Primatological Theory*
Seminar dealing with the theoretical material of primatological and biobehavioural perspectives in Anthropology.
Prerequisite: Consent of the Department.

Anthropology 641 H(3-0)

*Graduate Seminar in Civil-Military Relations*
Comparative analysis of relations between civil society and military institutions. While most theories of civil-military relations take the military and civilian sectors as a given, this seminar will adopt a critical approach to analyzing how civil and military institutions mutually constitute each other as distinct forms of society.
Prerequisite: Consent of the Department.

Anthropology 659 H(3-3)

*Primatology*
Specialized topics and laboratory training in this field will vary from year to year and may include: behavioural ecology, biomechanics, evolution, biosociality, and field methodology.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Anthropology 701 H(3-0)

*Independent Studies*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

## ARCHAEOLOGY ARKY

### Contact Info

Location: Earth Sciences Bldg., Room 806
Faculty number: (403) 220-5227
Fax: (403) 282-9567
E-mail address: nethier@ucalgary.ca
Web page URL: http://arky.ucalgary.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), thesis-based
Students in the Departments of Archaeology and Anthropology and the Faculty of Medicine may choose an interdisciplinary specialization in Biological Anthropology. For further information on the Biological Anthropology (Interdisciplinary) specialization, see the separate listing in this Calendar.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

a) A specimen of relevant written work (an honours essay, term paper, or seminar essay bearing the grade and initials of the supervising professor, the analysis chapter of a Master of Arts thesis or a published article where the applicant is the sole or senior author)
b) A concise statement setting forth the reasons for wishing to pursue graduate work in this department
c) An up-to-date curriculum vitae
d) A 3.3 grade point average in the last two years of program or over the last ten full course equivalents
e) Two Reference Letters

### 3. Application Deadline

The deadline for the submission of complete applications is 15 January for September admission.

### 4. Advanced Credit

The Department does not normally give advanced credit.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

#### Master of Arts

a) Normally, three full-course equivalents including Archaeology 601 and one of the following, as determined by the student's evaluation committee: Archaeology 615 or Archaeology 617 or a course in human osteology
b) A season of fieldwork or the equivalent

#### Doctor of Philosophy

a) Normally, four full-course equivalents in Archaeology
b) For those without a Master of Arts degree, normally five full-course equivalents

Note: The number of courses required of each student may vary according to each student's particular needs as determined by the supervisory committee. Unless previously satisfied, ARKY 601 and two of the following: ARKY 615 or ARKY 617 or a course in human osteology will be required as determined by the student's evaluation committee.

c) Normally, the writing of one research paper of publishable quality, as judged by the supervisory committee
d) A research proposal approved by a committee consisting minimally of three members of his or her supervisory committee, and by the Graduate Director. This must be submitted within twenty months of entering the program.
e) A reading ability in a foreign language acceptable

to the Department. The student's supervisory committee will decide the manner of demonstrating this ability.

f) Normally, proficiency in statistics, acceptable to the Department. The student's supervisory committee will decide the manner of demonstrating this ability.

Requirements (a) through (f) must be completed before sitting the written and oral components of the candidacy examination.

g) Normally, two seasons of fieldwork. However, students specializing in laboratory-based topics, like physical anthropology, may substitute an approved program of laboratory work for one of the fieldwork seasons.

### 6. Additional Requirements

During the first two weeks in program, each student will undergo an evaluation. This is not an examination but an assessment of academic background. The specific regulations and procedures covering evaluations and examinations are on file in the Department Office and are available to students. It is the responsibility of every student to become familiar with these regulations.
Fieldwork may be counted towards fulfillment of the full-time study and research requirement.

### 7. Credit for Undergraduate Courses

Normally only courses at the 500-level or higher may be taken for credit toward a graduate program.

### 8. Time Limit

Expected completion time is two years for the Master of Arts degree and four years for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Arts degree and six years for the doctoral degree.

### 9. Supervisory Assignments

The Department assigns an interim advisor to each student upon arrival. At any time before the end of the first year of studies, each student must select a faculty member to serve as supervisor. The interim advisor may become the supervisor.
Doctoral supervisory committees may be appointed at any time during the first year of studies, but no later than three months after the appointment of the supervisor. The supervisor, in consultation with the student, selects the committee.

### 10. Required Examinations

Questions on the research proposal will not be included in the oral candidacy examination.

Final thesis oral examinations are open.

### 11. Research Proposal Requirements

Within twenty months of entering the program, the student, with the supervisor's advice, develops a thesis research proposal. This is then transmitted to the student's supervisory committee for agreement and to the Graduate Director for approval and placed on file.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance in the form of research and teaching assistantships may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to the Department by January 15th.

### 14. Other Information

The Department has laboratories equipped for anthropometric and osteological analysis, faunal analysis, and microbotanical and geoarchaeological research. A number of teaching and comparative archaeological and zooarchaeological collections are maintained. Field equipment including survey, photographic and camping equipment is available.

### 15. Faculty Members/Research Interests

The active research interests of current faculty members can be found at http://arky.ucalgary.ca/contact-us/directory.

Note: Individual specializations are also listed in the Department's Graduate Brochure, published annually, and available upon request from the Department.

### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

**Archaeology 501** H(3-0)

*Practical Problems in Archaeological Interpretation*
Exercises in the analysis and interpretation of a variety of archaeological data sets.
Prerequisite: Archaeology 201 or 205 or consent of the Department.

**Archaeology 503** H(3-0)

*Gender in Prehistory*
The theoretical background for feminist archaeology and some of the important advances in Old and New World gender studies. Topics include the relationship of gender hierarchy to the rise of the state; contrasts between the ideological representation of gender and culture practice; and an overarching theme of critical analysis relating the present to the past.
Prerequisite: Archaeology 451 or consent of the Department.

**Archaeology 505** H(3-0)

*Topics of Debate*
Topics of debate in archaeology and human biology from a perspective that emphasizes philosophical, theoretical and methodological issues. Designed to hone students' critical, analytical, and debating skills, and as preparation for graduate studies.
Prerequisite: Archaeology 451.
Note: Archaeology 505 should be taken in the final year of the program.

**Archaeology 506** F(0-7)

*Advanced Archaeological Field Techniques*
As a continuation of Archaeology 306, students are offered training in the more advanced aspects of fieldwork.
Prerequisites: Pure Mathematics 30; Archaeology 201 and 306.
Note: Normally offered during the Spring and/or Summer Sessions.

**Archaeology 507** H(3-0)
(formerly Archaeology 533.13)

*Issues in Hominoid Behaviour*
Critical evaluation of the behavioural patterns shared by hominoids from the perspectives of primatology, paleonanthropology, and Paleolithic archaeology.
Prerequisites: Archaeology 201 or 203 or 205; Anthropology 201 or consent of the Department.

**Archaeology 511** H(3-0)

*Mesoamerican Writing Systems*
Writing systems of Mesoamerica, their origins and development, including the Mesoamerican calendar and astronomical knowledge.
Prerequisites: Archaeology 341 and 343 or consent of the Department.

**Archaeology 517** H(3-0)

*Archaeometry*
Analytical methods for reconstructing various aspects of life in the past based on analysis and interpretation of the material record. The structures of materials at the microscopic and macroscopic levels; raw materials and production technologies; provenance; dating; prospection; dietary reconstruction; sampling and measurement. Archaeological case studies are used throughout.
Prerequisite: Pure Mathematics 30; consent of the Department.

**Archaeology 523** H(3-0)
(Anthropology 523) (Geography 523)

*Human Ecological Systems*
The development of human ecology, its current directions and application of analytical techniques as they apply to anthropology, archaeology and geography.
Prerequisite: Pure Mathematics 30; consent of the Department.
Note: Not open to students with credit in Archaeology 609, Anthropology 609 and Geography 609

**Archaeology 531** H(3-0)

*Special Topics in Archaeology*
This course is offered periodically to meet special needs of students or visiting faculty members.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

**Archaeology 533** H(3-0)

*Special Topics in Archaeology*
This course is offered periodically to meet special needs of students or visiting faculty members.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

**Archaeology 537** H(3-0)

*Topics in Mesoamerican Archaeology*
Focus will be on particular time periods or themes in Mesoamerican archaeology and ethnohistory.
Prerequisites: Any two of Archaeology 341, 343, 345 or 347.

**Archaeology 553** H(3-0)

*Circum-Caribbean Archaeology and History*
The prehistory and history of the indigenous peoples of the Caribbean from the first peopling of the islands to the early contact period.
Prerequisite: Consent of the Department.
Note: Not open to students with credit in Archaeology 531.61.

Archaeology 555 H(3-2)

*Human Osteology*
Introduction to identification and interpretation of human skeletal and dental remains. Emphasis is on functional anatomy and reconstruction of prehistoric lifeways.
Prerequisite: Archaeology 203 or consent of the Department.
Note: Not open to students with credit in Archaeology 613.
Note: Preference in enrollment is given to students who have declared a Major in Archaeology or Anthropology.

Archaeology 589 H(3-0)
(Anthropology 589)

*Nutritional Anthropology*
The study of human dietary practices from biological and cultural perspectives. Subjects covered include the development of nutritional anthropology, principles of nutrition, principles of ecology, diet from an evolutionary, comparative and historic perspective, the impact of undernutrition on human physiology, and behaviour and methods in nutritional anthropology.
Prerequisite: Pure Mathematics 30; Anthropology 201 or Archaeology 203 or Archaeology 305, and consent of the Department.

Archaeology 591 H(3-0)

*Landscape Archaeology*
Human perceptions and uses of the ecophysical and cultural environment. How societies humanize their environment by naming places, identifying resources, establishing paths, modifying and replicating the natural landscape thereby creating a tradition of land use that can be accessed archaeologically.
Prerequisite: Archaeology 451.

Archaeology 593 H(3-0)

*Household Archaeology*
Human perceptions and uses of the built environment, particularly residential architecture. The emphasis is on the structure and symbolism associated with the spatial arrangements of objects, activities, and social interactions.
Prerequisite: Archaeology 451.

Archaeology 595 H(3-0)

*Problems in Palaeopathology and Palaeonutrition*
Patterns of disease in prehistoric human populations with consideration to the interaction of health and nutrition. Techniques for determining disease and nutrition from prehistoric remains are covered.
Prerequisite: Pure Mathematics 30; Archaeology 203 or consent of the Department. Archaeology 555 is recommended.
Note: Preference in enrollment is given to students who have declared a Major in Archaeology or Anthropology.

Archaeology 596 F(3S-0)

*Honours Thesis (BSc)*
Thesis normally required of Honours BSc students and also open for credit to other undergraduate Majors. Students are expected to carry out an analytical research project on a subject acceptable to the Department and to produce a final report written in a professional manner. Normally the project will be directed by one staff member who will consult with another staff member in arriving at an evaluation of the report.
Prerequisite: Consent of the Department.

Archaeology 597 H(3S-0)

*Independent Reading Course*
An independent reading course for archaeology Majors. Each student is required to choose reading in consultation with an advisor.
Prerequisite: Consent of the Department.

Archaeology 598 F(3S-0)

*Honours Thesis (BA)*
Thesis normally required of Honours BA students and also open for credit to other undergraduate Majors. Students are expected to carry out a research project in a subject acceptable to the Department and to produce a final report written in a professional manner. Normally, the project will be directed by one staff member who will consult with another staff member in arriving at an evaluation of the report.
Prerequisite: Consent of the Department.

Archaeology 599 H(3-0)

*Independent Readings in Archaeology*
An independent reading course for archaeology majors. Emphasis will be on the methodological, technical and scientific literature relating to archaeological interpretation. Each student is required to choose reading in consultation with an advisor.
Prerequisite: Consent of the Department.

Graduate Courses

Archaeology 601 H(3-0)

*Theoretical Foundations*
The philosophy of science, the history of anthropological theory, and a survey of contemporary theoretical approaches in anthropology. Throughout, the relevance to and connections with the subdisciplines of archaeology and biological anthropology will be emphasized.
Prerequisite: Consent of the Department.

Archaeology 603 H(3S-0)

*Seminar on Special Topics*
Intensive study of special problems of particular interest to Archaeology Department graduate students. Subject matter for any particular year to be left to the discretion of the Department.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Archaeology 605 H(3-2)

*Advanced Zooarchaeology*
Specialized techniques of zooarchaeological analysis employed in research areas including site seasonality, aging and sexing, paleo-environmental reconstruction and identification techniques for non-mammalian species.
Prerequisite: Archaeology 417 or equivalent.

Archaeology 607 H(0-6)

*Interpretation in Lithic Analysis*
Lithic analysis methodology, including issues such as reduction stage analysis, usewear and residue analysis, material sourcing, replication, and spatial patterning. The use of lithic remains in interpretation of the social behaviour of archaeological cultures.
Prerequisite: Consent of the Department.

Archaeology 611 H(3-2)

*Advanced Geoarchaeology*
Critical evaluation of case studies and field examples to explore analytical methods and interdisciplinary theoretical approaches used in geoarchaeology. Field projects will be accompanied by seminar discussions of methodological and analytical approaches to geoarchaeology.
Prerequisite: Archaeology 453, or Geography 307, or Geology 373, or consent of the Department.

Archaeology 613 H(3-1T-2)

*Analysis of Human Skeletal Remains*
Methods of analyzing human remains from archaeological contexts with emphasis on identification and description. Lecture, lab and weekly seminar directed to Archaeology graduate students who have not had a previous course in human osteology.
Prerequisite: Consent of the Department.
Note: Not open to students with credit in Archaeology 555 or 603.07.

Archaeology 615 H(3-0)

*Topics in Archaeological Theory and Method*
The history of archaeological theory and contemporary theoretical and methodological approaches used in archaeological research.
Prerequisite: Consent of the Department.

Archaeology 617 H(3-0)

*Theory and its Application in Biological Anthropology*
Basic issues in the study of human adaptation with a focus on principles of evolutionary biology as they apply to modern studies. Throughout, a bio-cultural approach will be emphasized.
Prerequisite: Consent of the Department.

Archaeology 619 H(3-0)

*Advanced Topics in Human Osteology*
Current developments in interpretation of human skeletal and dental remains. Topics include forensic anthropology, bone biology, and population reconstruction.
Prerequisite: Archaeology 555 or consent of the Department.

Archaeology 621 H(3S-0)

*Problems in Ethnoarchaeology*
Seminar on selected topics relating to ethnoarchaeology.
Prerequisite: Consent of the Department.

Archaeology 623 H(3S-0)

*Reconstructing Plains Culture*
Archaeological and ethnographic Plains culture and the methodological and theoretical issues involved in the use of archaeological reconstructions of the past. Normally focus will be on the northern Plains.
Prerequisite: Consent of the Department.

Archaeology 625 H(3S-0)

*Hunter-Gatherer Adaptations*
Intensive study of contemporary and prehistoric hunter-gatherer social and economic adaptations.

Archaeology 627 H(3S-0)

*Origins of Agriculture*
Intensive study of the origins of agriculture throughout the world.

Archaeology 629 H(3-1)

*Advanced Ceramic Analysis*
Studies in ceramic analysis, including typology, manufacturing techniques, use-wear, form/function and style.

Archaeology 637 H(3S-0)

*Mesoamerican Archaeology and History*
Ancient history of Mesoamerica, emphasizing a conjunctive approach based on hieroglyphic, historical and ethnohistorical sources as well as on archaeological evidence.
Prerequisite: Consent of the Department.

Archaeology 639 H(3S-0)

*Stable Isotope Methods in Archaeology*
Methods and applications of stable isotope analysis to archaeological research. Topics to be covered include the use of light stable isotopes to determine past and present diet, the use of stable isotopes to document residence and migration, analysis of stable carbon isotopes in soils, stable isotope ecology for environmental reconstruction and paleoclimate studies.
Prerequisite: Consent of the Department.

Archaeology 701 H(3S-0)

*Special Topics in World Archaeology*
Archaeology of particular geographical areas such as Circumpolar, North America, Mesoamerica, South America, Africa, Oceania, and Europe and Near East.
MAY BE REPEATED FOR CREDIT

Archaeology 703 H(3S-0)

*Advanced Seminar in Selected Topics*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

In addition to the numbered and titled courses shown above, the department offers a selection of advanced level graduate courses specifically designed to meet the needs of individuals or small groups of students at the advanced doctoral level. These courses are numbered in the series 800.01 to 899.99. Such offerings are, of course, conditional upon the availability of staff resources.

## ART ART

### Contact Info

Location: Craigie Hall D 100
Faculty number: (403) 220-5383
Fax: (403) 282-6925
E-mail address: julia.ross@ucalgary.ca
http://art.ucalgary.ca/graduate

### 1. Degrees and Specializations Offered

Master of Fine Arts (MFA) thesis-based
Specializations: sculpture, printmaking, photography, painting, drawing, media art and technology, interdisciplinary work

Applicants interested in a doctoral degree in Art on a special case basis should contact the Department.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

a) A four-year Bachelor of Fine Arts degree or equivalent qualification;
b) A portfolio of 20 recent works presented in jpeg format on disk;
c) A 3-5 page written statement of intent;
d) Two Reference Letters.

### 3. Application Deadline

The deadline for the submission of complete applications is 15 January for September admission.

### 4. Advanced Credit

Not applicable

### 5. Program/Course Requirements

The program core for all Master of Fine Arts students is a minimum of four full courses. Within the first twelve months of the program each student must complete one full-course equivalent 600-level studio course; one half-course equivalent 600-level graduate seminar, and Art 601 and Art 605. One half-course equivalent 600-level graduate seminar and one full-course equivalent 600-level studio course must be completed in the second twelve months of the program. In some circumstances, the Department may require a student to complete more than the four mandatory full courses.

### 6. Additional Requirements

Additional requirements for the Master of Fine Arts degree include an exhibition of the student's work, a supporting paper, and an oral examination.

### 7. Credit for Undergraduate Courses

Not applicable

### 8. Time Limit

Expected completion time for the Master of Fine Arts degree is two years. Maximum completion time is four years.

### 9. Supervisory Assignments

Each new student is assigned an interim advisor to assist in the planning of the academic program and in orienting the student to the Department's physical and academic resources. A permanent supervisor is appointed by 1 January of the first academic year of registration. The approval of a permanent supervisor, by the Graduate Program Director, is made after consultation with the student. Supervisors work closely with students in all phases of the program; they have the principal responsibility in assessing the student's performance, and advising the Department Head of the student's progress.

### 10. Required Examinations

Final thesis oral examinations are open.
Questions on the research proposal will not be included in the oral candidacy examination of special case doctoral degree students.

### 11. Research Proposal Requirements

Not applicable

### 12. Special Registration Information

The program requires an initial registration as a full-time graduate student for two consecutive years. A minimum of twenty-four months of full-time study is usually necessary to complete the degree requirements.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards see the Awards and Financial Assistance section of this calendar. Students applying for scholarships must submit their applications to the Faculty of Fine Arts by January 15.

### 14. Other Information

The Department has extensive facilities for multi-media, mixed media and new media projects.

### 15. Faculty Members/Research Interests

Faculty members and their research interests can be found at http://art.ucalgary.ca/contact-us/directory/68

### Graduate Courses

Art 601 H(0-3T)

*History of Art I*
Individual study: In consultation with the instructor, the student will select a research topic in art history or art criticism.
Prerequisite: Consent of the Department.

Art 603 H(0-3T)

*History of Art II*
Individual study: In consultation with the instructor, the student will select a research topic in art history or art criticism.
Prerequisite: Art 601 or consent of the Department.

Art 605 H(0-3T)

*Critical Study and Research*
Individual study and research in the area of studio specialization, critical theory, methodological issues and/or historical topics.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Art 661 F(3/2S-10)

*Advanced Studio Practice*
Individual weekly study in studio, with seminar-based discussions in research area. The seminar meets every two weeks throughout the entire academic year.
661.01. Advanced Studio Practice
661.02. Thesis Studio Practice
Prerequisite: For Art 661.01: Consent of the Department; for Art 661.02, the prerequisite is ART 661.01.

Art 691 H(3-0)

*Pedagogy and Professional Practice*
Issues in professional practice and post-secondary teaching in visual art. Optional Course.
Prerequisite: Consent of the Department.
**MAY BE REPEATED FOR CREDIT**

Art 699 H(3-0)

*Topics in Art Theory and Criticism*
Studies in contemporary art theory and criticism
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Art 761 H(2T-10)

*Advanced Independent Studio research*
Theoretical and applied concepts in studio.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Graduate Courses

Art History 613 H(3-0)

*Independent Study in Art History*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Art History 615 H(3-0)

*Conference Course in Art History*
Specialized study in an area of art history selected on the basis of particular interest and need.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Art History 617 H(3-0)

*Thesis Development*
A reading and conference course in the student's research area.
Prerequisite: Consent of the Department.

## BIOLOGICAL SCIENCES BISI

### Contact Info

Location: Biological Sciences Building, Room 186
Faculty number: (403) 220-6623
Fax: (403) 289-9311
E-mail address: biograd@ucalgary.ca
Web page URL: http://www.bio.ucalgary.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based

Concentrations of Study include:
Biochemistry; Cell Development & Physiology;
Ecology and Evolutionary Biology;
And Microbiology.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Science requirements, the Department requires:

a) A minimum grade point average of 3.20 on a four point scale over the last two full years or equivalent.
b) For students required to provide proof of proficiency in English; a TOEFL score of 580 (written test), or 92 (internet-based test), or an IELTS score of 7.5, or a MELAB score of 82, or a PTE score of 64.
c) A concise statement outlining the applicant's research interests and reasons for wishing to attend the University of Calgary.
d) Two Reference Letters.

### 3. Application Deadline

Deadlines for submission of complete applications for students with international transcripts:

1 May for September admission
1 September for January admission
1 January for May admission

Deadlines for submission of complete applications for students with Canadian or US transcripts:

1 June for September admission
1 October for January admission
1 March for May admission

### 4. Advanced Credit

Not applicable.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Science requirements, the Department requires:

a) Completion of a minimum of one full-course equivalent for both the Master of Science and doctoral programs. Students transferring to a doctoral program will be required to take a minimum of one half-course in addition to work already completed. Please note that graduate courses must be chosen in consultation with the supervisor and approved by the Graduate Director. Course requirements may include courses offered by other departments;
b) Completion of the appropriate number of Biology 601 Research Seminar courses in addition to (a) above;
c) Presentation of a Departmental Pre-Defense seminar on the results of the thesis research.

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

At least one-half of a graduate student's coursework must be at the 600-level or higher.

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

### 8. Time Limit

Expected completion time is two years for the Master of Science degree and four years for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Science degree and six years for the Doctor of Philosophy degree.

### 9. Supervisory Assignments

Applicants normally contact specific faculty members about possible supervision. The Department does not accept students unless at least one faculty member has indicated a willingness to act as supervisor. The supervisor, in consultation with the student, selects an Advisory Committee consisting of the supervisor and at least two other faculty members whose research area will be beneficial to the student's graduate program.

### 10. Required Examinations

Doctoral candidacy examinations have a written component followed by an oral component. Doctoral candidates are given three weeks to complete three substantive essays in answer to questions, which focus on the student's field of specialization, submitted by their candidacy committee. One week after the submission of the answers, the oral component will take place.

The oral candidacy exam will be based on the written essays and general research knowledge. Questions on the research proposal will not be included in the oral candidacy examination.

Final Thesis Examinations are required at both the Master of Science and Doctoral level. A public "Exit" Seminar preceding the examination is required.

### 11. Research Proposal Requirements

Both Master of Science and doctoral students must present a written research proposal to their supervisory committees no later than twelve months after initial registration in program.

### 12. Special Registration Information

A request for transfer of program from the Master of Science program to the doctoral program may be made no later than twenty-four months after initial registration. Students who transfer will be required to take one additional half-course, regardless of course work completed before the transfer, and are expected to meet the 36-month deadline for the candidacy examination.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for the Open Scholarship Competition must submit their scholarship applications to the Department by 18 January.

### 14. Other Information

None.

### 15. Faculty Members/Research Interests

The research interests of current faculty members can be found at:
http://bio.ucalgary.ca/research/index.html.

Biochemistry (BCEM)

Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

See also the separate listing of graduate level Chemistry courses.

Biochemistry 543 H(3-0)

*Enzymology*
The structure, mechanisms and biological interactions of enzymes. Binding, catalysis, rates and regulation will be discussed with regard to chemical principles of kinetics and reaction. The principles of enzyme action will be considered in the context of the biological role that enzymes play.
Prerequisites: Biochemistry 393 or 443, and Chemistry 353 or 355.

Biochemistry 547 H(3-0)

*Signal Transduction and Regulation of Metabolism*
Principles of signal transduction with examples from prokaryotes and eukaryotes. Discussion of protein covalent modifications, inositol lipid signaling, structure and function of protein kinases and protein phosphatases and their role in regulating various aspects of cell function. Emphasis on metabolic pathways, cell cycle control, checkpoints, DNA damage response and epigenetics.
Prerequisite: Biochemistry 393 or 443.

Biochemistry 551 H(3-0)

*Structural Biology*
Applications of modern methods to structural studies of proteins and nucleic acids by NMR and X-ray crystallography with a comparison of the structural information derived from the two methods. Crystallization of macromolecules. Experimental and theoretical foundations of X-ray and NMR structure determination, and ligand binding. Non-invasive NMR studies of metabolism, and magnetic resonance imaging.
Prerequisites: One of Biochemistry 341 or 393, and one of Biochemistry 471 or Chemistry 371.

Biochemistry 555 H(3-1T-0)

*Biomembranes*
The material examines the structure and function of biological membranes with a strong emphasis on the role of membrane proteins. Topics may include the physical properties of lipid bilayers, isolation and purification of membrane proteins, preparation of membrane mimetic systems, ion and solute movement across membranes (transport and ion channels), membrane protein folding, assembly and structure, and protein secretion and translocation systems.
Prerequisite: Biochemistry 393 or 443.
Note: Prior or concurrent completion of Biochemistry 431 and 471 is strongly recommended.

Biochemistry 561 H(2-3T)

*Applied Biochemistry and Biotechnology*
An introduction to the language, materials, methods, concepts and commercial applications of biotechnology with emphasis on methodology: biocatalysts, bioreactor designs and operation, scale-up, instrumentation, product recovery, animal and plant cell culture, process economics.
Prerequisite: Biochemistry 393.
Note: Credit for both Biochemistry 561 and Biotechnology 561 will not be allowed.
Note: Prior completion of Cellular, Molecular and Microbial Biology 411 or Biochemistry 401 is strongly recommended.

Biochemistry 575 H(3-2T-0)

*Lipids*
Structure and function of lipids including phospholipids, sphingolipids, and steroids. Topics include properties of lipids and bilayers, lipid-lipid and lipid-protein interactions, technological applications, biosynthesis and regulation, lipids as second messengers, intracellular trafficking, and lipids in physiology and disease. Literature review and student seminars are significant components of this course.
Prerequisite: Biochemistry 393 or 443

Biochemistry 577 H(3-4/2)

*Biomolecular Simulation*
Introduction to simulation and computer modelling methods commonly used in biochemistry and biophysics, with a focus on physical models to understand the behaviour of biomolecules. Topics include simulation methods, dynamics of proteins, DNA, and lipids, calculation of binding constants, protein-drug interactions, properties of ion channels as well as a number of recent literature topics.
Prerequisites: One of Biochemistry 341 or 393 and one of Biochemistry 471 or Chemistry 371.
Graduate Courses

Graduate Courses
Enrolment in any Graduate Course requires consent of the Department. 600-level courses are available with permission to undergraduate students in the final year of programs.

Biochemistry 641 H(3-0)

*Selected Topics in Biochemistry*
Selected topics in Biochemistry such as those which appear annually in the serial publication Annual Review of Biochemistry.
MAY BE REPEATED FOR CREDIT

Biochemistry 731 H(3-0)

*Current Topics in Biochemistry*
Contemporary methods of recombinant DNA technology will be combined with modern methods and strategies for expressing, secreting, purifying and characterizing proteins. This will include biophysical techniques, structural analysis and covalent modifications. Various modern 'omics' research approaches will also be discussed.

## Biology (BIOL)

†Limited amounts of non-scheduled class time involvement will be required for these courses.

Undergraduate Courses

Biology 501 H(3-0)
(Medical Science 501)

*Principles and Mechanism of Pharmacology*
Basic principles of pharmacology, with specific emphasis on receptor signaling mechanisms.
Prerequisites: Consent of the Department and Biochemistry 443, and one of Zoology 461, 463, or Medical Science 404.

Biology 503 H(3-0)
(Medical Science 503)

*Pharmacology of Organ Systems*
Pharmacology of the nervous, cardiovascular, renal and immune systems, as well as anti-cancer therapies. Principles of toxicology.
Prerequisite: Biology 501 (Medical Science 501) or consent of the Department.

Biology 505 H(3-0)

*Medicinal Plant Biochemistry*
This course deals with biochemical, molecular, and cellular aspects of plant metabolism, natural product diversity in the plant kingdom, and modern molecular and biochemical methods to understand plant metabolism. The focus of this course is on the metabolic pathways that are either unique to plants, or that exhibit unique features in, plants. Several key plant pathways that produce plant-derived medicines will be discussed.
Prerequisites: Biology 331 and Biochemistry 393
Note: Credit for Biology 505 and Botany 503 will not be allowed.
Note: Enrolment in this course may be limited. See Program Details in the Faculty of Science section of this Calendar.

Biology 515 (Medical Science 515) H(3-0)

*Cellular Mechanisms of Disease*
The cellular and molecular mechanisms underlying basic human disease processes and how these can be influenced by lifestyle and environmental factors. The ways in which this knowledge can be used in the laboratory diagnosis of disease.
Prerequisites: Biochemistry 443 and Biology 331.

Biology 520 F(3-3)

*Field Course in Tropical Biology*
An examination of biodiversity in a selected region of the tropics, including aspects of ecology of animals and plants, animal behaviour and an introduction to field techniques for observing and censusing selected taxa. Field studies will take place at forest and savannah sites with consideration of community-based conservation efforts.
Prerequisite: Consent of the Department.

Biology 551 H(3-0)

*Systems Biology*
An overview of theoretical concepts and high-throughput technologies in systems biology. Functional genomics, genetic circuits, gene-regulatory networks, and systems dynamics as applied to the control of development.
Prerequisite: Biology 331, Biochemistry 393, and Math 249 or 251 or 281.
Note: Prior completion of Computer Science 217 or 231; and Math 211 or 213 is strongly recommended.

Biology 553 H(3-0)

*Molecular Biophysics*
A comprehensive survey of modern biophysics covering the flow and processing of matter, energy and information in living systems. Equilibrium and non-equilibrium thermodynamics in biology. Molecular motors and facilitated proton transport. An integrative approach connecting atomistic theories to cellular processes.
Prerequisite: Biochemistry 341 or 393; and Biochemistry 471 or Chemistry 371.
Note: Prior completion of Biochemistry 555 is strongly recommended.

Biology 591 H(1-5)

*Insect Biodiversity*
A field course in the natural history and classification of insects, one of the most diverse groups of organisms known, as they are encountered in their natural habitat. Course material will include: techniques for collection and identification of major groups of insects and related terrestrial arthropods; aspects of behaviour and ecology of local species; use of insects as indicators of environmental change; censusing/monitoring insect populations.
Prerequisite: Consent of the Department.

Graduate Courses
Enrolment in any Graduate Course requires consent of the Department. (Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.) 600-level courses are available, with permission, to undergraduate students in the final year of programs.

Biology 601 H(2S-0)

*Research Seminar*
Reports on studies of the literature or of current research. Graduate students normally register in their supervisor's research cluster \
601.01. Biochemistry I
601.02. Biochemistry II
601.03. Cell Development and Physiology I
601.04. Cell Development and Physiology II
601.05. Ecology and Evolutionary Biology I
601.06. Ecology and Evolutionary Biology II
601.07. Microbiology I
601.08. Microbiology II
NOT INCLUDED IN GPA

Biology 603 H(3-1)
(Medical Science 603)

*Biology of Laboratory Animals*
The course is based on the Canadian Council on Animal Care Syllabus "Basic Principles of Laboratory Animal Science for Research Scientists." In addition to the study of common, research, farm and exotic animals, topics to be covered include ethical considerations, regulation and legislation, animal models, animal facilities and husbandry, hazard control, surgery, anaesthesiology, euthanasia and post-mortem examinations. Practical sessions will provide experience in handling and restraint of specific laboratory animals, injections, blood collection, anaesthesiology and surgery.
Note: Enrolment in this course is restricted in the first instance to graduate students who will do research utilizing animals.

Biology 607 H(3-3)

*Special Problems in Biology*
Lectures, seminars, term papers and training in theoretical and/or laboratory methods.
MAY BE REPEATED FOR CREDIT

Biology 609 H(3-0)

*Advanced Statistical Applications in Biology*
This course explains and demonstrates the analysis of biological data with general linear models, generalized linear models, maximum-likelihood fitting of nonlinear models, and resampling techniques. Content is presented in a workshop format, so that students learn the application of computer analysis coincidentally with statistical concepts.
Prerequisite: Familiarity with statistical inference, regression, and ANOVA-based experimental design (equivalent of Ecology 425) is required.
Note: Offered in odd-even dated academic years.

Biology 619 H(3-0)

*Advanced Evolutionary Biology*
The theory of organic evolution. Historical development of evolutionary ideas. Darwin's contribution. The mechanism of natural selection; sexual, kin and group selection. The application of the theory in biogeography, ecology, ethology and other areas in biology.
Note: Offered in odd-even dated academic years.

Biology 651 H(3-0)

*Topics in Systems Biology*
In-depth discussions of the latest publications in systems biology, with emphasis on the fundamental principles of genome and cell function.
Note: Offered in odd-even dated academic years.

Biology 653 H(3-0)

*Topics in Functional Genomics*
Presentation and discussion of the primary literature in high-throughput methods for global functional and network analysis of genes and proteins (reverse genetics, microarrays, two hybrid, mass spectrometry and RNAi screening).
Note: Offered in odd-even dated academic years.

Biology 703 H(0-6)

*Recent Advances in Biology*
Lectures, seminars and/or laboratories on special advanced topics in biological sciences. Each student should seek consent of a departmental faculty member who will supervise the chosen study.
MAY BE REPEATED FOR CREDIT

## Botany (BOTA)

### Undergraduate Courses

Botany 541 H(3-3)
(formerly Botany 441)

*Taxonomy of the Seed Plants*
A study of plants in relation to classification, phylogeny, evolution and identification. Students are required to make a plant collection of fifty plant specimens for identification in the laboratory. It is recommended that the collection be made in the preceding summer.
Prerequisites: Biology 327.

Botany 543 H(3-3)

*Plant Cell and Developmental Biology*
Physiology, biochemistry, molecular and cellular aspects of plant growth and development. Emphasis on the coordinated regulation of gene expression, cell-cell communication, and signalling during development. Discussion on the methods used to study development, such as mutants of Arabidopsis and other model systems.
Prerequisites: Biology 331 and Botany 303 or 321.
Note: Offered in odd-even dated academic years.
Note: Enrolment in this course may be limited. See Program Details in the Faculty of Science Section of this Calendar.

### Graduate Courses

Enrolment in any graduate course requires consent of the Department. Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.600-level courses are available with permission to undergraduate students in the final year of their programs.

Botany 633 H(3-0)

*Current Topics in Plant Biology*
Lectures, discussions and student seminars on topics of current interest in plant biology. Topics will include functional genomics, advances in forward and reverse genetics, hormone signaling, plant-microbe and plant-environment interactions.
Note: Senior undergraduate students in the Botany program are strongly encouraged to register this course.
MAY BE REPEATED FOR CREDIT

Botany 645 H(3-2S)

*Dynamic Aspects of Plant Ultrastructure*
The ultrastructural and functional aspects of the cell, tissue, and organ systems of vascular plants. Analysis and interpretation of electron micrographs. Seminars on recent research development.
Note: Offered in even-odd dated academic years.

Botany 745 H(0-6)

*Plant Biology Microtechniques*
Principles and practice of preparation of plant tissues for light microscope study. Plastic embedding techniques, histochemistry, immunohistochemistry, quantitative cytochemistry, fluorescence microscopy, confocal laser scanning microscopy and photomicroscopy are included.
Note: Offered in odd-even dated academic years.

## Cellular, Molecular and Microbial Biology (CMMB)

### Undergraduate Courses

†Limited amounts of non-scheduled class time involvement will be required for these courses.

Cellular, Molecular and Microbial Biology 505 † H(3S-0)

*Advanced Developmental Biology*
In-depth analyses of the current literature in developmental biology. Emphasis will be on the coordinated regulation of gene expression during development.
Prerequisites: Biochemistry 401 or 443, Cellular, Molecular and Microbial Biology 403.

Cellular, Molecular and Microbial Biology 511 H(3-0)

*Molecular Biology and Genetics*
The concepts of molecular biology as they apply to genetics. Application of current methodology to the understanding of the genetics of prokaryotes, lower and higher eukaryotes (for example: fungi, yeasts, trypanosomes, plants and animals). Genomic organization and function of subcellular organelles such as mitochondria and chloroplasts will also be considered in detail. The mechanism(s) of regulation of gene expression will be discussed in relation to nuclear as well as organelle genomes.
Prerequisite: Cellular, Molecular and Microbial Biology 411.

Cellular, Molecular and Microbial Biology 519 H(3-0)

*Advanced Cell Biology*
In-depth analysis of current literature in cell biology. Topics include the cytoskeleton, subcellular organization and dynamics, RNA and protein trafficking, and other aspects of eukaryotic cell biology.
Prerequisites: Biology 311, 331 and one of Biochemistry 401 or 443.

Cellular, Molecular and Microbial Biology 523 H(3-0)

*DNA, Genomes and RNA Function*
An examination and comparison of the roles of DNA and RNA in the cell. Includes chromatin structure, transcriptional regulation, mechanisms of post-transcriptional regulation at the RNA level, and the diverse roles played by RNA, ranging from information molecules to structural scaffolds to ribozymes.
Prerequisite: Cellular, Molecular and Microbial Biology 411.

Cellular, Molecular and Microbial Biology 527 H(3-3)
(formerly Cellular, Molecular and Microbial Biology 427)

*Immunology*
Comprehensive overview of the immune responses: antibody-antigen interaction, antibody structure, genetics and synthesis, cellular immunology, MHC, phagocytosis, tolerance, autoimmunity, hypersensitivity, tissue rejection, tumour immunology and vaccine production. Responses to viral, bacterial, fungal and parasite infections. Methods for the study of immunology.
Prerequisites: Biochemistry 401 or 443, Biology 311, 331, Cellular, Molecular and Microbial Biology 343.
Note: Enrolment in this course may be limited. See explanation in the Program section of this Calendar.

Cellular, Molecular and Microbial Biology 531 H(3-0)

*Topics in Cellular Interactions*
An exploration of selected topics concerning cell-cell interactions and the interactions of cells with their environment during development, differentiation and disease. Multidisciplinary approaches will be presented, using discussions of seminal research and critical analysis of current literature. Potential topics include cell junctions, cell signaling, cytoskeletal organization, stroma, extracellular matrix remodeling and stem cells.
Prerequisites: Biology 331, and one of Biochemistry 443 or 431 or 401
Note: Credit for both Cellular, Molecular and Microbial Biology 531 and 507.90 will not be allowed.
Note: Prior completion of Cellular, Molecular and Microbial Biology 403 is highly recommended and Cellular, Molecular and Microbial Biology 451 or 527 are advantageous.

Cellular, Molecular and Microbial Biology 543 H(3-0)

*Environmental Microbiology*
Focuses on understanding the interactions of micro-organisms with their environment. Roles of micro-organisms in nutrient cycling, biological control, and biodegradation will be discussed. The use of molecular approaches to identify and characterize microbial communities, and to understand the precise nature of microbial interactions with abiotic and biotic environments will be emphasised. Special topics will include plant-microbe and animal-microbe symbiosis, extreme environments and biotechnological applications of environmental microbiology.
Prerequisite: Cellular, Molecular and Microbial Biology 343 or consent of the Department.

Cellular, Molecular and Microbial Biology 545 H(3-0)

*Petroleum Microbiology*
Microorganisms can contribute to a more sustainable energy future. Their impact and roles in the fossil fuel industry will be reviewed. Topics will include oilfield souring, biocorrosion, biodegradation, enhanced recovery, upgrading, and bioremediation of contaminated sites.
Prerequisite: Cellular, Molecular and Microbial Biology 343 or consent of the Department.

Cellular, Molecular and Microbial Biology 549 H(3-0)

*Microbial Genetics*
The structure and function of microbial genes and genomes will be analyzed with state-of-the-art bioinformatics programs. Advances in understanding of mechanisms of genetic exchange in bacteria and bacteriophages, including conjugation, transduction, transformation and lysogeny will be presented together with selected topics in microbial genetics.
Prerequisite: Cellular, Molecular and Microbial Biology 411.

Cellular, Molecular and Microbial Biology 561 H(3-0)
(Medical Science 561)

*Cancer Biology*
Advances in methodology and in theoretical concepts have permitted continuing breakthroughs in our understanding of the organismal, cellular and molecular biology of cancer cells, and in the development of novel strategies for cancer prevention, diagnosis and treatment. These advances will be presented in a comprehensive overview of cancer including issues of demographics and incidence, causation and detection, origins and progression and therapeutic approaches. Emphasis will be placed on the cell and molecular biology of cancer and on the interaction of the cancer cell with the host organism.
Prerequisites: Biology 331, Cellular, Molecular and Microbial Biology 411 and one of Biochemistry 401 or 443.

Graduate Courses

Enrolment in any graduate course requires consent of the Department. Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599. 600-level courses are available with permission to undergraduate students in the final year of their programs.

Cellular, Molecular and Microbial Biology 637 H(3-3)

*Advanced Topics in Molecular Microbiology.*
Techniques and discussion of recent literature in molecular microbiology. Topics covered will vary from year to year, but could include bioinformatics, genomics, mutagenesis, advanced microscopy techniques, proteomics, vectors and cloning techniques, gene expression, and over-expression of proteins, as they relate to the study of prokaryotic systems. Course content will be tailored to the interests of the graduate students enrolled in the class in a given year.
MAY BE REPEATED FOR CREDIT

## Ecology (ECOL)

†Limited amounts of non-scheduled class time involvement will be required for these courses.

Undergraduate Courses

Ecology 501 H(0-3)

*Ecological and Evolutionary Applications*
A class project course in which students apply their understanding of ecological and evolutionary concepts and their analytical skills to investigate selected problems in detail. Project topics vary from year to year and will include fundamental and applied problems. Formal written and oral reports will be presented as a necessary component of the course.
Prerequisite: Ecology 417, 425, 429 and completion of at least 12.5 FCE in the Ecology program.
Note: Prior or concurrent completion of Biology 401, Ecology 419 and 439 are strongly recommended. Ecology 501 is intended to draw on experience gained throughout the Ecology program, and should be taken by students in the final year of the program.

Ecology 527 H(3-1T)

*Ecology of Fishes*
The ecology of fishes with an emphasis on freshwater systems. Fish will be used as models for examining ecological principles and theory at various levels of organization including physiological, behavioural, population and community ecology. Topics covered include: morphology, systematics, foraging, bioenergetics, life history strategies, population dynamics and the role of fish in aquatic food webs.
Prerequisites: Biology 313, and one of Ecology 417 or Zoology 477.02.
Note: Offered in even-odd dated academic years.

Graduate Courses

Enrolment in any graduate course requires consent of the Department. 600-level courses are available with permission to undergraduate students in the final year of programs.

Ecology 603 H(3-0)

*Advanced Behavioural Ecology*
Current problems and recent research in areas of particular significance. Topics will vary from year to year.
Note: Offered in even-odd dated academic years.
MAY BE REPEATED FOR CREDIT

Ecology 607 H(0-6)

*Limnology and Oceanography*
Lectures, seminars and projects in the areas of limnology, aquatic ecology and oceanography.

Ecology 677 H(0-6)

*Advanced Population Ecology*
The theory and practice of the study of populations, methods of population estimation, factors affecting populations, and systems approaches to the modelling of populations.
MAY BE REPEATED FOR CREDIT

Ecology 731 H(3-0)

*Advanced Plant Ecology*
Current problems and recent research in areas of particular significance. Topics will vary from year to year.
MAY BE REPEATED FOR CREDIT

## Zoology (ZOOL)

Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

†Limited amounts of non-scheduled class time involvement will be required for these courses.

Zoology 531 H(3-3)

*Histology*
Light and electron microscopic morphology of the basic tissues (epithelia, connective tissues, muscles and nerves) in the vertebrates; structural and functional associations of the basic tissues in the primary organs of the body.
Prerequisites: Biology 331 and one of Zoology 377 or 471.
Note: Offered in even-odd dated academic years.

Zoology 567 H(3-3)

*Animal Behaviour*
Offered from an evolutionary and ecological perspective. Development of ethological ideas; interaction of genotype and environment in ontogeny of behaviour; role of behaviour in dealing with environmental challenges.
Prerequisites: Biology 313 and one of Ecology 429, Zoology 375, 377 or 477.
Note: Credit for both Marine Science 546 and Zoology 567 will not be allowed.
Note: Offered in even-odd dated academic years.
Note: Enrollment in this course may be limited. See Program Details in the Faculty of Science section of this Calendar.

Zoology 571 H(3-2)

*Palaeobiology of Vertebrates*
Evolutionary trends in the major groups of vertebrates from both neontological and palaeontological viewpoints. The interpretation of palaeontological data and their applicability to our understanding of evolution, systematics and palaeoecology .

571.01 Dinosaurs, Birds and Mammals.

571.02 Fishes, Amphibians and Reptiles.
Prerequisite: Zoology 377.
Note: Credit for either Zoology 571.01 or 571.02 and Zoology 571 will not be allowed.
Note: Prior completion of Zoology 477.01 or 477.02, and Geology 201 or 209 are strongly recommended. Courses can be taken in either order. Zoology 571.01 is offered in odd-even dated academic years. Zoology 571.02 is offered in even-odd dated academic years.

Zoology 573 H(2-1T-3)

*Advanced Embryology*
Analysis of mammalian embryology including gametogenesis, fertilization, cleavage, gastrulation, and early organogenesis. Consideration of normal developmental patterns and abnormal events resulting in congenital malformations.
Prerequisite: Zoology 471 or Cellular, Molecular and Microbial Biology 403.
Note: Credit for both Zoology 573 and Medical Science 607.02 will not be allowed.
Note: Offered in odd-even dated academic years.

Zoology 575 H(3-0)

*Advanced Topics in Animal Biology*
Prerequisite: Biology 313.
MAY BE REPEATED FOR CREDIT

Zoology 577 H(3-3)

*Mammalogy*
A detailed examination of the evolution, morphology, physiology, ecology and behaviour of mammals.
Prerequisites: Biology 313 and Zoology 411.01 or consent of the department..
Note: Offered in even-odd dated academic years.
Note: Enrollment in this course may be limited. See explanation in the Program section of this Calendar.

Zoology 583 H(3-0)

*Ornithology*
An overview of the biology of birds, including their evolution, morphology, ecology and behaviour. The course will emphasize the influence that being a flying homeotherm has had on almost every aspect of avian biology.
Prerequisites: Zoology 477.01 and Biology 313.
Note: Offered in odd-even dated academic years.

Zoology 595 H(3-0)

*Comparative Neuromuscular Physiology*
Examination of the nervous and muscular systems of selected invertebrate animals spanning phyla from the Protozoa to the Echinodermata. Material will be selected that relates the behaviour to the nervous and muscular systems unique to each group. Specializations unique to various groups will be examined as well as the increasing complexity at various levels of organization. Instructional format includes lectures and student seminars.
Prerequisite: Zoology 461.

Zoology 597 H(3-1S)

*Principles of Endocrinology*
General and molecular aspects of endocrine physiology. Topics will include the mechanisms of hormone action (receptor occupancy and transduction of signal), current techniques in endocrinology, synthesis and release of hormones, and the functional role of different endocrine organs. Lectures will include examples from lower vertebrates and invertebrates to emphasize comparative aspects.
Prerequisite: Zoology 463.

## BIOMEDICAL ENGINEERING BMEN

UPDATED

### Contact Info

Location: ENA 121C
Faculty number: (403) 220-3835
Fax: (403) 210 8447
E-mail address: bmegrad@ucalgary.ca
Web page URL:
http://www.schulich.ucalgary.ca/Biomedical

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based
Master of Engineering (MEng), thesis-based

The curriculum is designed for students with degrees in Engineering, Medicine, Physical Sciences, or Life Sciences. Background experience and qualifications, as well as areas of interest of the applicants will be taken into account at the time of admission. The appropriateness of the undergraduate preparation of the applicant must be supported by the proposed supervisor(s). Students in the MSc and PhD degree programs are normally considered full-time.

The MEng (thesis-based) will focus on Engineering Healthcare Systems Management, and is intended to be taken full time, although part-time schemes are available.

Some aspects of the Biomedical Engineering Graduate program are offered in collaboration with the University of Alberta.

### 2. Admission Requirements

Students will be admitted to the Faculty of Graduate Studies on the recommendation of the Admissions Committee for the Biomedical Engineering program. Minimum GPA requirements are 3.0 for the MEng (thesis-based) program, 3.2 for the MSc program, and 3.5 for the PhD program, all on a 4.0 scale.

For admission to the MEng, MSc or PhD program, students must provide two Reference Letters with their application package.

For admission to the MEng (thesis-based) program, students must have an approved undergraduate degree in engineering.

MSc and PhD students can only be accepted upon identification of one or more approved Biomedical Engineering Program graduate supervisors who are willing to supervise and fund the applicant.

International students are required to demonstrate proficiency in the English language, in accordance with the guidelines of the Faculty of Graduate Studies. All students must meet the admission requirements of both the Faculty of Graduate Studies and the Biomedical Engineering Graduate Program.

Transfer of appropriately qualified MSc students directly into the PhD program is encouraged. Students wishing to transfer must do so between 8 and 16 months of first registration. For transfer a minimum GPA (over a minimum of 3 half course equivalents, including BMEN 602.02 (or BMEN 601) and 604.02 (or BMEN 603)) of 3.5 is required. In addition, a research proposal, approved by the supervisory committee, must be submitted to the Biomedical Engineering Graduate Program. Applications for transfer must be supported by both the supervisor and the supervisory committee.

### 3. Application Deadline

Students applying for MSc and PhD programs may be admitted for September, January, or May. Students applying for the MEng (thesis-based) program may be admitted for September start only. For all programs, deadlines are 3 months prior to the start of the semester (i.e. June 1 for September admission, etc.) for students holding a degree from a recognized Canadian or US University, and 6 months prior to the start of the semester (i.e. March 1 for September, admission, etc.) for students holding a degree from another recognized international University.

### 4. Advanced Credit

Credit may be granted with approval of the Biomedical Engineering Graduate Program. Advanced standing will not be granted for BMEN 602.02 or BMEN 604.02.

### 5. Program/Course Requirements

MSc/PhD

For a Master of Science degree, all students are required to take a minimum of four half courses as approved by the Biomedical Engineering Graduate Program. Note the sequence of BMEN 602.01 and BMEN 602.02, as well as BMEN 604.01 and BMEN 604.02 each count as one half course equivalent.

For a Doctor of Philosophy, two further elective courses are required beyond the Master of Science requirements. For students who transfer from an MSc program, six graduate half courses are required beyond the BSc, or equivalent, degree.

All MSc and PhD students are required to take two half-course equivalents of Core Courses plus a BME program seminar course (either BMEN 605 or BMEN 607). The Core Courses are offered as quarter courses (BMEN 602.01, BMEN 602.02, BMEN 604.01 and BMEN 604.02).

Other courses may be chosen from the listing of Additional Courses or approved courses from other departments (see website for most recent information:

http://www.schulich.ucalgary.ca/Biomedical). Other relevant courses, not on the Additional course list or Program's web site, require the approval of the supervisor and the Biomedical Engineering Graduate Program. Students may be required to take senior undergraduate courses as deemed by their Supervisory Committee, but graduate credit will only be granted for senior undergraduate courses as approved by the Biomedical Engineering Graduate Program.

In addition to the course requirements, all MSc and PhD students are required to complete a research project and to submit a written thesis in compliance with the regulations of the Faculty of Graduate Studies.

### Master of Engineering (thesis-based)

For a Master of Engineering (thesis-based), eight half-courses are required, in accordance with the rules of the Biomedical Engineering Graduate Program and the Faculty of Graduate Studies.

All Master of Engineering (thesis-based) students are required to take two half-course equivalents of Core Courses plus a BME program seminar course (either BMEN 605 or BMEN 607) plus a project management course at the graduate level (usually ENCI 691), a health economics course at the graduate level (usually ECON 679) and a clinical trials and biomanufacturing course at the graduate level (usually MDSC 669). The Core Courses are offered as quarter courses (BMEN 602.01, BMEN 602.02, BMEN 604.01 and BMEN 604.02). One of the remaining three courses must be chosen from the Additional Courses approved by the Biomedical Engineering Graduate Program for Master of Engineering (thesis based) students (see website for most recent information: http://www.schulich.ucalgary.ca/Biomedical).The remaining two courses must include at least one BMEN or ENXX course.

In addition to the course requirements, all Master of Engineering (thesis-based) students are required to complete a project-based research project and to submit a written thesis in compliance with the regulations of the Faculty of Graduate Studies.

### Core Courses

1. Biomedical Engineering 602.01 - Fundamentals of Biomedical Engineering – Core Areas
2. Biomedical Engineering 602.02 - Fundamentals of Biomedical Engineering – Research Areas
3. Biomedical Engineering 604.01 - Frontiers of Biomedical Engineering – Scientific Communication
4. Biomedical Engineering 604.02 - Frontiers of Biomedical Engineering – Research Methods

Note that the four listed core course are quarter courses, though the intention is that most students would take BMEN 602.01 and BMEN 602.02 sequentially in the Fall term, and BMEN 604.01 and BMEN 604.02 sequentially in the Winter term. BMEN 602 and BMEN 604 may be taken out of sequence for students first registering in the Winter term.

### Additional Courses

1. Biomedical Engineering 605 – Research Seminars of Biomedical Engineering
2. Biomedical Engineering 607 – Research Seminars of Biomedical Engineering
3. Biomedical Engineering 609 – Anatomy and Physiology for Biomedical Engineers
4. Biomedical Engineering 619.XX – Special Problems in Biomedical Engineering

Additional Courses for MEng (thesis-based)

1. Medical Science 668 – Biotechnology Commercialization
2. Medical Science 672 – Biotechnology Business Aspects
3. Medical Science 658.02 – Health Economics II

Additional Courses in Theme 1: Medical Imaging

1. Electrical Engineering 697 - Digital Image Processing
2. Medical Science 689.01– Medical Imaging Techniques
3. Medical Science 689.02– Advanced Magnetic Resonance Imaging
4. Medical Science 689.03– Advanced Medical Image Processing
5. Medical Science 689.04 - Advanced Molecular Imaging
6. Medical Science 689.99 –Medical Imaging Project

Additional Courses in Theme 2: Cell and Tissue Engineering

1. Chemical Engineering 659 – Advanced Cell and Tissue Engineering

Additional Courses in Theme 3: Biomechanics

1. Biomedical Engineering 619.02 – Special Topics in Biological Tissue System Mechanics
2. Civil Engineering 651 - Finite Element Modeling
3. Civil Engineering 653 – Theory and Application of the Finite Element Method
4. Mechanical Engineering 653 - Continuum Mechanics
5. Mechanical Engineering/Kinesiology/Medical Science 663 - Advanced Biomechanics (Muscle)

Additional Courses in Theme 4: Bioelectrical Engineering

1. Electrical Engineering 623/519.11 - Biomedical Instrumentation
2. Electrical Engineering 663 - Numerical Electromagnetic Field Computation
3. Electrical Engineering 631 - System Identification and Parameter Estimation
4. Electrical Engineering 665 - Bioelectromagnetism

Additional Biomedical Engineering related courses may be listed under other departmental listings - see website for most recent information: http://www.schulich.ucalgary.ca/Biomedical. Courses are listed by theme, but students are not restricted to taking courses from within a theme. The supervisor and supervisory committee should be consulted for course selection. Courses not listed under Additional Courses or on the list at http://www.schulich.ucalgary.ca/Biomedical require the approval of the Biomedical Engineering Graduate Program.

## 6. Additional Requirements

Not applicable.

## 7. Credit for Undergraduate Courses

Graduate credit may be given for 500-level courses. No more than one half-course of credit will be allowed in MSc/PhD or MEng program as approved by the supervisory committee, and the Biomedical Engineering Graduate Program.

## 8. Time Limit

In accordance with the Faculty of Graduate Studies regulations, the expected completion time for the MEng (thesis-based) degree is 18 months, for the MSc is 24 months and for the PhD is 48 months. Students transferring from the MSc to the PhD program are expected to complete studies within 60 months. Funding in the MSc and PhD programs may not be available after these expected completion times.

## 9. Supervisory Assignments

MSc and PhD students need a supervisor for admission to the program. A supervisory committee, approved by the Director of the Biomedical Engineering Graduate Program, will be established by the supervisor immediately upon entry into the PhD program. MEng (thesis based) students will choose a supervisor in consultation with the Biomedical Engineering Graduate Program. A supervisory committee is optional for MSc students.

The supervisory committee will advise on course selection and research topic for the student. The supervisory committee will usually be cross-disciplinary, as required by the student's research topic and deemed necessary by the supervisor in consultation by with the Director of the Biomedical Engineering Graduate Program. The supervisory committee will recommend transfer to the PhD program for MSc students and certify the background preparation for PhD students prior to scheduling of the candidacy exam. All students will follow the guidelines of the Biomedical Engineering Graduate Program regarding supervision, frequency of committee meetings, course changes, thesis or project proposals, candidacy examinations, etc. as outlined in the Student Handbook. Membership on candidacy and examination committees requires the approval of the Biomedical Engineering Graduate Program.

## 10. Required Examinations

A written research proposal will be required before the oral candidacy exam can be completed. Prior to the oral candidacy exam, the supervisory committee must review and approve the written research proposal and assess the appropriateness of background preparation of the student. The oral candidacy examination is to focus on two areas: 1) the proposed research project, and 2) the preparation of the candidate and the ability of the candidate to carry out research at the doctoral level. The oral candidacy exam must be completed within 16 months of first registration as a PhD student for direct entry with an MSc, and within the first 20 months for students who transfer from an MSc to PhD program.
A public lecture, scheduled by the Biomedical Engineering Graduate Program, is required immediately prior to MEng, MSc and PhD final thesis oral examinations.

The supervisor is a non-voting member of the oral candidacy committee, and is a voting member of the final thesis oral examination committee.

## 11. Research Proposal Requirements

PhD students must present a written research proposal to the supervisor and to the Biomedical Engineering Graduate Program no later than twelve months after initial registration. Current practice is for MSc and PhD students to enroll in BMEN 604.02, which requires completion and oral presentation of a research proposal. The proposal, with an approval of the supervisor and the coordinator of BMEN 604.02, must be sent to the Biomedical Engineering Graduate Program to be placed in the student's file.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Students in MSc and PhD programs will not be admitted without self-funding or funding from an interested supervisor. Please see the Biomedical Engineering Graduate Program handbook for more

details.

Students in the MEng (thesis-based) program do not receive funding, but may be eligible for awards or financial assistance.

For information on awards, see the Awards and Financial Assistance section of this Calendar.

### 14. Other Information

A Master of Science, Master of Engineering, or Doctor of Philosophy in Biomedical Engineering does not entitle graduates to a designation of Professional Engineer. The title of Engineer, or Professional Engineer, is restricted to those who are members of a Provincial engineering association.

### 15. Faculty Members/Research Interests

Faculty members in this program are based in the Schulich School of Engineering, and the faculties of Kinesiology, Medicine, Veterinary Medicine and Science. Many BME faculty are cross-appointed to multiple departments. Information about BME faculty research can be found at http://www.schulich.ucalgary.ca/Biomedical

#### Graduate Courses

**Biomedical Engineering 601** H(3-0)

*Fundamentals of Biomedical Engineering*
An introduction to biology, biochemistry, anatomy, physiology, engineering fundamentals, and biostatistics for biomedical engineers. Detailed discussion on current biomedical engineering topics, including current local and international research and industry, with an emphasis on local strengths.

**Biomedical Engineering 603** H(3-0)

*Frontiers of Biomedical Engineering*
An introduction to research in biomedical engineering, experimental design, preparation and review of research proposals, technical (oral and written) communication to diverse audiences.

**Biomedical Engineering 605** Q(1.5S-0)

*Research Seminars in Biomedical Engineering*
Reports of studies of the literature or of current research.
NOT INCLUDED IN GPA

**Biomedical Engineering 607** Q(1.5S-0)

*Research Seminars in Biomedical Engineering*
Reports of studies of the literature or of current research.
NOT INCLUDED IN GPA

**Biomedical Engineering 609** H(3-3/2)

*Anatomy and Physiology for Biomedical Engineers*
Advanced instruction on human skeletal structure, types of connective tissues, structure of joints, muscle and organ structure and function, cardiac physiology, blood properties and flow, introduction to autonomous nervous system, and disorders of the musculoskeletal system. Other topics will be covered dependent on the interests of the instructor and students.

**Biomedical Engineering 619** H(3-1)

*Special Problems in Biomedical Engineering*
Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member.
MAY BE REPEATED FOR CREDIT

## CHEMISTRY CHEM

#### Contact Info

Location: Science A Building, Room 109
Faculty number: (403) 220-6252
Fax: (403) 284-1372
E-mail address: gradinfo@chem.ucalgary.ca
Web page URL: http://www.chem.ucalgary.ca/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based

PhD and MSc programs are available for full-time study only.

Specializations: Analytical, Applied, Bio-Organic, Bio-Physical, Electrochemistry, Environmental, Inorganic, Materials, Organic, Organometallic, Physical, Polymer, and Theoretical Chemistry
These areas do not constitute formal divisions, and the thesis research may cut across the traditional lines.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Science admission requirements, the Department requires:

#### Master of Science and Doctor of Philosophy

Two reference letters with reference forms. Letters and forms must bear the referee's signature and the letter must be printed on official letterhead from the referee's institution and sent in a sealed envelope or from an institutional email account. The reference form is available from
http://www.ucalgary.ca/chem/grad/apply

An appropriate letter of recommendation is one written by an individual who can provide an assessment of the applicant's background and capabilities with respect to our department. An applicant currently registered in a graduate degree program, or who has recently completed a graduate degree program, must submit one letter of reference from his/her program supervisor.

For applicants required to prove proficiency in English, a TOEFL score of 580 (written test), 92 (internet-based test), an IELTS score of 7.5, a MELAB score of 83, or a PTE score of 64.

#### Master of Science

For applicants with a Master of Science (MSc) degree:

a) A Master of Science degree recognized by the Faculty of Graduate Studies
b) An admission grade point average of 3.3 or better on a four point scale

#### Doctor of Philosophy

For applicants with a Bachelor of Science (BSc) degree:

a) A four-year Honours degree or its equivalent
b) An admission grade point average of 3.7 or better on a four point scale

### 3. Application Deadline

Deadlines for submission of complete applications:

15 April for September admission

15 August for January admission

10 December for May admission

### 4. Advanced Credit

Advanced credit for graduate courses taken as an unclassified student, or qualifying student may be given for courses in which the student obtains a grade of "B" or higher.

A reduction in course requirements may be given for students who completed graduate courses at other institutions. This will be determined on program entry and after consultation with the research supervisor and the graduate office.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Science requirements, the Department requires:

#### Master of Science

Three half-course equivalents (500-level or above). Normally a minimum of two half-courses will be Chemistry courses

#### Doctor of Philosophy

a) Four half-course equivalents (500-level or above) for students entering with a four-year Honours BSc degree or equivalent. Normally, a minimum of three half-courses will be Chemistry courses;
b) A minimum of one and a maximum of four half-courses for students entering with an MSc degree or equivalent. The number of half-courses will be determined by consultation between the student, the supervisor, and the Graduate Director.

Students who transfer to the doctoral program will be given credit for courses taken in the MSc program.

### 6. Additional Requirements

Each student must participate in the Department's CHEM 601 and CHEM 603 Research Seminars in each year he/she is registered in a graduate program.

A Master of Science student planning to apply for a transfer to a doctoral program must notify his/her supervisory committee at least one month before the committee meeting which takes place at the end of the student's first year in program.

### 7. Credit for Undergraduate Courses

At least one-half of a graduate student's course work must be at the 600-level or higher and only where appropriate to a student's program will graduate credit be given for courses numbered 500-599, which are considered undergraduate courses. In addition to course prerequisites, consent of department is required.

### 8. Time Limit

Expected completion time is two years for the Master of Science degree and four for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Science degree and six years for the doctoral program.

### 9. Supervisory Assignments

Students are assigned an interim advisor (currently the Graduate Director) upon first registration in a program and must choose a permanent supervisor before the fifth month in program.

### 10. Required Examinations

Doctoral students are required to complete written and oral candidacy examinations. Further details may be obtained from the Department's *Handbook of Graduate Studies available at:* http://www.ucalgary.ca/chem/handbook.

*The oral examination component will include questions on the research proposal.*

Final thesis oral examinations are open.

### 11. Research Proposal Requirements

Students will submit a draft research proposal two to four months before the oral candidacy examination. Within one week of receiving the proposal, the supervisory committee and one additional member of

the Department will meet with the student to decide the sub-discipline on which the student will be examined during the candidacy exam. The written component will consist of the finalized version of the research proposal, which is to be submitted 30 days before the oral examination. The proposal is limited to 25 pages (10 on background, 10 on proposed work, and 5 on original extensions of the work). Feedback on the proposal will be provided to the student prior to the oral examination; however, the assessment of the candidate's overall performance will be determined by the oral examination only.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance is normally available to all qualified students in the form of Teaching Assistantships (TA), Faculty of Graduate Studies Support (FGSS), and Trust funding. TA and FGSS are not normally available beyond twenty-eight months in a Master's program and fifty-two months in a doctoral program.

For further information on awards, see the Awards and Financial Assistance section of this calendar.

### 14. Other Information

None.

### 15. Faculty Members/Research Interests

The faculty members in the Department and their specific research interests can be found at http://www.chem.ucalgary.ca.

#### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

Chemistry 515 H(3-4)

*Advanced Instrumental Analysis*
Lectures: Fundamental aspects of modern instrumental methods. Spectroscopic methods: UV-visible and atomic absorption spectroscopy, flame and plasma emission methods. Chromatographic methods; liquid and gas chromatography. Mass spectroscopy. Laboratory: Analysis of inorganic and organic samples using spectroscopic, electrochemical, and chromatographic instrumental methods.
Prerequisites: Chemistry 311 and 315.

Chemistry 521 H(3-0)

*Introduction to Atmospheric Chemistry*
An introduction to tropospheric and stratospheric chemistry. The detailed chemistry of the stratosphere and troposphere; gas-phase chemical kinetics; photochemistry and atmospheric radiation; aerosols; anthropogenic pollution and air quality; climate forcing; introduction to modeling and atmospheric transport.
Prerequisites: Chemistry 315 and 373.
Note: Chemistry 471 is recommended as a prerequisite.

Chemistry 531 H(3-1T)

*Advanced Inorganic Chemistry I*
Coordination and organometallic chemistry of the transition elements, incorporating the lanthanoids and actinoids. Fundamental and applied aspects, including characterization techniques, reaction mechanisms, catalysis and bioinorganic chemistry.
Prerequisites: Chemistry 333 and 353 or 355.

Chemistry 533 H(3-1T)

*Advanced Inorganic Chemistry II*
Chemistry of the s- and p-block elements. Interpretation of nuclear magnetic resonance, electron paramagnetic resonance, vibrational and mass spectra. Fundamental concepts and industrial uses of inorganic heterocycles and polymers, electron-deficient and organometallic compounds. Solid-state chemistry.
Prerequisites: Chemistry 333 and 353 or 355.

Chemistry 535 H(1-8)

*Advanced Inorganic Laboratory*
Advanced laboratory techniques for the synthesis and characterization of main group compounds, organometallics and solid-state materials using modern spectroscopic and structural methods. Includes a short project.
Prerequisites: Chemistry 333 and 453.
Note: Open to students in Chemistry programs and to others by consent of the Department.

Chemistry 551 H(3-1T)

*Organic Synthesis*
Concepts and strategies of synthesizing molecules with emphasis on carbon-carbon bond-forming reactions, protecting groups, chemo-, regio- and stereoselectivity
Prerequisite: Chemistry 453.

Chemistry 553 H(3-1T)

*Bio-organic Chemistry*
Organic chemistry applied to the understanding of biomolecules: selected topics from carbohydrate, peptide/protein, lipid and nucleoside chemistry, enzyme inhibition and drug design.
Prerequisite: Chemistry 453.

Chemistry 555 H(1-8)

*Advanced Organic Laboratory*
Advanced laboratory techniques: methods of purification and identification of products, purification of reagents, experimental design, working with air/moisture sensitive reagents. Includes a short research project.
Prerequisite: Chemistry 453.
Note: Credit for both Chemistry 55 and 455 will not be allowed.
Note: Open to students in Chemistry programs and to others by consent of the Department.

Chemistry 557 H(3-1T)

*Natural Product Chemistry*
The organic chemistry of important classes of natural products such as polyketides, terpenoids, alkaloids, and antibiotics; illustrating the biosynthetic processes involved in their production, and selected chemical transformations, and syntheses.
Prerequisite: Chemistry 453.

Chemistry 559 H(3-1T)

*Organic Spectroscopy*
The instrumentation, theory and practical aspects of spectroscopy (e.g. UV/vis, MS, IR, $^{1}H$ and $^{13}C$ NMR including 2D-techniques). The emphasis will be on the application for structural elucidation through a problem solving approach.
Prerequisite: Chemistry 351 and one of 353 or 355.

Chemistry 571 H(3-0)

*Physical Chemistry of Interfaces*
The chemical and electrical nature, as well as basic thermodynamics, of interfaces. Surface films and aqueous interfaces, including micelles and bilayers. Interfaces involving solids such as metals and semiconductors. Absorption phenomena and surface catalysis. Survey of experimental approaches for interfacial studies.
Prerequisites: Chemistry 371 and 373.

Chemistry 573 H(3-0)

*Nature of the Condensed Phase in Chemistry*
Theoretical models of liquids and solids. Dielectric continuum, polarizabilities and magnetism. Ionic crystal, insulators, conductors, semiconductors and super conductors. Some aspects of scattering techniques for structure determination.
Prerequisites: Chemistry 371 and 373.

Chemistry 575 H(3-1T-3)

*Advanced Electronic Structure Theory*
A discussion of the theories of modern electronic structure illustrated by applications to molecular structure and bonding, electronic spectroscopy, as well as chemical reactivity and dynamics.
Prerequisites: Chemistry 371 and 373.

Chemistry 579 H(3-0)

*Surface and Colloid Chemistry for Engineers*
Introduces the fundamental and applied aspects of interfacial phenomena including capillarity, surface and interfacial tension, films, wetting and contact angles, adsorption, micellization, solubilization and emulsification. Examples drawn from colloids, foams, aerosols and macromolecules.
Prerequisites: Chemistry 209, 357 and Chemical Engineering 427.

Chemistry 599 H(3-0)

*Selected Topics in Chemistry*
Selected topics are offered based on the interests of Chemistry faculty and students.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

#### Graduate Courses

Advanced graduate level courses are listed below. Courses in certain areas are grouped under "Selected Topics" titles. The content and offering of these are decided annually by the Department to meet the requirements of graduate students in the program. A student may receive credit for several courses in a given selected topics area. Details of offerings and course outlines may be obtained from the Department on request.

Unless stated otherwise the prerequisite for entry to all courses at the 600 level and above is "consent of the Department."

Chemistry 601 H(2S-0)

*Research Seminar*
Reports on studies of the literature or of current research. Required of all graduate students in Chemistry.
NOT INCLUDED IN GPA

Chemistry 603 H(2S-0)

*Research Seminar*
Continuation of Chemistry 601.
NOT INCLUDED IN GPA

Chemistry 613 H(3-0)

*Electrochemical Fundamentals and Methodologies*
Origin, significance, and thermodynamics of interfacial potential differences; structure of the double layer; basic principles of electron transfer at interfaces, Butler-Volmer equation; mass transport control of electro-chemical reactions; controlled potential methods as applied to electrode surface reactions and homogeneous reactions coupled to electron-transfer processes.

Chemistry 615 H(3-0)

*Analytical Separations*
Theory and practice of resolving mixtures into separate components for analysis. Basic theory; liquid-liquid extraction; high performance liquid chromatography; gas-liquid, open bed, ion exchange and exclusion chromatography; electrophoresis.

Chemistry 617 H(3-0)

*Advanced Analytical Chemistry*
Consideration of principles and equilibria pertaining to aqueous and nonaqueous neutralization, redox, complexation, precipitation and potentiometric methods employed in analyses. Statistical considerations of analytical data and analysis.

Chemistry 619 H(3-0)

*Selected Topics in Analytical Chemistry*
Topics of current interest such as: properties of synthetic polymer membranes, advanced instrumental methods, developments in chemical sensors, speciation studies, environmental analytical chemistry.
MAY BE REPEATED FOR CREDIT

Chemistry 621 H(3-0)

*Organometallic Chemistry*
A detailed discussion of structure, bonding and preparative methods in organometallic chemistry including the industrial and synthetic applications of organometallic compounds.

Chemistry 623 H(3-0)

*Chemistry of the Main Group Elements*
The chemistry of electron-deficient, electron-precise, and electron-rich rings, inorganic polymers, and organometallic compounds of the main group elements; applications of spectroscopic techniques; industrial uses. Seminars on recent research developments.

Chemistry 627 H(3-0)

*Theoretical Inorganic Chemistry*
Aspects of theoretical inorganic and organometallic chemistry including: quantitative and qualitative molecular orbital theory; the bonding and structure of molecules, clusters, and extended arrays; the fragments of organometallic species; orbital correlation diagrams in inorganic reactions; spectroscopic methods and their interpretation.

Chemistry 629 H(3-0)

*Selected Topics in Inorganic Chemistry*
Courses are offered to cover topics of current interest, such as bioinorganic chemistry, inorganic solution phenomena, and the inorganic chemistry of the solid state.
MAY BE REPEATED FOR CREDIT

Chemistry 651 H(3-0)

*Advanced Organic Stereochemistry*
Stereochemical principles in organic chemistry, including: geometry, bonding, symmetry, molecular isomerism, conformational analysis, asymmetric and stereocontrolled reactions.

Chemistry 653 H(3-0)

*Advanced Organic Spectroscopy*
Advanced spectroscopic techniques for the determination of organic molecular structure. Techniques include Nuclear Magnetic Resonance Spectroscopy (NMR), Infrared and Raman Spectroscopy, Ultraviolet and Visible Spectroscopy; (absorption, fluorescence, chiroptic), Mass Spectrometry, and an outline of the single-crystal X-ray diffraction method. Separation techniques will be covered, particularly those combining separations and spectroscopic analysis.

Chemistry 655 H(3-0)

*Advanced Organic Synthesis*
A review of modern synthetic reactions and methods in the field of organic chemistry with emphasis on the recent literature.

Chemistry 657 H(3-0)

*Theoretical Organic Chemistry*
Theoretical principles of organic chemistry including stereochemistry, molecular orbital calculations, pericyclic processes (Woodward-Hoffmann rules), and PMO theory.

Chemistry 659 H(3-0)

*Selected Topics in Organic Chemistry*
Courses are offered in major branches of organic chemistry, including: carbohydrate chemistry, steroids and terpenoids, semiochemistry, heterocyclic chemistry, biosynthesis of secondary metabolites, as well as other topics of current interest.
MAY BE REPEATED FOR CREDIT

Chemistry 669 H(3-0)

*Selected Topics in Applied Chemistry*
Courses are offered in such topics as electrochemistry, industrial catalysis, chemistry of energy sources, colloid and surface chemistry and polymer chemistry.
MAY BE REPEATED FOR CREDIT

Chemistry 681 H(3-0)

*Crystallography*
A general introduction to X-ray analysis of single crystals. Topics include: Geometry of the crystalline state; diffraction of X-rays; Fourier synthesis; methods of structure solution; accuracy and precision of derived parameters.

Chemistry 689 H(3-0)

*Selected Topics in Physical Chemistry*
Courses are offered in such topics as dielectric properties, kinetics, molecular vibrations, fluorescence spectroscopy, X-ray diffraction.
MAY BE REPEATED FOR CREDIT

Chemistry 701

*Independent Study*
Independent study outside a student's thesis area under the direction of a staff member and approved by the student's supervisor (or in the case of PhD students the supervisory committee) and Department Head. A report must be submitted on completion of the course.

## COMMUNICATIONS STUDIES COMS

### Contact Info

Location: Social Sciences Building, Room 222
Faculty number: (403) 220-6357
Fax: (403) 210-8164
E-mail address: gradprog@ucalgary.ca
Web page URL:
http://www.comcul.ucalgary.ca/gradprograms

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), thesis-based
Master of Communications Studies (MCS), course-based

The Doctor of Philosophy program offers specializations in three areas: Social Contexts of Science and Technology; Media and Film Studies; Socio-Cultural Approaches to Communication

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Graduate program in Communications Studies requires:

Master of Arts (thesis-based, full or part time)

a) A written statement of intent (250-500 words)
b) Two samples of written work
c) A detailed curriculum vitae
d) A completed baccalaureate degree in Communications Studies or related field
e) Two Reference Letters

Master of Communications Studies (course-based, full or part time)

a) A written statement of intent (250-500 words)
b) Two samples of written work
c) A detailed curriculum vitae
d) A completed baccalaureate degree in Communications Studies or related field
e) Two Reference Letters

Note: Masters students must take three half course equivalents in each of fall and winter terms in the first year of their program to be considered full time. There is no assurance of consideration for funding for part time students.

Doctor of Philosophy

a) A statement of research intent (500-1000 words)
b) Three samples of written work
c) A detailed curriculum vitae
d) Completed baccalaureate and master's degrees in Communications Studies or equivalent
e) Two Reference Letters

### 3. Application Deadline

The deadline for the submission of complete applications is 15 January for September admission.

### 4. Advanced Credit

MCS applicants must request advanced credit at the time of admission for graduate level courses up to a maximum of one half-course equivalent. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Approval of the Director is required. Advanced credit is not available to MA applicants.

## 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Graduate Program in Communications Studies requires the following:

### Master of Arts (thesis-based, six half-course equivalents)

a) Two half course equivalents: Communications Studies 601 and Communications Studies 615.
b) One half course equivalent chosen from Communications studies 603, Communications Studies 607, or Communications Studies 623.
c) Three half course equivalent electives. .
d) One half-course equivalent elective may be selected from other graduate programs; one half-course equivalent elective may be Communications Studies 711, Directed Studies.

### Master of Communications Studies (course-based, ten half-course equivalents)

a) Ten half course equivalents including core courses Communications Studies 601, Communications Studies 605, and Communications Studies 615.
b) Five elective half courses.
c) One half course equivalent may be selected from other graduate programs; one half course elective may be Communications Studies 711, Directed Studies.
d) Communications Studies 790 - Masters Project. Included as two of the ten half course requirements.

### Doctor of Philosophy (five half-course equivalents)

a) Three half course equivalents: Communications Studies 601, Communications Studies 615 or equivalent, and Communications Studies 713,
b) One half course equivalent chosen from Communications studies 603, Communications Studies 607, or Communications Studies 623.
c) One half course equivalent elective.
d) One half-course equivalent elective may be selected from other graduate programs; one half-course equivalent elective may be Communications Studies 711, Directed Studies.

Note: PhD students who can show that they have taken Communications Studies 601 or equivalent may substitute an elective.

## 6. Additional Requirements

Not applicable.

## 7. Credit for Undergraduate Courses

Credit for undergraduate courses toward a Master's program will be given only in the case of the course being developed for graduate level work. Students in the doctoral program will not be given credit for undergraduate courses.

## 8. Time Limit

Expected completion time is two years of full-time study or three years of part-time study for the Master of Arts degree and the Master of Communications Studies degree; and four years for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Arts degree, and six years for the Master of Communications Studies and Doctor of Philosophy degrees.

## 9. Supervisory Assignments

### Master of Arts

An interim advisor is assigned by the program in the first year. The student must choose a thesis supervisor by the beginning of the second year.

### Master of Communications Studies

The Program Director or designate is the assigned interim advisor for the first two years of the student's program for full-time and part-time students. The Program Director or designate is the supervisor for part-time students continuing past two years in the program. In the student's COMS 790 project year, the project supervisor may or may not be the permanent supervisor of record.

### Doctor of Philosophy

By June of the first year in program, the student must submit his/her proposed field of research and the name of his/her proposed supervisor for approval by the program. The supervisory committee must be appointed no later than three months after the appointment of the supervisor.

## 10. Required Examinations

Doctor of Philosophy – Doctoral candidacy examinations have a written and an oral component. Students have three weeks to write papers in three areas relevant to their proposed research. The student's supervisory committee sets the areas and the examination questions in consultation with the candidacy committee. The oral examination takes place one week after the completion of the written papers.

Final thesis oral examinations are open.

## 11. Research Proposal Requirements

Students whose research involves human subjects must receive approval from the University of Calgary Conjoint Faculties Research Ethics Board before beginning data collection.

Master of Arts – Thesis supervisor must approve proposal.

Master of Communications Studies – Project supervisor(s) must approve proposal.

Doctor of Philosophy – In consultation with the supervisory committee, before the candidacy examinations, each doctoral student is required to submit a preliminary thesis proposal that may serve as an additional basis for questioning. A more detailed, Final Thesis Proposal (including an Application for Ethics Approval where relevant), approved by the supervisory committee must be submitted to the graduate coordinator within six months of the successful completion of the candidacy examination.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Financial assistance may be available to qualified students. For information on Awards, see the Awards and Financial Assistance section of this Calendar.
http:grad.ucalgary.ca/awards
Students applying for open doctoral scholarships must submit their applications to the Department of Communication and Culture Graduate Programs Office by January 15.

## 14. Other Information

Inquiries concerning specific questions about the program and degree requirements should be directed to: Department of Communication and Culture, Graduate Programs, Social Sciences 222, University of Calgary, 2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4.

## 15. Department Members/Research Interests

The active research interests of current faculty can be found at
http://www.comcul.ucalgary.ca/facultyresearch.
Note: Courses that are considered electives will be offered on the basis of student needs and contingent upon the availability of staff resources.

### Graduate Courses

Note: Not all courses will be offered each year.

**Communications Studies 601** H(3S-0)

*Interdisciplinary Approaches to Communications Studies*
An overview of theories, problematics and approaches in the field of communications studies.
Prerequisite: Consent of the Program Director.

**Communications Studies 603** H(3S-0)

*Media Studies*
Theories and perspectives in the study of media production, industries, genres, and reception.
Prerequisite: Consent of the Program Director.

**Communications Studies 605** H(3S-0)

*Organizational Communication*
An examination of the application of theory and methodology of administrative communication processes in complex organizations.
Prerequisite: Consent of the Program Director.

**Communications Studies 609** H(3S-0)

*Communication Law*
An examination of the operation of Canadian law as it relates to the areas of telecommunications, broadcasting and other media.
Prerequisite: Consent of the Program Director.

**Communications Studies 613** H(3S-0)

*Communication Theory*
An examination of the major perspectives in communication theory through a historical analysis of classic works and an overview of contemporary approaches and applications.
Prerequisite: Consent of the Program Director.

**Communications Studies 615** H(3S-0)

*Research Methods*
A survey of research methods appropriate to the study of communication and culture.
Prerequisite: Consent of the Program Director.

**Communications Studies 619** H(3S-0)

*Communications and Cultural Industries*
An analysis of the governmental and social contexts which inform the current development of telecommunications, communications, cultural industries and new media in Canada.
Prerequisite: Consent of the Program Director.

**Communications Studies 623** H(3S-0)

*Social Contexts of Science and Technology*
Theoretical perspectives for understanding central debates in the study of science and technology in their social, political, cultural, and communication contexts.
Prerequisite: Consent of the Program Director.

**Communications Studies 625** H(3S-0)

*Interpersonal and Small Group Communication*
An examination of theory and research concerning communication processes in face-to-face and small

group interaction. Provides opportunities to develop effective practical skills.
Prerequisite: Consent of the Program Director.

Communications Studies 627 H(3S-0)

*Media and Politics*
An examination of political communication in traditional and new media, focusing on the interrelationships of media, political thought, and behaviour.
Prerequisite: Consent of the Program Director.

Communications Studies 629 H(3S-0)

*Communication Management*
An examination of communication management in business organizations. Looks at such topics as marketing, public relations and advertising in the context of rapidly changing business environments.
Prerequisite: Consent of the Program Director.

Communications Studies 641 H(3S-0)

*Intercultural and International Communication*
An examination of cultural/communication issues and practices in Canadian and international context. Examines the role of media systems in processes of culture, development and identity formation.
Prerequisite: Consent of the Program Director.

Communications Studies H(3S-0)

Prerequisite: Consent of the Program Director.

Communications Studies H(3S-0)

Prerequisite: Consent of the Program Director.

Communications Studies H(3S-0)
Communications Studies 711 H(3S-0)

*Directed Studies*
A research project under the direction of a faculty member.
Prerequisite: Consent of the Program Director.
MAY BE REPEATED FOR CREDIT

Communications Studies 717 H(3S-0)

*Selected Topics in Communication*
A variety of communication topics based on faculty expertise.
Prerequisite: Consent of the Program Director.
MAY BE REPEATED FOR CREDIT

Communications Studies 790 F(0-6)

*Master's Project*
A full year course required of all MCS students. Students develop a major research project under the supervision of a faculty member, on the basis of their particular interest.
Prerequisite: Consent of the Program Director.

## COMPUTER SCIENCE CPSC

### Contact Info

Location: Information and Communications Technology Building, Room 602
Faculty number: (403) 220-6015
Fax: (403) 284-4707
E-mail address: cpscappl@ucalgary.ca
Web page URL: http://www.cpsc.ucalgary.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based

The Master of Science degree with a specialization in Software Engineering, thesis based.

This specialization is offered jointly through the Department of Computer Science and the Department of Electrical and Computer Engineering. Software Engineering is a formal specialization.

Students may register in the MSc and PhD programs as part-time students only with permission from the department.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Science requirements, the department requires two appropriate letters of reference dated within twelve months of the date of application and:

#### Master of Science

a) An undergraduate background of either:
A four-year Bachelor's degree or equivalent in Computer Science from a recognized institution with a minimum GPA of 3.3 in the last 2 years (i.e., last 20 half course equivalents) of the undergraduate program
OR
A four-year Bachelor's degree or equivalent from a recognized institution with a minimum GPA of 3.3 in the last 2 years (i.e., last 20 half course equivalents) of the undergraduate program.

In addition, candidates must have an undergraduate course at the 3rd or 4th year level in each of the following computer science areas:

- Theory of Computation
- Software Engineering
- Systems (Operating Systems, Compilers, Distributed Systems, Networking)
- Application (Artificial Intelligence, Graphics, Databases, etc.)

The cumulative GPA for these courses must be at least 3.3.

Post-degree Computer Science courses may be considered in calculating the GPA. Exceptions to the GPA requirements may be considered for students with either:

- Demonstrated research excellence, or
- GRE General scores of at least 600 verbal and 750 quantitative and either 720 analytical (old test format) or 5.5 (new test format)

b) For applicants required to provide proof of proficiency in English, a TOEFL score of 600 (written test) or 100 (internet-based test), or an IELTS score of 7.5 or above, or a MELAB score of 84 or above, or a PTE score of 70 or above.

c) For students applying with degrees from outside Canada, GRE scores are generally expected and will be considered.

#### Master of Science degree with a Specialization in Software Engineering (thesis-based)

Students applying for entry to the Master of Science with a specialization in Software Engineering will be assessed on qualification as in (a) above, but with a GPA of 3.0 and at least three years relevant experience in the software industry following the Bachelor's degree.

#### Doctor of Philosophy

For students applying with a Master of Science degree, all the requirements for a Master of Science (above) apply, plus a thesis-based Master of Science degree from a recognized institution with a minimum GPA of 3.3.

For exceptional students applying with a Bachelor of Science degree, all the requirements for a Master of Science (above) apply, plus a four-year Honours degree or its equivalent from a recognized institution with a minimum GPA of 3.7 and demonstrated research ability.

### 3. Application Deadline

Deadlines for the submission of complete applications:

| Admission Date | International Students | Canadian Students |
|---|---|---|
| September | 1 February | 1 May |
| January | 1 May | 1 September |

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

### 5. Program/Course Requirements

Graduate programs must be chosen in consultation with the supervisor and approved by the Computer Science Graduate Affairs Committee. In addition to the Faculties of Graduate Studies and Science requirements, the Department requires:

#### Master of Science (thesis-based)

a) Course Requirements: Computer Science 699, plus
b) 4 additional half-course equivalents. At least two half-courses must be graduate-level computer science courses (labelled CPSC or SENG) and at most one half-course can be an undergraduate course numbered at the 500-level.

We recommend that students who are considering continuing on to a doctoral program or entering certain career paths, select courses that demonstrate some breadth across Computer Science (see PhD Breadth Requirements for courses).

c) Seminar Requirement: Students are required to give a department seminar presentation on a topic related to their graduate research.

#### Master of Science degree with a Specialization in Software Engineering (thesis-based )

a) Course Requirements: Computer Science 699, plus
b) 4 half-course equivalents. At least three of these half-course equivalents must be taken from the Approved SENG list (available from the Department), and at most one half-course can be an undergraduate course numbered at the 500-level.

We recommend that students who are considering continuing on to a doctoral program or entering certain career paths, select courses outside the Approved SENG list that demonstrate some breadth across Computer Science (see PhD Breadth Requirements for courses).

c) Seminar Requirement: Students are required to give a department seminar presentation on a topic related to their graduate research.

#### Doctor of Philosophy

a) Course Requirements: Students will be required to have achieved at least a grade of B in at least eight half-courses beyond the requirements for an undergraduate degree before completion of the PhD degree. At least three of these must be taken while the student is enrolled as a PhD student in

Computer Science at the University of Calgary. Of the eight half-courses, at least six must be graduate level courses, with the remaining two courses being either graduate level courses or advanced (500-level) undergraduate courses. In addition to the above courses, Computer Science 699 or equivalent experience is required and does not count toward the minimum 8 half-courses above.

b) Breadth Requirements: Students must have achieved at least a grade of B in two graduate courses in each of three categories.

These three categories are to be selected from the following four categories:
*A. Applications:* Includes Graphics, Human-Computer Interaction, Artificial Intelligence, Computer Vision, and Scientific Computing
*B. Systems:* Includes Databases, Compilers, Networks, Operating Systems, and Software Engineering
*C. Theory:* Includes Algorithms, Computational Complexity, Quantum Computation, Numerical Analysis, Cryptography, Category Theory, Programming Languages Theory
*D. External to Computer Science:* If this category is used, the two courses must be presented with a justification as to why they are another area, and must be approved by the student's supervisor and the graduate committee.

An alternative breadth/depth program that satisfies the supervisor, the supervisory committee, and the graduate committee may be proposed in special cases. In case of conflict, an appeal committee will be struck by the Head of the Department.

c) Seminar Requirement: Students are required to give a department seminar presentation on a topic related to their graduate research.

## 6. Additional Requirements

None.

## 7. Credit for Undergraduate Courses

For MSc programs, at most one half-course at the 500-level may be taken as part of the course work requirement. This must be recommended by the supervisor and approved by the Graduate Director.

For PhD programs, at most two half-courses at the 500 level may be taken as part of the course work requirement; at most one of these taken while registered in the current PhD program. This must be recommended by the supervisor and approved by the Graduate Director on the normal Doctor of Philosophy Course Approval Form (form available from the Department).

## 8. Time Limit

Expected completion time is two years for thesis-based Master of Science. Expected completion time for doctoral students entering with a Master's degree is three years, and four years for a student transferring to the doctoral program without a Master's degree.

## 9. Supervisory Assignments

Generally, students are admitted to a specific research area and supervisor. Sometimes students are admitted to a specific lab or research area only and are assigned an interim advisor. In the latter case, the student must find a permanent supervisor within six months of the start of the program. Students may seek a change in research area or supervisor after admission. Such a change must be satisfactory to the student, and to the proposed new supervisor. Provided this change meets any current supervisory load constraints, this change will be supported and approved by the Graduate Director.
Doctoral students select their supervisory committee members in consultation with their permanent supervisors.

## 10. Required Examinations

There is an oral candidacy examination in the doctoral program within the firth 28 months of the program but after all course requirements are fulfilled. The scope of the oral candidacy exam is defined by a reading list, the candidate's research proposal and a single-authored scientific paper on a topic approved by the supervisory committee. The reading list is, prepared by the student's supervisor in collaboration with the supervisory committee, and given to the student at least two months before the oral candidacy exam. The candidate must have written the scientific paper while enrolled in the PhD program. The supervisory committee must have approved the paper before the oral candidacy exam is scheduled. The candidate's research proposal together with the reading list and scientific paper must be submitted to the examination committee when the oral candidacy exam is scheduled (at least 1 month before the oral candidacy exam). The oral candidacy exam may include questions from the scientific paper, the proposal, and the reading list.

Final thesis oral examinations are open.

## 11. Research Proposal Requirements

At the Master's level, research proposal requirements are determined by the supervisor.

At the Doctoral level, a research proposal must be approved by the student's supervisory committee, before the oral candidacy exam is scheduled. The research proposal will contain an abstract, a literature survey (including an analysis of the literature), an overview of the proposed research, a plan for completing the proposed research, and references.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards see the Awards and Financial Assistance section of this Calendar. Successful applicants may be offered departmental teaching assistantships and/or research assistantships in their offer letter.

Students should contact the department for information on scholarship deadlines.

## 14. Other Information

None.

## 15. Faculty Members/Research Interests

Information on faculty research interests may be found at: http://www.cpsc.ucalgary.ca/Research/

### Graduate Courses

Note: Registration in all courses requires the approval of the Department of Computer Science. Computer Science students should also see courses listed under Software Engineering.

**Computer Science (CPSC)**

**Computer Science 601** H(3-0)

*Special Topics in Computer Science*
A study of problems of particular interest to graduate students in Computer Science.
MAY BE REPEATED FOR CREDIT

**Computer Science 605** H(3-0)
(Medical Science 605)

*Information Storage and Processing in Biological Systems*
Examination of complex biological systems; concepts and fundamentals of biological solutions to information storage and processing; modelling and computer simulation of biological systems; information storage in biological molecules; genetic networks; hierarchical organization of biological information processing in signal transduction, development, evolution, and ecology; biological control systems.

**Computer Science 607** H(3-0)

*Biological Computation*
Examination and modelling of biological networks; focus on the latest developments in biological computing and their theoretical backgrounds, such as: DNA computing; genomic algorithms; artificial chemistries; complex adaptive systems, chaos and fractals; immune system computing; gene regulatory networks; swarm intelligence systems.

**Computer Science 609** H(3-0)

*Foundations of Multi-Agent Systems*
Modelling of agents and properties of multi-agent systems. Communication issues, including interaction and coordination concepts, forming and maintaining organizations, and competitive agent environments. Example systems; the implementation of a multi-agent system will be performed as the assignment.
Note: Credit for both Computer Science 609 and Software Engineering 697 will not be allowed for programs offered by the Department of Computer Science.
Note: Lectures may run concurrently with Computer Science 567.

**Computer Science 610** H(3-0)

*Compiler Code Generation and Optimization*
Compiler code generation and optimization techniques, including register allocation, instruction selection, dataflow analysis, and code optimization techniques using intermediate representations. Implementation of special language features and tools for automated code generation.
Note: Lectures may run concurrently with the first semester of Computer Science 510.

**Computer Science 611** H(3-0)

*Complexity Theory*
Deterministic and non-deterministic time and space complexity; complexity classes and hierarchies; NP-complete problems and intractable problems; axiomatic complexity theory.
Note: Lectures may run concurrently with Computer Science 511.
Note: Computer Science 413 or equivalent is recommended as preparation for this course.

**Computer Science 613** H(3-0)

*Program Specification, Proof and Transformation*
Program proving techniques; approaches to partial and total correctness. Operational abstraction and data abstraction. Mechanical transformation of programs. Machine assisted proof.
Note: Computer Science 417 or 521 or equivalent is recommended as preparation for this course.

**Computer Science 617** H(3-0)

*Category Theory for Computer Science*
Introduction to category theory with applications in

computer science. Functors, natural transformations, adjoints and monads, initial and final algebras. Introduction to 2-categories and fibrations.
Note: Computer Science 417, 513, 521 or equivalent is recommended as preparation for this course.

Computer Science 619 H(3-0)

*Quantum Computation*
Quantum information, quantum algorithms including Shor's quantum factoring algorithm and Grover's quantum searching technique, quantum error correcting codes, quantum cryptography, nonlocality and quantum communication complexity, and quantum computational complexity.
Note: Lectures may run concurrently with Computer Science 519.

Computer Science 625 H(3-0)

*Principles of Computer Security*
Security policies and protection mechanisms for a computing system, including such topics as design principles of protection systems, authentication and authorization, reference monitors, security architecture of popular platforms, formal modeling of protection systems, discretionary access control, safety analysis, information flow control, integrity, role-based access control. Legal and ethical considerations will be introduced as necessary.
Note: Computer Science 457 and Mathematics 271, or equivalents, are recommended as preparation for this course.
Note: Lectures may run concurrently with Computer Science 525.

Computer Science 626 H(3-0)

*Network Systems Security*
Attacks on networked systems, tools and techniques for detection and protection against attacks including firewalls and intrusion detection and protection systems, authentication and identification in distributed systems, cryptographic protocols for IP networks, security protocols for emerging networks and technologies, privacy enhancing communication. Legal and ethical issues will be introduced as necessary.
Note: Computer Science 418 and 441, or equivalents, are recommended as preparation for this course. Lectures may run concurrently with Computer Science 526.

Computer Science 627 H(3-0)

*Computer Viruses and Malware*
Study of computer viruses, worms, Trojan horses, and other forms of malicious software. Countermeasures to malicious software. Legal andethical issues, and some general computer and network security issues.
Prerequisites: Computer Science 313 and 457 or equivalents and consent of the Department.
Note: Lectures may run concurrently with Computer Science 527.

Computer Science 628 H(3-0)

*Spam and Spyware*
Study of spam and other forms of unsolicited bulk electronic communication, and spyware. Legal and ethical issues, and tie-ins to other fields like business and economics. Spam and spyware countermeasures, and related security problems.
Prerequisites: Computer Science 313 and 457 or equivalents and consent of the Department.
Note: Lectures may run concurrently with Computer Science 528.

Computer Science 629 H(3-0)
(Pure Mathematics 629)
(formerly Computer Science 601.09)

*Elliptic Curves and Cryptography*
An introduction to elliptic curves over the rationals and finite fields. The focus is on both theoretical and computational aspects; subjects covered will include the study of endomorphism rings, Weil pairing, torsion points, group structure, and effective implementation of point addition. Applications to cryptography will be discussed, including elliptic curve-based Diffie-Hellman key exchange, El Gamal encryption, and digital signatures, as well as the associated computational problems on which their security is based.
Prerequisites: Pure Mathematics 315 or consent of the Department.

Computer Science 630 H(3-0)

*Information Theoretic Security*
Information theoretic concepts such as entropy, mutual information and statistical distance, and their applications to cryptography in information theoretic settings. Models and analysis of security and efficiency, and constructions of cryptographic primitives including encryption, authentication, secret sharing, multiparty computation and key agreement, when there is no limit on the adversary's computational resources.
Notes: One of Computer Science 219, 233 or 235, one of Mathematics 271, 273 or Pure Mathematics 325, and one of Statistics 211 or Mathematics 321, or equivalents, are recommended as preparation for this course. Lectures may run concurrently with Computer Science 530.

Computer Science 635 H(3-0)

*Image Analysis and Computer Vision*
Standard methods used in the analysis of digital images. Image acquisition and display: visual perception; digital representation. Sampling and enhancement. Feature extraction and classification methods. Object recognition.
Note: Lectures may run concurrently with Computer Science 535.

Computer Science 641 H(3-0)

*Performance Issues in High Speed Networks*
An overview of current research in high speed networks. Topics covered will include the current Internet, the future Internet, wireless networks, optical networks, Asynchronous Transfer Mode (ATM), TCP/IP, network traffic measurement, Web server performance, and mobile computing. Emphasis will be placed on network performance issues for next-generation Internet protocols and applications.

Computer Science 653 H(3-0)

*Computational Geometry*
Geometric searching, hull proximity and intersection data structures and algorithms and their complexity.
Note: Computer Science 415 or 517 or equivalent is recommended as preparation for this course.

Computer Science 657 H(3-0)

*Modelling And Visualization of Plants*
Modelling, simulation and visualization of plants for computer graphics and biological purposes. Modelling of plants as an example of interdisciplinary research including computer science, biology, mathematics and physics. L-systems as a formal basis for model construction. Modelling languages. Information flow in plants. Symmetry, self-similarity and allometry of plants. Descriptive models of plant architecture. Models integrating plant structure and function. Simulation of plant development. Case studies: competition for space, phyllotaxis, tropisms, and biomechanical considerations. Reaction-diffusion models of morphogensis. Genotype-to-phenotype mapping. Modelling of plant ecosystems. Rendering and visualization of the models. A survey of applications and research directions.
Note: Computer Science 453 or 553 or equivalent is recommended as preparation for computer science students taking this course.

Computer Science 661 H(3-0)

*Algorithms for Distributed Computation*
Basic problems in distributed systems such as symmetry breaking, consensus, resource allocation, and synchronization. The impact of system characteristics, such as models of communication, timing and failure, and of solution requirements, such as correctness and complexity criteria and algorithmic constraints, on the computability and complexity of these problems. Techniques for solving problems under different models will be emphasized.
Note: Lectures may run concurrently with Computer Science 561. Computer Science 413 or equivalent is recommended as preparation for this course.

Computer Science 662 H(3-0)

Agent Communications
An examination of communication paradigms in multi-agent systems. A number of paradigms will be covered including simple protocols, BDI, (Believe, Desire, Intension), and social commitments.
Notes: Lectures may run concurrently with Computer Science 568.

Computer Science 667 H(3-0)

*Computer Algebra*
Fundamental problems, classical and modern algorithms, and algorithm design and analysis techniques of use in computer algebra. Integer and polynomial arithmetic. Additional problems in computer algebra, possibly including problems in computational linear algebra, factorization, and concerning systems of polynomial equations will be considered as time permits.
Note: Lectures may run concurrently with Computer Science 518. Computer Science 413, 491 and Pure Mathematics 431, or equivalents, are recommended as preparation for this course.

Computer Science 669 H(3-0)
(Pure Mathematics 669)

*Cryptography*
An overview of the basic techniques in modern cryptography, with emphasis on fit-for-application primitives and protocols. Topics will include symmetric and public-key cryptosystems; digital signatures; elliptic curve cryptography; key management; attack models and well-defined notions of security.
Prerequisite: Consent of the Department.
Note: Students should not have taken any previous course in cryptography.

Computer Science 671 H(3-0)

*Database Management Systems*
Foundations of database applications and database systems, plus some advanced topics in data management systems will be introduced.

Computer Science 673 H(3-0)

*Distributed Database Systems*
Introduction to distributed database systems. Topics

covered include: architecture, data design, query processing, transaction management, multidatabases, object-oriented databases and advanced system issues.

Computer Science 675 H(3-0)

*Datawarehouse Systems*
Design, development and deployment of datawarehouses. Schemas, models, data organization, OLAP, tuning, data mining and architectural models may be discussed.

Computer Science 681 H(3-0)

*Research Methods in Human-Computer Interaction*
Application of the theory and methodology of human-machine studies to real systems; theory and practice.
Note: Computer Science 481 or equivalent is recommended as preparation for this course.

Computer Science 683 H(3-0)

*Information Visualization: Theory and Practice*
The theory and development of interactive visual representations of abstract data for the purpose of amplifying cognition. Topics covered can include representational issues, perceptual issues, visual literacy, spatial abstraction, and interaction issues.
Note: Computer Science 583 or equivalent is recommended as preparation for this course.

Computer Science 687 H(3-0)

*Computer Animation*
Principles of traditional animation, key framing, parametric and track animation, free form deformation, inverse kinematics, dynamics, spring mass systems, particle systems, numerical integration, Lagrangian constraints, space time constraints, collisions, human animation, behavioural animation, metamorphosis, implicit animation techniques, animating liquids, gases and cloth, motion capture.
Note: Lectures may run concurrently with Computer Science 587.

Computer Science 689 H(3-0)

*Modelling for Computer Graphics*
Parametric Modelling. B-splines and NURBS. Subdivision schemes. Surface subdivision. Multiresolution. Wavelets. Implicit modelling. Blends. Polygonization. Blobtree. Precise contact modelling. Solid modelling. CSG. Procedural modelling. Special topics, e.g. Differential geometry. Graph based modelling. Topology.
Note: Lectures may run concurrently with Computer Science 589.

Computer Science 691 H(3-0)

*Rendering*
Physical foundations of illuminations techniques. Color. Radiometry and photometry. Reflection models. The rendering equation. Ray tracing. Monte Carlo techniques. Sampling and antialiasing. Texturing. Radiosity. Photon tracing. Volume rendering. Image-based rendering. Real-time shading.
Note: Lectures may run concurrently with Computer Science 591.

Computer Science 695 H(3-0)

*Advanced Geometrical Algorithms in Geographical Information Systems*
Examination of advanced geometric algorithms for representation, analysis and visualization of Geographical Information Systems. Data structures such as progressive mesh, ROAM, multidimensional Delauney triangulization, quadtree and space partitioning. Algorithmic techniques such as incremental, divide and conquer, sweep-plane, and dimension reduction. Algorithms for surface simplification, culling, quality measurement and reduction.

Computer Science 697 H(3-0)
(formerly Computer Science 601.20)

*Biometric Technologies*
Principles of biometric system design, technology and performance evaluation. Verification, identification and synthesis in biometrics. Traditional and emerging techniques for fingerprint matching, face recognition, iris modeling, signature authentication, and biometric pattern recognition. Multi-modal biometrics and biometric security.

Computer Science 699 H(3-0)

*Research Methodology in Computer Science*
An introduction to and survey of research areas and methods in Computer Science. Professional skills in computer science research such as reviewing, critical evaluation, and the preparation of research proposals.
Note: This course meets for one and one-half hours per week during the Fall and Winter Sessions.
NOT INCLUDED IN GPA

Computer Science 701 H(3-0)

*Research Topics in Computer Science*
In depth course on a focused current research topic in Computer Science. Involves a significant research component and requires substantial background knowledge.
MAY BE REPEATED FOR CREDIT

Computer Science 767 H(3-0)

*Advanced Topics in Multiagent Systems*
An in-depth study of a selected subfield of multiagent systems including state-of-the-art research. This is a project-driven course.
Prerequisite: Computer Science 567 or 609.

Computer Science 771 H(3-0)

*Current Trends in Database Technology*
Advanced topics chosen from Bioinformatics, Data mining, Mobile Databases, Spatial Databases and Web Databases. There is a large project component.

Computer Science 781 H(3-0)

*Advanced Topics in Human-Computer Interaction*
The topics covered will change year by year depending on current advances in human computer interaction.
Prerequisite: Computer Science 481 or equivalent.
Note: Computer Science 581 or 681 or equivalent is highly recommended as preparation for this course.

Computer Science 785 H(3-0)

*Implicit Modelling*
A detailed look at modelling using implicit and iso-surface techniques taking an in depth review of the literature. Algebraic methods will be followed by skeletal models, field function design, modelling techniques, rendering and texture mapping. Polygonisation algorithms, ray tracing implicits, techniques for animation, meta-morphosis, precise contact modelling, deformation and warping. Algorithms and data structures and implementation details will be presented. Students will be expected to make a new contribution in their project and term paper.

Computer Science 789 H(3-0)

*Advanced Geometric Modelling*
Current research topics including spline modelling, Subdivision Surfaces, multiresolution, wavelets, analysis of the subdivision surfaces and reverse subdivision.

Graduate Courses
Software Engineering (SENG)

Software Engineering 605 Q(3-1)

*Industrial Topics in Software Engineering*
A study of practical approaches of industrial relevance to students specializing in Software Engineering.
Note: Consult Department (Computer Science or Electrical and Computer Engineering) for details regarding offerings in the upcoming academic year.
MAY BE REPEATED FOR CREDIT

Software Engineering 607 H(3-1)

*Special Topics in Software Engineering*
A study of problems of particular interest to students specializing in Software Engineering.
Note: Consult Department (Computer Science or Electrical and Computer Engineering) for details regarding offerings in the upcoming academic year.
MAY BE REPEATED FOR CREDIT

Software Engineering 609 Q(3-1)

*Special Topics in Software Engineering*
A study of problems of particular interest to students specializing in Software Engineering.
Note: Consult Department (Computer Science or Electrical and Computer Engineering) for details regarding offerings in the upcoming academic year.
MAY BE REPEATED FOR CREDIT

Software Engineering 611 Q(3-1)

*Requirements Engineering I*
The elicitation, modelling, expression, and validation of requirements.

Software Engineering 613 Q(3-1)

*Requirements Engineering II*
Applications of requirements engineering to the management of the lifecycle of software development from requirements elicitation through analysis, design, coding, testing, enhancement and reuse.
Prerequisite: Software Engineering 611.

Software Engineering 615 H(3-2)
(formerly Computer Science 601.93)

Agile Software Engineering
Investigation and application of agile software development practices.
Prerequisite: Consent of the Department
Notes: Students are expected to have some background in software development as preparation for this course. Lectures may run concurrently with Software Engineering 515.

Software Engineering 627 H(3-1)

*Software Engineering Decision Support*
Provides methodological foundations of software engineering decision-making and how to apply them to make better decisions about processes, products, and resources as well as for selection of tools and techniques.
Note: Credit for both Software Engineering 627 and 625 will not be allowed.

Software Engineering 629 Q(3-0)
(formerly Software Engineering 609.17)

*Software Engineering Standards and Models*
Formal description of algorithms for current software engineering standards and models. Trends and future development in software engineering standardization.

Software Engineering 637 H(3-2)

*Dependability, Reliability, and Testing of Software Systems*
Principles of software dependability techniques, and techniques to improve, to predict, and to test software reliability.
Note: Credit for both Software Engineering 637 and either Software Engineering 631 or 635 will not be allowed.
Note: Engineering 319, Software Engineering 511, and Software Engineering 421, or their equivalents, are recommended as preparation for this course.

Software Engineering 641 H(3-1)
(formerly Computer Science 601.33)

*Software Evolution and Reuse*
Phenomena and approaches involved in the evolution and reuse of large-scale software, including design for modifiability and tool support. Strengths and weaknesses of industrially-current techniques as well as recent research results.
Prerequisite: Consent of the Department.
Note: Credit for both Software Engineering 641 and 541 will not be allowed.
Note: Software Engineering 301 or Computer Science 301 or equivalent are recommended as preparation for this course. Lectures may run concurrently with Software Engineering 541.

Software Engineering 651 H(3S-0)

*Half-Course Project*
A project in either software development or software best practice and experience.
Note: Credit for both Software Engineering 651 and 652 will not be allowed.
Note: This course is only available to students registered in the course-based MSc in Computer Science with the Software Engineering Specialization.
Note: Students should register for this course in the semester when they will complete it.

Software Engineering 652 F(3S-0)

*Full-Course Project*
A project in either software development or software best practice and experience.
Note: Credit for both Software Engineering 652 and either 651 or Electrical Engineering 698 will not be allowed.
Note: This course is only available to students registered in the course-based MSc in Computer Science with the Software Engineering Specialization or to MEng students with a specialization in Software Engineering.
Note: Students should register for this course in the semester when they will complete it.

Software Engineering 697 Q(3-0)
(formerly Software Engineering 609.22)

*Agent-Based Software Engineering*
Principles and practices of engineering agent-based software systems.
Note: Credit for both Software Engineering 697 and Computer Science 609 will not be allowed for programs offered by the Department of Computer Science.

## CULTURE AND SOCIETY CUSP

### Contact Info

Location: Social Sciences Building, Room 222
Faculty number: (403) 220-6357
Fax: (403) 210-8164
E-mail address: gradprog@ucalgary.ca
Web page URL:
http://www.comcul.ucalgary.ca/gradprograms

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), thesis-based

The Doctor of Philosophy program offers specializations in three areas: Heritage and Identity; Development Studies; Social and Global Justice.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Graduate Program in Culture and Society requires:

Master of Arts (thesis based, full or part time)

a) A written statement of intent (250-500 words)
b) A current curriculum vitae
c) Two samples of applicant's written work
d) A completed baccalaureate degree
e) Two Letters of Reference

Note: Masters students must take three half course equivalents in each of fall and winter terms in the first year of their program to be considered full time. There is no assurance of consideration for funding for part time students.

Doctor of Philosophy

a) A statement of research intent (500-1000 words)
b) A current curriculum vitae
c) Three samples of applicant's written work
d) Completed baccalaureate and Master's degrees
e) Two Letters of Reference

### 3. Application Deadline

The deadline for the submission of complete applications is 15 January for September admission.

### 4. Advanced Credit

Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Advanced credit is not available to MA applicants.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Graduate Program in Culture and Society requires:

Note: Courses for both the MA and PhD degrees may be selected from graduate-level courses in Communications Studies or Culture and Society. One half-course equivalent elective may be selected from other graduate programs; one half-course equivalent elective may be Culture and Society 711: Directed Studies.

Master of Arts (Six half-course equivalents)

a) Three half course equivalents: Culture and Society 601, Culture and Society 613, and Culture and Society 615
b) One half course equivalent chosen from Culture and Society 603, Culture and Society 605, or Culture and Society 607.
c) Two half course equivalent electives.

Doctor of Philosophy (Five half course equivalents)

a) Three half course equivalents: Culture and Society 601, Culture and Society 713, and Culture and Society 615 or equivalent.
b) One half course equivalent chosen from Culture and Society 603, Culture and Society 605, or Culture and Society 607.
c) One half course equivalent elective at the 600 or 700 level.

### 6. Additional Requirements

Not applicable.

### 7. Credit for Undergraduate Courses

Credit for undergraduate courses toward a Master's program will be given only in the case of the course being developed for graduate level work. Students in the doctoral program will not be given credit for undergraduate courses.

### 8. Time Limit

Expected completion time is two years for the full time Master of Arts degree, three years for the part time Master of Arts degree, and four years for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Arts degree and six years for the Doctor of Philosophy degree.

### 9. Supervisory Assignments

Master of Arts

An interim advisor is assigned by the program in the first year. The student must choose a thesis supervisor by the beginning of the second year.

Doctor of Philosophy

By June of the first year in program, the student must submit his/her proposed field of research and the name of his/her proposed supervisor for approval by the program. The supervisory committee must be appointed no later than three months after the appointment of the supervisor.

### 10. Required Examinations Doctor of Philosophy

Doctoral candidacy examinations have a written and an oral component. Students have three weeks to write papers in three areas relevant to their proposed research. The student's supervisory committee sets the areas and the examination questions in consultation with the candidacy committee. The oral examination takes place one week after the completion of the written papers.

Final thesis oral examinations are open.

### 11. Research Proposal Requirements

Students whose research involves human subjects must receive approval from the University of Calgary Conjoint Faculties Research Ethics Board before beginning data collection.

Master of Arts

Thesis supervisor must approve proposal.

Doctor of Philosophy

In consultation with the supervisory committee, before the candidacy examinations, each doctoral student is required to submit a preliminary thesis proposal that may serve as an additional basis for questioning. A more detailed, Final Thesis Proposal (including an Application for Ethics Approval where relevant), approved by the supervisory committee must be submitted to the graduate coordinator within six months of the successful completion of the candidacy examination.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on Awards, see the Awards and Financial Assistance section of this Calendar. http:grad.ucalgary.ca/awards

Students applying for open doctoral scholarships must submit their applications to the Department of Communication and Culture Graduate Programs Office by January 15.

### 14. Other Information

Inquiries concerning specific questions about the program and degree requirements should be directed to: Department of Communication and Culture, Graduate Programs, Social Sciences 222, University of Calgary, 2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4.

### 15. Department Members/Research Interests

The active research interests of current faculty can be found at
http://www.comcul.ucalgary.ca/facultyresearch

Note: Courses that are considered electives will be offered on the basis of student needs and contingent upon the availability of staff resources.

#### Graduate Courses

**Culture and Society 601** H(3S-0)

*Interdisciplinary Approaches to Culture and Society*
An introduction to ways of studying culture and society from a variety of perspectives, including those rooted in traditional disciplines and more interdisciplinary approaches such as cultural studies and critical discourse analysis. Specific problems in culture and society will provide the basis for course work.

**Culture and Society 603** H(3S-0)

*Heritage and Identity - Issues and Approaches*
An investigation of various issues related to defining and portraying cultural heritage, ethnic identity, and history within the public sphere and how governments, special interest groups, heritage organizations and institutions, and the mass media shape public perceptions of national and regional identity, ethnicity, and history.

**Culture and Society 605** H(3S-0)

*Approaches to Development Theory and Praxis*
Critical historical processes of development within a global context, competing theoretical and methodological paradigms for evaluating those processes, and their implications for the praxis of development in both the Global North and South

**Culture and Society 613** H(3S-0)

*Cultural and Social Theory*
An examination of a wide range of critical social theories, including feminist theory, critical race theory and postcolonial theory, will provide students with the analytical sophistication and critical thinking skills necessary to unpack complex cultural and social dynamics and to develop innovative approaches to vexing issues.

**Culture and Society 615** H(3S-0)

*Research Methods*
A survey of research methods appropriate to the study of communication and culture.

**Culture and Society 711** H(3S-0)

*Directed Studies*
A research project under the direction of a Faculty member.
Prerequisite: Consent of the Program Director.
Note: May be repeated for credit once.
MAY BE REPEATED FOR CREDIT

**Culture and Society 717** H(3S-0)

*Selected Topics in Culture and Society*
A variety of topics based on faculty expertise.
Prerequisite: Consent of the Program Director.
MAY BE REPEATED FOR CREDIT

## DRAMA DRAM

#### Contact Info

Location: Craigie Hall D 209
Department number: (403) 220- 5422
Fax: (403) 284-0713
E-mail address: dramgs@ucalgary.ca
Web page URL:
http://www.finearts.ucalgary.ca/drama/

### 1. Degrees and Specializations Offered

Master of Fine Arts (MFA) (thesis-based)
Specializations: Directing, Design/Technical, Playwriting, Theatre Studies

Students will generally be accepted and registered on a full-time basis. Part-time registration will be considered on an individual basis.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

a) A baccalaureate degree that has clearly included a major emphasis in the study of drama with study at the undergraduate level in the proposed area of specialization. Deficiencies of background may be corrected during a year of study as a qualifying student.
b) A written application including a biographical outline of the applicant's studies and experience in theatre and a statement of intent outlining proposed projects in the Department. When the applicant intends to study in the Design/Technical area, a portfolio of drawings and design work is required. Applicants to the Playwriting area must submit a portfolio of original creative writing. Applicants to the Theatre Studies area must submit samples of their written work.
c) Two Letters of Reference

### 3. Application Deadline

The deadline for the submission of complete applications is 15 January for September admission. In exceptional circumstances, at the discretion of the Graduate Committee, January admission may be possible. Inquiries should be addressed to the Graduate Director and all admission materials submitted to the Department by 15 October for consideration.

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department also specifies the following requirements:

All candidates must take a minimum of four full graduate courses, including Drama 605. All candidates must complete a thesis.
Courses required for specific areas are described below:

a) Directing candidates must enrol in Drama 610, Drama 647 and Drama 649 in the first year.
b) Design/Technical candidates must enrol in at least four of the decimalized series that includes Drama 623, Drama 625, Drama 627 and Drama 629. Candidates must complete, to the satisfaction of an examining committee, a portfolio and an oral review relating to their design work at the completion of the first three full courses. Details concerning the portfolio and procedures to be followed in case of failure are on file in the Department of Drama office.
c) Playwriting candidates must enrol in Drama 671 and Drama 673 in the first year. Drama 647 and Drama 649 are also required courses.
d) Theatre Studies candidates must enrol in Drama 647 and Drama 649 in the first year.

### 6. Additional Requirements

a) For Directing candidates, the thesis will consist of the direction of a full-length play and a supporting paper that reflects critically on the production and on the process of its creation.
b) For Design/Technical candidates, the thesis will consist of the design of a full-length production in two of the following areas: scene design, costume design, light design, sound design. Technical Direction may serve as one of the areas. Pictorial material and a supporting paper that reflects critically upon the production and the process of its creation are also required.
c) For Playwriting candidates, the thesis will consist of a full-length play and a supporting paper that reflects critically on the play and the process of its creation.
d) For Theatre Studies candidates, the thesis will be a substantial scholarly research paper that may be in some cases informed by a creative performance project.

### 7. Credit for Undergraduate Courses

The Department of Drama may give credit for undergraduate courses at the 500-level at the discretion of the supervisor and graduate committee. No more than half of a student's program may be done at the undergraduate level.

### 8. Time Limit

The Master of Fine Arts degree must be completed within four years.

### 9. Supervisory Assignments

The graduate committee assigns a supervisor after discussion with the student.

### 10. Required Examinations

Final thesis oral examinations are open.

### 11. Research Proposal Requirements

Research proposals are formulated by the student in consultation with the supervisor and approved by the graduate committee. The committee will follow the University's policies on ethical conduct in research in its review of proposals.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to the Department by 1 February .

### 14. Other Information

None.

### 15. Faculty Members/Research Interests

The interests and research specialties of the staff can be found at
http://drama.ucalgary.ca/contact-us/directory

#### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

Drama 517 H2S-2)

*Advanced Design for Theatre I*
Advanced set, props, lighting, and costume design theory, process and technique for a variety of theatre forms and performance styles.
Prerequisite: Consent of the Department.

Drama 519 H(2S-2)

*Advanced Design for Theatre II*
Continuation of Drama 517.
Prerequisites: Drama 517 and consent of the Department.

Drama 531 H(2S-2)

*Scene Painting I*
Theory and technique of scene painting for a variety of theatre genres.
Prerequisite: Consent of the Department.

Drama 533 H(2S-2)

*Scene Painting II*
Continuation of theory and technique of scene painting for a variety of theatre genres.
Prerequisites: Drama 531 and consent of the Department.

Drama 540 F(4S-0)

*Seminar in Drama III*
Critical study at an advanced level of the dramatic metaphor as presented in the Department's season of plays; intensive focus on the historical period and theatrical genre of one or two of the season's plays especially.
Prerequisite: Drama 440 or consent of the Department.

Drama 560 F(2S-2)

*Performance Creation III*
Independent research, creation and facilitation of original solo or group performances.
Prerequisite: Drama 460 or consent of the Department.

Drama 564 F(2S-2)

*Drama Education*
Research into the nature and function of drama education across a variety of age levels and learning environments. Practical experience in structuring learning activities, developing classroom controls and facilitating creative process and performance may be included.
Prerequisite: Drama 460 or consent of the Department.

Drama 571 H(2S-0)

*Directed Studies I*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Drama 572 F(2S-0)

*Directed Studies II*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Drama 590 F(1S-10)

*Professional Theatre Internship*
Internship experience in acting; directing; design; dramaturgy; theatre, stage or production management with a local professional theatre organization.
Prerequisites: Fourth-year standing and consent of the Department.

#### Graduate Courses

Drama 605 H(4S-0)

*Methods in Theatre Research*
Methods in research in the four areas of specialization in the MFA Theatre program.
Note: Required of all students enrolled in the MFA Theatre program.

Drama 607 H(2S-2)

*Director, Designer, and Mise-en-scene*
Advanced collaborative methods and techniques for directors, designers and dramaturges, leading to the creation of a mise-en-scene for selected plays of varying styles and genres.

Drama 610 F(2S-3)

*Selected Problems in Directing*

Drama 623 H(2S-2)

*Seminar in Scene Design*
MAY BE REPEATED FOR CREDIT

Drama 625 H(2S-2)

*Seminar in Costume Design*
MAY BE REPEATED FOR CREDIT

Drama 627 H(2S-2)

*Seminar in Lighting Design*
MAY BE REPEATED FOR CREDIT

Drama 629 H(2S-2)

*Seminar in Technical Direction*
MAY BE REPEATED FOR CREDIT

Drama 647 H(3S-0)

*Studies in Modern Drama I*
Studies in the literature, history, theory and criticism of drama, theatre and performance from the late nineteenth century to the mid-twentieth century.

Drama 649 H(3S-0)

*Studies in Modern Drama II*
Studies in the literature, history, theory and criticism of drama, theatre and performance from the mid twentieth century to the present.

Drama 651 H(2S-0)

*Directed Studies*
MAY BE REPEATED FOR CREDIT

Drama 660 F(2S-3)

*Seminar and Practicum in Performance Creation*

Drama 671 H(3S-0)

*Selected Problems in Playwriting I*

Drama 673 H(3S-0)

*Selected Problems in Playwriting II*

## ECONOMICS ECON

#### Contact Info

Location: Social Sciences Building, Room 454
Faculty number: (403) 220-6064
Fax: (403) 282-5262
E-mail address: dalip@ucalgary.ca
Web page URL: http://econ.ucalgary.ca/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), thesis-based and course-based

The Department offers a formal specialization in Health Economics. Other specializations are arranged informally, determined by the research interests of the student.

There is a requirement of full-time study for the course-based and thesis-based Master of Arts and doctoral programs.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

#### Master of Arts

a) A minimum of four full-year equivalent economics courses. These must include the equivalent of Economics 395/495/497 (econometrics), Economics 387/389 (mathematics for economists), Economics 557 (senior microeconomics), and Economics 559 (senior macroeconomics), with at least a "B" average in senior economics courses.
b) Three Reference Letters

#### Doctor of Philosophy

a) The requirements listed above for the Master of Arts program. Doctoral candidates may require greater proficiency in Mathematics.
b) A Master of Arts degree in Economics or its equivalent, with a high level of proficiency in Microeconomic Theory, Macroeconomic Theory, and Econometrics. If courses have been taken more than five years ago, students may be required to upgrade their knowledge in these fields.
c) Three Reference Letters

### 3. Application Deadline

Deadline for submission of complete applications is February 1 for September admission.

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given

for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

## 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

### Master of Arts (thesis-based)

a) For students holding an Honours Economics degree with credits in Economics 395, Economics 387, Economics 389, Economics 495, Economics 497, Economics 557 and Economics 559 or their equivalents, the completion of three full graduate courses in Economics. Such students may be able to complete the degree in one year. In special cases the Department may allow students to substitute one full or two half-courses from a related discipline for one of the elective graduate courses in Economics.
b) For students without an Honours Economics degree or students whose Honours degree in Economics does not include the undergraduate courses specified in (a) or their equivalents, the completion of such courses as are required to raise their competence to the appropriate level. Graduate course requirements for such students are the same as in (a). Such students may be able to complete the degree in two years.
c) The completion of Economics 615, Economics 657, and Economics 659 unless one or more of them is explicitly exempted by the requirements for a specialization.

### Master of Arts (course-based)

The departmental academic requirements for the course-based Master of Arts degree are comparable to those for the thesis-based Master of Arts specified above. The differences in the course-based program are:

a) The thesis requirement is replaced by two additional full graduate courses (making a total of five full courses).
b) The courses from a related discipline are increased to one and one-half of the elective graduate courses in Economics.
c) A research paper. The topic may be a limited empirical research project, a critical review of the literature in a particular area, or a critical analysis of a theoretical or important policy problem.
d) An exit requirement consisting of a research defence in an open conference and if unsuccessful a comprehensive written examination.

### Master of Arts (thesis-based or course-based) with a Specialization in Health Economics

a) The completion of Economics 679 and Economics 681 as two of the six half-courses required in the thesis-based program, or as two of the ten half-courses required in the course-based program.
b) Students may be excused from the requirement that they take Economics 659. However, if they are contemplating continuing on to a doctoral program, they are cautioned that most doctoral programs will require a course that is equivalent to Economics 659.

### Doctor of Philosophy

The Department of Economics requires that doctoral students take twelve one-semester courses. Required courses include two courses each in econometrics, ECON 615 and ECON 715, microeconomic theory, ECON 657 and ECON 757, and macroeconomic theory, ECON 659 and ECON 759. In addition, students must take six one-semester courses in "field" areas. Students are also recommended to take a non-credit one-week course in the Fall semester block week (the week prior to the start of classes) of the first year in Mathematical Economics (ECON 600). The Department allows for the possibility that Master's-level courses and course work taken at other institutions may be substituted for some of the required doctoral courses. Decisions concerning course substitutions and the transferability of graduate courses from other institutions are made on a case-by-case basis. Students are advised that the comprehensive theory examinations, which are required of all doctoral students, include material from the core courses listed above.

## 6. Additional Requirements

None.

## 7. Credit for Undergraduate Courses

Credit is not given for undergraduate courses.

## 8. Time Limit

Expected completion time for students studying on a full-time basis is two years for the Master of Arts thesis-based and one year course-based, and four years for the Doctor of Philosophy. Maximum completion time is four years for the Master of Arts (thesis-based and course-based) and six years for the Doctor of Philosophy

## 9. Supervisory Assignments

The process by which students are matched with supervisors is an informal one, based on mutual research interest.

## 10. Required Examinations

### Doctor of Philosophy

Doctoral students are required to pass a written comprehensive examination in each of Microeconomic Theory, Macroeconomic Theory, and Econometrics. Each examination will be three hours long. These examinations shall be scheduled in May of their first year. In August, students who fail one or more of the comprehensive theory examinations shall be given a second opportunity to pass those examinations they failed. Students who do not pass their comprehensive theory examinations by the second sitting shall be required to withdraw from the program.

Doctoral students are required to pass a written comprehensive field examination in two fields of study. The written comprehensive field examinations shall each be three hours long. These examinations shall normally be scheduled in June of the second year. Students who fail one or more of the written comprehensive field examinations shall be given a second opportunity in August to pass those examinations they failed. Students who do not pass their written comprehensive field examinations by the second sitting shall be required to withdraw from the program.

The oral candidacy exam will include examination on general research knowledge, information from the written examinations and the research proposal.

Students who do not pass their oral candidacy examination by the twenty-eighth month of their program shall be required to withdraw from the program.

## 11. Research Proposal Requirements

Doctoral students are required to have a thesis proposal approved by the department before the candidacy examination.

## 12. Special Registration Information

Not applicable.

## 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, please see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to the Department by February 1.

To be eligible for funding beyond the first year, a student must pass all comprehensive theory examinations by the beginning of classes of their second year. To be eligible for funding beyond the Fall semester of the third year, a student must pass their comprehensive field examination and their oral candidacy examination by the beginning of Winter semester courses in their third year.

## 14. Other Information

None

## 15. Faculty Members/Research Interests

The active research interests of the current faculty can be found at:
http://econ.ucalgary.ca/contact-us/directory

### Graduate Courses

Students are required to have departmental consent before registering in any of the following courses:

Economics 605 H(3-0)
*Advanced Computational Optimization and Economic Applications I*

Economics 607 H(3-0)
*Advanced Computational Optimization and Economic Applications II*
Prerequisite: Economics 605.

Economics 611 H(3-0)
*Independent Study*
MAY BE REPEATED FOR CREDIT

Economics 615 H(3-0)
*Advanced Econometrics I*

Economics 617 H(3-0)
*Advanced Econometrics II*
Prerequisite: Economics 615 or consent of the Department.

Economics 619 H(3-0)
*Economics of International Commercial Policy*

Economics 621 H(3-0)
*International Trade*

Economics 625 H(3-0)
*The Economics of the Petroleum Industry*

Economics 627 H(3-0)
*Energy in the Production Sector of the Economy*

Economics 633 H(3-0)
*Labour Markets*

Economics 635 H(3-0)
*Regulatory Economics*

Economics 641 H(3-0)

*Financial Economics*

Economics 643 H(3-0)

*Institutions and Growth*

Economics 645 H(3-0)

*Topics on Institutions and Economic Performance*

Economics 651 H(3-0)
(formerly Economics 611.13)

*Redistribution and Social Insurance*

Economics 653 H(3-0)

*Public Revenue Analysis*

Economics 655 H(3-0)

*Cost/Benefit Analysis*

Economics 657 H(3-0)

*Microeconomic Theory*

Economics 659 H(3-0)

*Macroeconomic Theory*

Economics 661 H(3-0)

*Behavioural Economics*

Economics 663 H(3-0)

*Experimental Economics*

Economics 667 H(3-0)

*Seminar in Industrial Organization*

Economics 675 H(3-0)

*Advanced Topics in Natural Resource Economics*

Economics 677 H(3-0)

*Seminar in Economics of the Environment*

Economics 679 H(3-0)
(Medical Science 679)

*Health Economics I*
Applies basic concepts from economics to the examination of health and health care policy issues, such as why we have the kind of health care system we have, various aspects of health care reform, promotion of health, and evaluation in interventions.
Prerequisite: Consent of the Department.

Economics 681 H(3-0)

*Health Economics II*

Economics 691 H(3-0)

*Research Methods I*

Economics 693 H(3-0)

*Research Methods II*

Economics 695 H(3-0)

*Research Methods III*

Economics 711 H(3-0)

*Independent Study*
MAY BE REPEATED FOR CREDIT

Economics 715 H(3-0)

*Advanced Topics in Econometrics*

Economics 757 H(3-0)

*Advanced Microeconomic Theory*

Economics 759 H(3-0)

*Advanced Macroeconomic Theory*

In addition to the numbered and titled courses shown above, the Department offers a selection of advanced level graduate courses specifically designed to meet the needs of individuals or small groups of students. These courses are numbered in the series 800.01 to 899.99. Such offerings are, of course, conditional upon the availability of staff resources.

## EDUCATION GRADUATE PROGRAMS

### Contact Info

Location: Education Tower,
Faculty number: (403) 220-5675
Toll free in Canada (877) 623-0292
Fax: (403) 282-3005
E-mail address: gder@ucalgary.ca
Web page URL: http://educ.ucalgary.ca/gder

Beginning on July 1, 2010, the Faculty of Education will be changing its organizational structure for the administration of all graduate programs from Divisions, APSY- Applied Psychology and GDER- Graduate Division of Educational Research , to 4 'Educational Studies Areas'(EDSAs). These EDSAs will be the academic homes for faculty members and students whose research, expertise and interests are aligned with these areas. All of our current graduate students, degrees and specializations will continue to be offered and supported within this new organizational structure by the Office of Graduate Programs in the Faculty of Education.

For more information, specific details on this transition and changing contact information, please consult the Faculty of Education Website at
http://educ.ucalgary.ca/ and also the online updates of the Graduate Calendar at
http://www.grad.ucalgary.ca/calendar

Please see the Applied Psychology and Graduate Division of Educational Research program entries in this Calendar for program details and requirements.

## APPLIED PSYCHOLOGY APSY

### Contact Info

Location: Education Tower, Room 302
Faculty number: (403) 220-5651
Fax: (403) 282-9244
Email: apsyinfo@ucalgary.ca
Web page URL: http://www.educ.ucalgary.ca/apsy/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based
Master of Education (MEd), course-based
Master of Counselling (MC), course-based

Specializations:
School and Applied Child Psychology
Counselling Psychology

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Education requirements, Division requirements include:

#### Counselling Psychology

Normally, a minimum of three full-course equivalents in applied psychology and/or psychology. This must include:

- Two undergraduate statistics courses (Note: For those who completed a psychology degree at the University of Calgary, PSYC 312 acts as an equivalent.)
- APSY 419 (Communication Skills in Guidance and Counselling) or its equivalent
- A senior undergraduate psychology or applied psychology course in each of learning theory, developmental psychology, and personality theory
- A résumé and a concise rationale for the application (500 words or less)
- Two letters of reference.

Information on the criteria used for admission decisions can be obtained from the Division website in the document *Counselling Psychology Information Booklet* and from the Division office.

*Note:* Although the following is not an admission requirement into the Master's programs, the College of Alberta Psychologists (CAP) (i.e., the governing body that licenses psychologists in Alberta) requires that individuals have completed a senior undergraduate or graduate half-course in *biological bases of behaviour* before licensure as a psychologist. Furthermore, for those planning to eventually seek admission into a Canadian Psychological Association (CPA) accredited doctoral program, several additional undergraduate or graduate level prerequisite courses need to be completed. Please see section on Doctor of Philosophy in Counselling Psychology for additional information.

#### School and Applied Child Psychology

The Master's programs in School and Applied Child Psychology have been developed in alignment with accreditation and training standards for Canadian programs of psychology. They adhere to the scientist-practitioner model, which emphasizes the interaction of research, theory, and practice. The goal is to develop researchers and professionals who use evidence-based knowledge to critically inform practice and to conduct applied and theoretical research relevant to the practice of School and Applied Child Psychology. Students are expected to gain broad knowledge in the areas encompassed by school and applied child psychology and develop a firm foundation in the philosophy of science and scientific methodology. Students are taught to critically evaluate and apply research through their substantive courses.

The Master of Science is an on-campus, thesis-based program while the Master of Education is a course-based distributed (online) program. Detailed information on these programs can be obtained from the Division website.

In addition to Faculties of Graduate Studies and Education requirements, Divisional entry requirements for the Master of Science program include:

- Honours degree in Psychology (or equivalent), with a grade point average of 3.0 (equivalent to a B or 70% in many universities) over the courses taken during the last two years of study
- A typed résumé and statement of research and

professional interests including the specification of a prospective research supervisor from among current faculty
- Two letters of reference
- For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (written test) or 92 (internet-based test) or a MELAB score of 82 or an IELTS score of 7.0.
- Prior to admission, the most promising applicants may be interviewed to evaluate their understanding of and motivation for entry into the field of school and applied child psychology

In addition to Faculties of Graduate Studies and Education requirements, Divisional entry requirements for the Master of Education include:
- A completed bachelor's degree in Education or Psychology with a grade point average of 3.0 (equivalent to a B or 70% in many universities) over the courses taken during the last two years of study
- A minimum of 30 credit units (10 half credit courses) completed in psychology or education is required prior to application
- A resume and a concise rationale for the application (500 words or less).
- Two letters of reference
- For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (written test) or 92 (internet-based test) or a MELAB score of 82 or an IELTS score of 7.0.
- Prior to admission, the most promising applicants may be interviewed to evaluate their understanding of and motivation for entry into the field of school and applied child psychology

## Doctor of Philosophy

### Counselling Psychology

- A completed Master's degree in Counselling Psychology or equivalent from an approved university, with a minimum grade point average of 3.5 in the Master's program. If coursework from an applicant's Master's program is not equivalent to courses from the Master of Science in Counselling Psychology at the University of Calgary, the student will be required to take additional courses within the doctoral program to ensure equivalent training.
- 
- Two senior undergraduate or one graduate half-course in a) biological bases of behaviour, (b) cognitive-affective bases of behaviour, (c) social bases of behaviour, and (d) individual behaviour, .
- One senior undergraduate or one graduate half course in the historical and scientific foundations of general psychology
- If all of the prerequisite courses for admission to the PhD program in Counselling Psychology have not been completed at the time of application, students who have up to two full-course equivalents in deficiencies may still be admitted, but the prerequisite courses will need to be completed before the doctoral candidacy examination
- A typed résumé and a concise rationale (500 words or less) for the application
- Two letters of reference

*Note:* The Division of Applied Psychology will be applying for accreditation of its doctoral program in Counselling Psychology by the Canadian Psychological Association (CPA) within the next few years.

### School and Applied Child Psychology

Master of Science students who have a minimum grade point average of 3.5 in their first year of studies can apply to transfer to the doctoral program at the beginning of their second year.. All of the requirements for transfer must be completed prior to full acceptance into the PhD program:
- Successful completion of the MSc in School and Applied Psychology (including thesis) and
- Approval of a PhD Research Program Proposal by the student's PhD supervisory committee.

Detailed information regarding transfer to the doctoral program is available from the Division.

A limited number of outstanding applicants holding equivalent Bachelor's and Master's degrees from elsewhere may be considered. However, if the course content of their Master's program is not equivalent to the Master of Science at the University of Calgary in School and Applied Child Psychology, students will be required to take additional courses within their doctoral program to ensure equivalent training. These additional courses (a maximum of two full courses) must be completed in the first year of study. Applicants must also have a research advisor selected from among professors in the Division of Applied Psychology upon entry to the program.

Master of Counselling

The *Master of Counselling Program* normally requires at least three half-courses in psychology or educational psychology (including one course each in human development and learning). In addition, applicants are required to have a half-course in counselling skills. As part of the application process, students are required to submit a résumé and a concise rationale for the application. Related volunteer work or paid employment is an asset.

Students who plan to apply for registration as psychologists after completing the program should bear in mind that additional undergraduate and graduate courses in applied psychology and/or psychology may be required. Further information on registering requirements can be obtained from the College of Alberta Psychologists' website.

## 3. Application Deadline

On-line applications to the Master of Counselling, program may be accessed through the following link: https://www.gradapplication.ucalgary.ca/account/instructions.asp.

The deadline for the submission of complete applications is:
15 December for September admission

## 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring grade point average to a required level for admission.

## 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Education requirements, the Division requires:

### Master of Science - Counselling Psychology

Students will be required to complete:
- Eight full-course 600 level equivalents (including 500 hours of practicum experience (equivalent to 1.5 full courses): APSY 603, APSY 605, APSY 607 or 611, APSY 615. A{PSY 617, APSY 621, APSY 623, APSY 625, APSY 627, APSY 631,,APSY 640,, APSY 641 or 643, APSY 691.04 and 691.05, APSY 695.06, and one-half course elective.
- a thesis (equivalent to one full course)
- a non-credit research seminar

Course content addresses theory, research, and practice in the domains identified by the Canadian Counselling and Psychotherapy Association (CCPA) Standards for Accreditation of Counsellor Education Programs. Detailed information on core course requirements can be obtained from the Division website. First year students are assigned an interim advisor who will assist with course selection.

### Master of Education – Counselling Psychology

Students will be required to complete a course-based program which includes:
- eight full-course 600 level equivalents (including 500 hours of practicum experience (equivalent to 1.5 full courses): APSY 603, APSY 605, APSY 615, APSY 617, APSY 621, APSY 623, APSY 625, APSY 627, APSY 631, APSY 640, APSY 641 or 643, APSY 691.04 and APSY 691.05, APSY 695.06, and two half-course electives.
- written and oral comprehensive examinations upon the completion of coursework.

Course content addresses theory, research, and practice in the domains identified by the CCPA Standards for Accreditation of Counsellor Education Programs. Detailed information on core course requirements can be obtained from the Division website in the document Counselling Psychology Information Booklet and from the Division office. First year students are assigned an interim advisor who will assist with course selection.

### Master of Science – School and Applied Child Psychology

Students will be required to complete:
- 15 half-courses (including a minimum of 600 practicum hours): APSY 603, APSY 605, APSY 607, APSY 635, APSY 650, APSY 651, APSY 652, APSY 654, APSY 656, APSY 657, APSY 658, APSY 660, APSY 674, APSY 675, APSY 676
- a thesis (equivalent to three half-courses)

### Master of Education – School and Applied Child Psychology

The Master of Education will be offered through a distributed learning mode of delivery. Students will be required to complete a course-based program which includes:
- 18 half-courses (including a minimum of 600 practicum hours): APSY 603, APSY 605, APSY 607, APSY 635, APSY 650, APSY 651, APSY 652, APSY 654, APSY 656, APSY 657, APSY 658, APSY 660, APSY 674, APSY 675, APSY 676, APSY 684, APSY 698 A/B, CAAP 601, and an APSY/CAAP elective. APSY 684 comprises the capstone course requirement and must be taken as the final course or concurrently with final courses prior to commencing the internship.
- A portfolio exit project.
- A 1,200 hour internship (equivalent to 2 half-courses).

*Note: Detailed information on core course requirements for each specialization can be obtained from the Division website.*

The Master of Counselling Program is offered through a distributed learning mode of delivery. It consists of twelve half-courses, 10 of which are compulsory. The compulsory courses required by all students in the CAAP and APSY MC degree are listed by program

area below. More complete course descriptions, along with learning objectives, and evaluation procedures, are provided on the Division of Applied Psychology website.

### Master of Counselling – APSY

#### APSY: MC required Courses

- APSY 602: Counselling theories and professional practice
- APSY 603: Professional Ethics in Applied Psychology
- APSY 605: Research Design and Statistics in Applied Psychology
- APSY 608: Introduction to statistical analyses
- APSY 616: Assessment theory and practices
- APSY 622: Developing and sustaining a working alliance with clients
- APSY 625: Cultural and Social Justice Issues in Professional Practice.
- APSY 627: Group Processes in Applied Psychology
- APSY 631: Career Development: Theory and Practice
- APSY 632: Career development and services for Organizational settings
- APSY 633: Career Counselling: Process and Resources
- APSY 634: Multicultural Career Development and counselling
- APSY 636: Systemic approaches to community change
- APSY 638: Counselling interventions for client change
- APSY 642: Counselling Practicum I
- APSY 644: Counselling Practicum II
- APSY 646: Processes of Learning
- APSY 648: Lifespan Human Development
- APSY 664: Psychological Approaches to Health
- APSY 668: Theory and practice of Clinical supervision
- APSY 670: Final Project Seminar
- APSY 672: Counselling exceptional children
- APSY 678: Art therapy history
- APSY 680: Counselling Graduate Practicum: Selected Topics
- APSY 682: Special Topics: Counselling

### Master of Counselling - CAAP

- Campus Alberta Applied Psychology 601: Theories of Counselling and Client Change
- Campus Alberta Applied Psychology 603: Professional Ethics
- Campus Alberta Applied Psychology 605: Developing a Working Alliance
- Campus Alberta Applied Psychology 607: Equity and Diversity Issues in Counselling
- Campus Alberta Applied Psychology 611: General Counselling Practicum
- Campus Alberta Applied Psychology 613: Assessment
- Campus Alberta Applied Psychology 615: Intervening to Facilitate Client Change
- Campus Alberta Applied Psychology 617: Methods of Inquiry
- Campus Alberta Applied Psychology 619: Specialized Practicum
- Campus Alberta Applied Psychology 693.99: Final Project Portfolio Course

### Doctor of Philosophy – Counselling Psychology

Students who have completed the pre-requisites in the areas of (a) biological bases of behaviour, (b) cognitive-affective bases of behaviour, (c) social bases of behaviour, (d) individual behaviour, (e) historical and scientific foundations of general psychology, and (f) the courses required of students on the Master of Science program in Counselling Psychology will be required to complete:

- two doctoral-level full-course equivalents normally including APSY 731, APSY 742, and one half-course in research methods.
- a non-credit research seminar
- a candidacy examination
- a dissertation
- a twelve-month full-time internship.: APSY 788

Students who are deficient in prerequisites will be required to take additional courses on their programs once admitted. A student may be deficient in up to two full-course equivalents, which must be completed before the PhD candidacy examination.

Detailed information on core course requirements can be obtained from the Division website.
*Note: First year students are assigned an interim advisor who will assist with course selection.*

### Doctor of Philosophy – School and Applied Child Psychology

Master of Science students admitted to the Doctoral program will be required to complete:

- all remaining courses (including the thesis) in the Master of Science program
- a non-credit research seminar
- one doctoral-level full-course equivalent
- a candidacy examination
- twelve-month (min. 1600 hours) full-time internship
- a dissertation

Students entering the program following completion of a Master's degree outside the program may be required to take additional Master's courses to ensure equivalency to the Master of Science program in School and Applied Child Psychology at the University of Calgary. A student may be deficient in no more than two full courses, which must be completed in the first year of Doctor of Philosophy studies.

Detailed information on core course requirements can be obtained from the Division website.
*Note: First year students are assigned an interim advisor who will assist with course selection.*

## 6. Additional Requirements

Applied experience is an asset. Applicants to the Master of Counselling and Master of Education in School and Applied Child Psychology should have reasonable computer literacy because portions of the programs are delivered on-line.

## 7. Credit for Undergraduate Courses

The Division does not normally accept undergraduate courses for credit toward graduate degrees.

## 8. Time Limit

### Counselling Psychology

The Master of Science requires a minimum of two consecutive four-month terms of full-time study and research. Students may complete the degree in a minimum of two years of full-time study. Maximum time allowed for completion of the Master of Science degree is four years.

The Master of Education can be completed in two years of full-time study but students may take up to six years to complete the degree on a part-time basis.

The Doctor of Philosophy degree may be completed in three years.. Maximum completion time allowed for the Doctor of Philosophy degree is six years.

Normally, Master of Counselling students will complete their program in three years. The maximum time to completion is six years.

### School and Applied Child Psychology

The Master of Science requires two years of full-time study to complete. Maximum completion time is four years. The Master of Education (Distributed Learning) can also be completed in three years of full-time study but students may take up to six years to complete the degree on a part-time basis.
Students transferring from the Master of Science into the doctoral program can anticipate five years of full-time study from their initial entry into the Master of Science program to completion of their doctoral program. Maximum completion time is six years for the Doctor of Philosophy degree.

## 9. Supervisory Assignments

An interim advisor is assigned to each first-year student in a thesis-based program. Students are responsible for initiating discussions with potential permanent supervisors and are expected to have finalized supervisory arrangements by their second annual registration.

A supervisor is not assigned to students in the course-based Master of Counselling program.

## 10. Required Examinations

Comprehensive examinations for the Master of Education program and candidacy examinations for the doctoral program both have written and oral components.

Distributed learning programs (Master of Education in School and Applied Child Psychology and Master of Counselling have a capstone exit procedure. Information on examinations is provided on the Division website.

## 11. Research Proposal Requirements

Information on research proposals is available through the interim advisor/supervisor. Ethics approval is needed for all research projects involving the use of human subjects before data collection begins. To initiate the ethics review, the researcher must submit a copy of the application (available on the Research Services website) to the Conjoint Faculties Research Ethics Board, c/o Associate Dean (Research), Faculty of Education.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships for September admission must submit their scholarship applications to the Division by the preceding 1 February.

The Division also provides assistance for students through teaching assistantships, graduate research scholarships and other Divisional scholarships. Application forms and deadline information for these awards can be obtained from the Division.

## 14. Other Information

For further information or for copies of the Division brochure, write to the Division of Applied Psychology, University of Calgary, 2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4 website www.ucalgary.ca/apsy/

Further information on the Master of Counselling may be obtained from the Division website http://educ.ucalgary.ca/apsy/mc-online

## 15. Faculty Members/Research Interests

Research interests of faculty members and adjunct faculty can be found at: http://www.educ.ucalgary.ca/research/academic/homepages.html and from the Division office.

### Graduate Courses

Note: Graduate courses within the Division of Applied Psychology can be taken only with consent of the Division of Applied Psychology and in specific cases additional requirements may be necessary (see below).

**Applied Psychology 603** H(3-0)

*Ethics in Applied Psychology*
Ethical and legal issues in Applied Psychology. Professional issues in practice settings.
Prerequisite: Consent of the Division.

**Applied Psychology 605** H(3-2)

*Research Design and Statistics in Applied Psychology*
Research design and statistics, including methods for research in applied psychology and related laboratory instruction.

**Applied Psychology 607** H(3-2)

*Research in Applied Psychology - Multivariate Analysis*
Research design and statistics in applied psychology, with special reference to large sample techniques.
Prerequisites: Applied Psychology 301 and 303 or equivalents.

**Applied Psychology 611** H(3-2)

*Qualitative Research Methodologies*
Advanced study of qualitative research methods for use in applied psychology and education.
Prerequisites: Applied Psychology 301 and 303 or consent of the Division.

**Applied Psychology 615** H(3-0)
(formerly Applied Psychology 693.24)

*Theoretical and Clinical Foundations of Assessment*
In-depth review of theoretical and clinical foundations of psycho-educational assessment. Focus is on processes of assessment, properties of tests, use and interpretation of tests and clinical diagnosis.

**Applied Psychology 617** H(3-3)

*Psychological Assessment of Adults*
The purpose of this course is to provide students with the knowledge and skills necessary to select, administer, score and interpret formal psychological tests and other assessment instruments commonly used within counselling contexts.
Prerequisite: Applied Psychology 615

**Applied Psychology 619** H(3-0)

*Counselling Girls and Women*
Sex role development; stereotyping and social roles; counselling theories; counselling approaches.

**Applied Psychology 621** H(2-2)

*Creating a Working Alliance*
Theory and practice in developing skills contributing to working alliance and problem clarification. Ethical, legal and professional issues are the context for the application of generic counselling skills in laboratory experiences.
Prerequisite: Applied Psychology 419 or consent of the Division.
Prerequisite or Corequisite: Applied Psychology 623.
Note: Not open to unclassified students.

**Applied Psychology 623** H(3-0)

*Theory in Counselling*
History and systems involved in counselling psychology and client change.
Prerequisite: Consent of the Division.

**Applied Psychology 625** H(3-0)

*Cultural Influences on Professional Practice*
An examination of cultural influences on theory and practice in applied psychology.
Prerequisite: Consent of the Division.

**Applied Psychology 627** H(3-1)

*Group Processes in Applied Psychology*
Theory of group practice in applied psychology, with experiential laboratory.

**Applied Psychology 629** H(3S-2)

*Theory and Applications: Selected Topics*
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

**Applied Psychology 631** H(3-0)

*Theories of Career Development*
Study of career development theory and related research; implications for the applied field.

**Applied Psychology 633** H(2-2)

*Career Counselling*
Laboratory and field experiences in career counselling.
Prerequisite: Applied Psychology 631.

**Applied Psychology 635** H(3-0)
(formerly Applied Psychology 693.54)

*Advanced History, Theory, and Practice in Psychology*
Course examines the history of psychological concepts in Western culture, major theoretical systems and research approaches, and the foundational assumptions of contemporary perspectives in psychology.
Prerequisite: Open to students enrolled in the School and Applied Child Psychology program or permission of the Division.
Note: Not open to students with credit in APSY 693.54.

**Applied Psychology 637** H(3-0)

*Relationship Counselling*
Review of theory and systems in marriage and family counselling. Structured observation activities.
Prerequisite or Corequisite: Applied Psychology 640 or consent of the Division.

**Applied Psychology 639** H(2-2)

*Counselling Interventions*
Theory and practice in planning and implementing client change interventions; the application of counselling interventions in laboratory experiences.
Prerequisites: Applied Psychology 621 and 623 or consent of the Division.
NOT INCLUDED IN GPA

**Applied Psychology 640** F(2-7)

*Practicum in Counselling Psychology*
Supervised counselling experience and related seminars.
Prerequisites: Applied Psychology 621, 623, 625 and consent of the Division.
Prerequisites or Corequisites: Applied Psychology 639 and one of 601, 615, or 685, or equivalent.
Note: Not open to unclassified students.
NOT INCLUDED IN GPA

**Applied Psychology 641** H(3-0)

*Development, Learning and Cognition - Child and Adolescence*
The interactions of development, learning and cognition in childhood and adolescence.

**Applied Psychology 643** H(3-0)

*Development, Learning and Cognition - Adult*
The interactions of development, learning and cognition in childhood and adulthood.

**Applied Psychology 650** H(3-0)
(formerly Applied Psychology 693.48)

*Family and Social Bases of Behaviour*
Course explores theoretical perspectives and contemporary research on socialization processes in childhood and adolescence, with particular emphasis on family and peer interpersonal relations.
Note: Not open to students with credit in APSY 693.48.

**Applied Psychology 651** H(3-0)
(formerly Applied Psychology 683)

*Disorders of Learning and Behaviour*
Focuses on childhood and adolescent disorders through an examination of theories, diagnostic and associated features and disorders, prevalence, developmental course, cultural and gender context, and familial patterns.
Prerequisite: Open to students enrolled in the School and Applied Child Psychology program or permission of the Division.
Note: Not open to students with credit in APSY 683.

**Applied Psychology 652** H(3-0)

*Academic and Language Assessment*
Course provides a broad understanding of the standards that guide assessment practices through an examination of assessment of academic areas and language skills.
Prerequisite: Open to students enrolled in the School and Applied Child Psychology program or permission of the Division.
Note: Not open to students with credit in APSY 667.

**Applied Psychology 654** H(3-0)

*Neurobiological and Developmental Bases of Learning and Behaviour*
Course examines the field of cognitive neuroscience from an assessment framework. It explores the evolving understanding of neurobehavioural disorders and new testing techniques and practices.
Prerequisite: Open to students enrolled in the School and Applied Child Psychology program or permission of the Division.

Applied Psychology 656 F(1-14)

*Practicum in Academic and Language Assessment and Intervention*
This 200-hour practicum provides opportunities to develop competencies in academic and language assessment and interventions within an approved setting.
Prerequisite: Open to students enrolled in the School and Applied Child Psychology program or permission of the Division.
NOT INCLUDED IN GPA

Applied Psychology 657 H(3-0)

*Cognitive and Neuropsychological Assessment*
Focuses on the theory and practice of intellectual/cognitive, memory, and neuropsychological assessment primarily through the use of individually administered standardized tests.
Prerequisite: Open to students enrolled in the School and Applied Child Psychology program or permission of the Division.

Applied Psychology 658 H(3-0)

*Interventions to Promote Cognitive, Academic, and Neuropsychological Well-Being*
Focuses on evidence-based interventions aimed at promoting cognitive, academic, and neuropsychological development in children and youth.
Prerequisite: Open to students enrolled in the School and Applied Child Psychology program or permission of the Division.

Applied Psychology 660 H(3-0)

*Social, Emotional, and Behavioural Assessment*
Grounded in bioecological systems perspective and developmental and resiliency frameworks, course focuses on the comprehensive assessment of children and youth referred for social, emotional, and behavioural concerns.
Prerequisite: Open to students enrolled in the School and Applied Child Psychology program or permission of the Division.

Applied Psychology 661 H(3-0)

*Psychological Foundations of Student Exceptionality*
Major trends, developments, theoretical foundations, and current practices and challenges relative to the education of students with diverse learning needs.
Prerequisite: Open to students enrolled in APSY programs or permission of the Division.

Applied Psychology 667 H(3-3)

*Assessment of Students with Exceptional Learning Needs*
Theory and practice in school-based academic and social-emotional assessment techniques and strategies for use with students with diverse learning needs. Laboratory and field experiences.
Prerequisite: Open to students enrolled in the School and Applied Child Psychology program or permission of the Division.
Note: Not open to students with credit in APSY 652.

Applied Psychology 671 H(1-3)

*Practicum in School-based Interventions for Children and Youth with Exceptional Learning Needs: I*
Practicum in educational interventions for children and adolescents with special learning needs. Focus on general assessment, analysis, intervention, and strategies in applied settings.
Prerequisite: Applied Psychology 661 or equivalent.

Applied Psychology 673 H(3-3)

*Practicum in School-based Interventions for Children and Youth with Exceptional Learning Needs: II*
Advanced practicum in educational interventions for children and adolescents with special learning needs. Focus on specialized assessment, analysis, interventions, and strategies in applied settings.
Prerequisite: Applied Psychology 671 or equivalent.

Applied Psychology 674 H(3-0)

*Interventions to Promote Socio-emotional and Behavioural Well-being*
Courses focuses on strategies to enhance the socio-emotional and behavioural well-being of children and youth who exhibit significant emotional and behavioural needs in school and community settings.
Prerequisite: Open to students enrolled in the School and Applied Child Psychology program or permission of the Division.

Applied Psychology 675 F(1-14)

*Practicum in Cognitive and Neuropsychological Assessment and Intervention*
This 200-hour practicum provides opportunities to develop competencies in cognitive and neuropsychological assessment and interventions within an approved setting.
Prerequisite: Open to students enrolled in the School and Applied Child Psychology program or permission of the Division.
NOT INCLUDED IN GPA

Applied Psychology 676 F(1-14)

*Practicum in Social, Emotional, and Behavioural Assessment and Intervention*
This 200-hour practicum provides opportunities to develop competencies in social, emotional, and behavioural assessment and intervention within an approved setting.
Prerequisite: Open to students enrolled in the School and Applied Child Psychology program or permission of the Division.
NOT INCLUDED IN GPA

Applied Psychology 677 H(3-0)

*Play Therapy Theory and Process*
The theoretical foundations and basic orientation necessary to understand and use play as therapy are outlined, along with the developmental underpinnings of play in children and the basic principles upon which child-centered play therapy is built.

Applied Psychology 679 H(3-0)

*Fundamentals of Solution-Oriented Therapy*
Provides a working knowledge of the theory and practice of solution-oriented therapy and related models.

Applied Psychology 684 H(3-0)

*Advanced Seminar in the Domains of School Psychology Leadership and Function in the Schools*
This course provides an advanced study of the domains and functions of school and applied child psychologists. Constituting a final course within the MEd program, students are required to demonstrate a comprehensive understanding of competencies in ten domains identified by the National Association of School Psychologists as central to the school psychology profession.
Prerequisite: Consent of the Division.
Notes:Open only to students enrolled in the MEd program in School and Applied Child Psychology who have completed all other course work prior to enrollment.

Applied Psychology 691 Q(1.5S-0)

*Graduate Seminar: Selected Topics*
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

Applied Psychology 692 F(3S-0)

*Graduate Seminar: Selected Topics*
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

Applied Psychology 693 H(3S-0)

*Graduate Seminar: Selected Topics*
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

Applied Psychology 694 F(1S-3)

*Graduate Practicum: Selected Topics*
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

Applied Psychology 695 H(1S-3)

*Graduate Practicum: Selected Topics*
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT
Notes:
1. 700-level courses are normally available only to students in the Applied Psychology doctoral program.
2. Students seeking an internship can do so by registering in a 700-level Special Topics course, in consultation with their supervisor.

Applied Psychology 698 F

*Pre-Master's Internship in School and Applied Child Psychology*
This 1,200 hour internship requires the integration and application of the full range of school psychology competencies and domains within an approved setting.
Prerequisite: Consent of Training Director. Open only to students enrolled in the MEd or MSc in School and Applied Child Psychology.
NOT INCLUDED IN GPA

Applied Psychology 701 H(3-0)

*Advanced Research Design, Psychometrics and Statistics in Applied Psychology*
Provides intensive exposure to sophisticated quantitative techniques relevant to research design, psychometrics, and statistics such as structural equation modelling (SEM), item-response theory (IRT), and hierarchical linear modelling (HLM).
Prerequisite: Applied Psychology 607 or equivalent.

Applied Psychology 703 H(3-0)

*Advanced Seminar in Applied Psychology*
Doctoral seminar in issues in applied psychology. Dissertation development.
NOT INCLUDED IN GPA

Applied Psychology 705 H(3-0)

*Advanced Seminar in Special Education I*
Advanced study of theoretical, empirical, and practical issues affecting individuals with exceptional learning needs.
Prerequisite: Applied Psychology 661 or equivalent.

Applied Psychology 709 H(3-0)

*Advanced Seminar in Applied Learning and Developmental Psychology I*
Advanced study of theory and practice in human development and learning.

Applied Psychology 731 H(3-0)

*Advanced Clinical Supervision in Applied Psychology*
This course provides students with formal training in clinical supervision with the intent of raising an awareness of supervision models, as well as a conceptual framework and vocabulary for thinking through their supervision practice.
Prerequisite: Open only to doctoral students in School and Applied Child Psychology and Counselling Psychology or permission of the Division.

Applied Psychology 732 H(3-0)

*Advanced Seminar in School and Applied Child Psychology*
Seminar series that links theory and research with practice in the school psychology domains of professional competence.
Prerequisite: Open only to doctoral students in School and Applied Child Psychology.

Applied Psychology 741 H(3-2)

*Advanced Professional Skills and Issues*
This course focuses on providing knowledge and developing skills in the areas of consultation, supervision, and program development and evaluation across the lifespan.

Applied Psychology 742 F(2-7)

*Advanced Practicum in Counselling*
Advanced practicum in counselling psychology, and related seminars.
NOT INCLUDED IN GPA

Applied Psychology 788 F

*Pre-Doctoral Internship in Counselling Psychology*
One full calendar year, full-time (or two years, half-time) supervised training experience in an approved clinical setting. Practical application of theories and interventions pertaining to individual and group, couple, or family counselling as well as assessment, consultation, and supervision. Experience in addressing a variety of professional issues.
Note: Open only to students enrolled in the PhD program in Counselling Psychology.
NOT INCLUDED IN GPA

Applied Psychology 792 F(3-0)

*Advanced Seminar: Selected Topics*
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

Applied Psychology 793 H(3S-0)

*Graduate Seminar: Selected Topics*
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

Applied Psychology 794 F(1S-3)

*Advanced Practicum: Selected Topics*
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

Applied Psychology 795 H(1S-3)

*Advanced Practicum: Selected Topics*
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

Applied Psychology 798 F

*Pre-Doctoral Internship in School and Applied Child Psychology*
Supervised 1,600 hour pre-doctoral internship in School and Applied Psychology involving the theory and practice of evaluations, consultation, interventions, research, and related activities within an approved school, clinic, or other human service agency.
Prerequisite: Consent of the Training Director. Open only to doctoral students in School and Applied Child Psychology.
NOT INCLUDED IN GPA

In addition to the numbered and titled courses shown above, the Division offers a selection of advance level graduate courses specifically designed to meet the needs of individuals or small groups of students at the advanced doctoral level. The courses listed in the calendar as May Be Repeated for Credit may be decimalized to create these specialized offerings. Such arrangements are, however, contingent upon the availability of staff resources.

## Master of Counselling

Graduate Courses

Note: Students not in the Master of Counselling program may take these courses only with consent of the Division of Applied Psychology and in specific cases additional requirements may be necessary (see below).

Campus Alberta Applied Psychology 601 H(3-0)

*Theories of Counselling and Client Change*
Engages students in a critical evaluation of a range of contemporary counselling theories and helps them begin to develop a description of their own emerging theory.

Campus Alberta Applied Psychology 603 H(3-0)

*Professional Ethics*
Addresses personal and professional ethical issues in counselling. The perspectives of different professional disciplines will be used to highlight commonalities and differences. Students will reflect critically on both personal and collective worldviews and values as well as explore the impact of those perspectives on counselling processes and contexts.

Campus Alberta Applied Psychology 605 H(2-2)

*Developing a Working Alliance*
Focuses on the understanding and acquisition of skills that are essential for the development of working alliances in counselling contexts. Introduces a theoretical framework for the application of counselling skills in addition to providing the opportunity for skill practice.
Prerequisite or Corequisite: Campus Alberta Applied Psychology 601.

Campus Alberta Applied Psychology 607 H(3-0)

*Equity and Diversity Issues in Counselling*
Focuses on increasing personal awareness, identification of conceptual frameworks, and development of in-depth knowledge of equity and diversity issues in counselling. Students will be expected to examine their own attitudes, behaviours, perceptions and biases.

Campus Alberta Applied Psychology 611 H(2-7)

*General Counselling Practicum*
Provides an opportunity for professional development and supervised practice in a general counselling setting. Students will be involved in direct work with clients under the supervision of a qualified professional.
Prerequisites: Campus Alberta Applied Psychology 601, 603, 605, 607, 613 and 615 and consent of the Campus Alberta Program.
NOT INCLUDED IN GPA

Campus Alberta Applied Psychology 613 H(2-2)

*Assessment*
Combines a theoretical and practical focus to develop a framework from which to approach the assessment of client change in a variety of contexts.
Prerequisites: Campus Alberta Applied Psychology 601 and 605.

Campus Alberta Applied Psychology 615 H(2-2)

*Intervening to Facilitate Client Change*
Combines a theoretical and practical focus to develop a framework from which to plan and implement client change interventions in a variety of contexts.
Prerequisites: Campus Alberta Applied Psychology 601 and 605.

Campus Alberta Applied Psychology 617 H(3-2)

*Methods of Inquiry*
Helps students critically analyze other research efforts and in the process learn how to think through their own research questions in a critically evaluative manner.

Campus Alberta Applied Psychology 619 H(2-7)

*Specialized Practicum*
Provides an opportunity for professional development and supervised practice in a specialized counselling context. Students will be involved in direct work with clients under the supervision of a qualified professional. The practicum allows students to actively explore issues encountered in working with a specialized client population or area of practice.
Prerequisites: Campus Alberta Applied Psychology 611, 613 and 615.
NOT INCLUDED IN GPA

Campus Alberta Applied Psychology 621 H(3-0)

*Foundations of Career Development*
Focuses on major theories and models of career development and related research. Emphasis will be placed on the integration of theory with career counselling practice.
Prerequisites: Campus Alberta Applied Psychology 601.

Campus Alberta Applied Psychology 623 H(3-0)

*Processes and Resources for Facilitating Career-Life Transitions*
Provides knowledge of common issues associated with career-life transitions as they pertain to models of career counselling. Students also acquire knowledge about various types of career development resources and gain critical skills for selecting and using resources to facilitate career-life transitions.
Prerequisites: Campus Alberta Applied Psychology 605 and 621.

Campus Alberta Applied Psychology 625 H(3-0)

*Systemic Community Change: A Comprehensive Approach to Human Service Delivery*
Provides students with a theoretical and practical basis to work as effective community change agents in a broad range of sectors. An examination of comprehensive guidance in schools provides a foundation for exploring key concepts pertinent to developing and implementing comprehensive services in a variety of contexts, and in the process, gaining a better understanding of communities, and building their strengths and capacities.

Campus Alberta Applied Psychology 627 H(3-0)

*Career Development in Organizational Settings*
Designed to combine theoretical and practical concerns regarding applications of career development concepts to human resources contexts in organizations. Concepts will be relevant to counselling and human resources development professionals.
Prerequisites: Campus Alberta Applied Psychology 601, 603, 605 and 607.

Campus Alberta Applied Psychology 629 H(3-0)

*Multicultural Issues in Career Development*
Increasing cultural diversity requires career development practitioners to examine the ways that their services are designed and delivered. Designed to enable students to deliver culturally responsive career counselling services to diverse populations.
Prerequisites: Campus Alberta Applied Psychology 607 and 621.

Campus Alberta Applied Psychology 631 H(3-0)

*Learning Processes*
Addresses the essential features of major theories of learning and presents current research in each area of learning. Students will discover how the principles of learning relate to their own learning and behaviour, and how the principles can be used to understand the behaviour of others and enhance counselling practice.

Campus Alberta Applied Psychology 633 H(3-0)

*Human Development*
Introduces a comprehensive view of human development across the lifespan, drawing on the major theoretical positions. Developmental themes are discussed in terms of their application to typical and atypical human development in children, adolescents and adults.

Campus Alberta Applied Psychology 635 H(3-0)

*Health Psychology*
Focuses on how human psychology and human health intersect and is organized according to core principles and skills that guide the practice of health psychology. Will orient students to contemporary theories and models of health, illness, and health promotion, and their relevance in a variety of settings.
Prerequisites: Campus Alberta Applied Psychology 601, 607, and 617.

Campus Alberta Applied Psychology 637 H(3-0)

*Group Process*
Provides a conceptual understanding of group process, applied to a wide range of contexts and clientele. Incorporates various theories of group counselling and group process to develop an overall conceptual framework. Delivery consists of two integrated components: (a) an on-line component focusing on group theories and conceptual aspects of working in group contexts and (b) a face-to-face component delivered during a summer institute.
Prerequisites: Campus Alberta Applied Psychology 601, 603, 605, and 607.

Campus Alberta Applied Psychology 639 H(3-0)

*Introductory Data Analysis*
An introductory course on descriptive and inferential statistics designed to give students with minimal statistical background sufficient competence to conduct basic statistical procedures. Topics will include: displaying data; measures of central tendency, variability, and correlation; regression analysis and prediction; probability; parameter estimation; and analysis of variance. Emphasis will be on understanding basic concepts, using software to conduct analyses, and interpretation of results.

Campus Alberta Applied Psychology 641 H(3-0)

*Exceptional Children*
Intended to help students enhance their awareness and understanding of major trends, developments, theoretical foundations, and current practices and challenges in counselling and providing consultation for special needs children and adolescents.

Campus Alberta Applied Psychology 661 H(3-0)

*History of Art Therapy*
Art therapy is examined from a broad perspective, from its beginnings as a treatment for mentally or emotionally disturbed people, to its development as a distinct profession in North America and Europe. The works of key authors are covered, along with their theoretical approaches and current trends in the field. Students will learn how the foundations of art therapy are incorporated by many disciplines, with applications in many settings.
Prerequisites: Campus Alberta Applied Psychology 611, 613, and 615.

Campus Alberta Applied Psychology 681 H(3-0)

*Clinical Supervision*
Intended for students to learn the process of clinical supervision and as a result become better consumers of supervision, more effective supervisors, and more able to evaluate their current and future development and involvement in supervisory roles.
Prerequisites: Campus Alberta Applied Psychology 601, 603, 605, and 607.

Campus Alberta Applied Psychology 691Q(15S-0)

*Graduate Seminar: Special Topics*
Prerequisite: Consent of the Campus Alberta Program.
MAY BE REPEATED FOR CREDIT

Campus Alberta Applied Psychology 693 H(3-0)

*Graduate Seminar: Selected Topics*
Prerequisite: Consent of the Campus Alberta Program.
MAY BE REPEATED FOR CREDIT

Campus Alberta Applied Psychology 695 H(1-4)

*Graduate Practicum: Selected Topics*
Prerequisite: Consent of the Campus Alberta Program.
MAY BE REPEATED FOR CREDIT

## GRADUATE DIVISION OF EDUCATION RESEARCH GDER

### Contact Info

Location: Education Tower, Room 940
Faculty number: (403) 220-5675
Toll free in Canada (877) 623-0292
Fax: (403) 282-3005
E-mail address: gder@ucalgary.ca
Web page URL: http://educ.ucalgary.ca/gder

### 1. Degrees and Specializations Offered

The Graduate Division of Educational Research offers Doctor of Philosophy (PhD), Doctor of Education (EdD), Master of Arts (MA), Master of Science (MSc), and Master of Education (MEd) degrees in nine areas of specialization, as noted below. The Doctor of Philosophy degree program is normally intended to prepare scholars for careers in research and teaching. The Doctor of Education degree program is normally intended for practising professionals in education-related situations. The Master of Arts and Master of Science are equivalent thesis-based research degrees that prepare students for further research. The Master of Education is a course-based professional degree.

### Curriculum, Teaching and Learning

The specialization offers the opportunity to develop and integrate understandings, within a general curriculum framework, in a variety of fields of study, for example: Curriculum Studies, Gifted education, French education, Language and Literacy education, Mathematics, Science and Environmental education. This includes the study of subject matter, courses, programs, purposes and practices used to teach and learn in formal and informal educational settings. This specialization supports a broad range of quantitative and qualitative research methods and inquiry.
(PhD, EdD, MSc, MA, MEd)

### Educational Contexts

This interdisciplinary approach to education includes philosophy; sociology; comparative, global and cultural education; gender studies; and history. Educational Contexts serves students specializing in these areas while also complementing the programs of students in all the specializations of GDER. Such interdisciplinary inquiry asks, for example: How do culture, spirituality, social class, gender, and ethnicity influence the perceptions, policies and practices of education as a process and as an institution? How do the language we use and the mental models we construct in order to interpret our world influence the way we make decisions and work with others? How do our histories and philosophies affect how we deal with the world and understand our own selves?

Master's and doctoral projects in the Educational Contexts specialization are based on sound research methodology from the chosen field, and are often interdisciplinary in nature. (PhD, EdD, MA, MEd)

### Educational Leadership

This specialization draws upon the social sciences and humanities to prepare researchers and practitioners for the analysis and resolution of issues and problems related to educational policy and the direction and management of schools, school systems, other institutions, and governmental bodies concerned with public and private education. This specialization prepares graduates for administrative and research-related careers with an understanding of organizational change in the field of educational leadership. (PhD, EdD, MA, MEd)

### Educational Technology

This specialization is addressed to two audiences:

a) Teachers who are interested in the application of technology in the classroom or who are interested in technology leadership positions;
b) Those who are interested in instructional development in settings outside elementary/secondary schools, e.g., instructional developers in colleges, institutes of technology and universities, military/industrial trainers, health educators, and private training consultants.

Students in this specialization have the opportunity to investigate a broad spectrum of instructional design and development techniques as they apply to newer technologies and to explore new directions in instructional design and development as they emerge in the literature. (PhD, EdD, MSc, MA, MEd)

### Higher Education Leadership

This specialization offers learners insight into local, national and international scholarly communities and graduates will understand issues in higher education leadership and administration, analyze ethical and legal issues in leadership and administration, appreciate links between theory and practice, and gain career-enhancing executive preparation. (PhD, EdD, MA, MEd)

### Interpretive Studies in Education

Within the Interpretive Studies in Education specialization, education may be understood broadly as a highly complex, contested and living human enterprise. Graduate level research in this specialization involves examining how aspects of education are symbolically and existentially experienced in the world. This entails attending to the different meanings of teaching as practice and learning as experience, and to how and under what conditions—historical, cultural, linguistic, social and political—those meanings have come to be. Graduate work in Interpretive Studies in Education involves engaging in interpretive forms of inquiry, such as hermeneutics, phenomenology, feminist theory, critical theory, narrative theory, post-structuralism, historical inquiry, semiotics and cultural studies, so as to achieve a deeper, more critical understanding of teaching, learning and educational work more generally. (PhD, EdD, MSc, MA, MEd)

### Teaching Languages

Learning and Teaching Languages is a multi-faculty initiative that includes the Faculties of Education and Arts, in an integrated approach to graduate education. It provides opportunities to engage in basic and applied research, to gain professional recognition, and/or an understanding of language and literary studies in English and other languages.

In GDER two specialization areas fall under this initiative:

#### Second Language Teaching (SLT)

This specialization offers students the opportunity to develop and broaden their pedagogical and research skills in learning and teaching a second or additional language by enabling them to:

a) pursue the study of topics relevant and, in some cases necessary, to teach in the contemporary educational climate, with courses in second language teaching and learning, multilingual and bilingual education, cultural diversity and technology;
b) seek a new career direction, such as administrators in educational settings that involves second language studies;

c) French teaching/Enseignement du français, allows students to acquire the same knowledge with the focus on French.(PhD, EdD, MA, MEd)

#### Teaching English as a Second Language (TESL)

This specialization aims to address practical, professional and theoretical interests in the area of Teaching English as a Second Language. This area will be of interest to:

a) University graduates intent on establishing new career directions in both local and international contexts;

b) Individuals seeking to upgrade their educational qualifications for professional recognition;

c) Individuals interested in conducting research under the guidance of a faculty member in this specialization. (PhD, EdD, MA, MEd).

### Workplace and Adult Learning

There are two routes in the Workplace and Adult Learning specialization:

a) The course-based Master's program (MEd) is an online program designed to provide practitioners with the knowledge and skills to take a leadership role in working with adults in a variety of contexts;

b) Thesis-based degrees (MA, EdD, PhD) in this specialization are commonly interdisciplinary in focus, e.g., adult learning theory, marketing higher education, learning in the workplace. The MA and PhD degrees are normally pursued on campus. The EdD degree is available on campus and online.

### GDER Programs Online

The Graduate Division of Educational Research offers online graduate programs via the web and other multi-media components to local, regional, national, and international communities. Programs normally lead to the Master of Education (MEd) in Curriculum, Teaching and Learning; Educational Contexts; Educational Leadership; Educational Technology;; Higher Education Leadership; Second Language Teaching; Teaching English as a Second Language; and Workplace and Adult Learning. The thesis-based Doctor of Education (EdD) in the specializations of Educational Leadership (K-12); Educational Technology; Higher Education Leadership; and Workplace and Adult Learning; are offered in direct response to the needs of working professionals in a variety of settings, including administrators, program directors, and deans in colleges and institutes of technology.

Contact: GDER at gder@ucalgary.ca or (403) 220-5675 or toll free in Canada (877) 623-0292.

### 2. Admission Requirements

In addition to the Faculties of Graduate Studies and Education, requirements, the Graduate Division of Educational Research requires:

#### Doctor of Philosophy (PhD)

a) A thesis-based Master's degree in an appropriate field. Outstanding applicants holding Master's degrees without thesis may be considered;

b) A minimum grade point average of 3.50 on a four-point scale in a Master's degree program;

c) A written statement indicating the applicant's reasons for wishing to pursue a graduate program in the Graduate Division of Educational Research;

d) Where appropriate, candidates will be expected to have, or to obtain, relevant practical experience in their area of specialization;

e) For applicants required to prove proficiency in English, a TOEFL score of 580 (written test), 93 (internet-based test), a MELAB score of 82 or an IELTS score of 7.0;

f) Two Reference Letters.

#### Doctor of Education (EdD)

a) A course or thesis-based Master's degree in an appropriate field;

b) A minimum grade point average of 3.50 on a four-point scale in a Master's degree program;

c) A written statement indicating the applicant's reasons for wishing to pursue a graduate program in the Graduate Division of Educational Research;

d) Candidates will be expected to have, or obtain, relevant practical experience in their area of specialization;

e) For applicants required to prove proficiency in English, a TOEFL score of 580 (written test), 93 (internet-based test), a MELAB score of 82 or an IELTS score of 7.0;

f) Two Reference Letters.

*Admission Portfolio for Doctoral Applicants*

Applicants to the Doctor of Philosophy and Doctor of Education programs are encouraged to submit an Admission Portfolio containing examples of their work. The purpose of the Admission Portfolio is to give applicants the opportunity to provide additional documentation that demonstrates their suitability and qualification for doctoral studies. The Admission Portfolio is particularly relevant for program applicants who do not hold a thesis-based Master's degree.

The Doctoral Admission Portfolios must include a Table of Contents and an Executive Summary that outlines the contents of the Portfolio.
The Doctoral Admission Portfolio may contain the following:

a) Thesis (if applicable);

b) Reports;

c) Research grants or scholarships;

d) Articles ;

e) Curriculum documents ;

f) Non-print materials, e.g., multimedia ;

g) Relevant prior learning (see below);

h) Personal statement documenting research skills and interests (for PhD applicants);

i) Personal statement documenting research and professional skills and interests (for EdD applicants.

Relevant Prior Learning Considerations

a) Personal continuing education/training;

b) Results in these continuing education efforts;

c) Experience in a field related to the aspired degree;

d) Management of people, resources, finances, situations;

e) Increasing or varying responsible positions in organizations related to the aspired degree;

f) Work-related products, e.g. reports, programs of learning or training, handbooks, videos, manuals, workshops, seminars;

g) Evidence of personal growth in knowledge, understanding, management skills, and intellectual resources;

h) Evidence of innovation;

i) Evidence of leadership, co-ordination.

Master's Programs
General

a) A written statement indicating the applicant's reasons for wishing to pursue a graduate program in the Graduate Division of Educational Research;

b) For students required to prove proficiency in English, a TOEFL score of 580 (written test) or 237 (computer-based test), or 93 (internet-based test), a MELAB score of 82 or an IELTS score of 7.0;

c) Two Reference Letters.

Curriculum, Teaching and Learning Specialization

Normally, an acceptable teaching certificate and teaching experience

Second Language Teaching Specialization

Teaching English as a Second Language Specialization

a) A minimum of two years teaching experience for the TESL specialization;

b) Relevant instructional experience for the SLT specialization;

c) A written statement and professional profile of past education and work experience;

d) An introductory level of linguistics knowledge and/or second language theory;

e) Knowledge of an additional language, preferred.

## 3. Application Deadline

MEd – Online

Curriculum, Teaching and Learning; Educational Contexts; Educational Leadership; Educational Technology; Higher Education Leadership; Second Language Teaching; Teaching English as a Second Language; Workplace and Adult Learning

15 December for July or September admission

EdD – Online

Educational Leadership; Educational Technology; Higher Education Leadership; Workplace and Adult Learning
15 December for July or September admission

MEd – On-Campus

Curriculum, Teaching and Learning; Educational Contexts; Educational Leadership; Educational Technology; Interpretive Studies in Education; Second Language Teaching; Teaching English as a Second Language
15 December for July or September admission

Thesis-Based On-Campus Degrees

PhD, EdD, MSc, MA
15 December for July or September admission

## 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma, or for courses taken to bring grade point average to a required level for admission.

## 5. Program/Course Requirements

For the most current program information, visit our website.

In addition to the requirements of the Faculty of Graduate Studies, the Division requires:

Doctor of Philosophy, Doctor of Education

These degree programs may be completed on a full-time or part-time basis.

a) A minimum of one and one-half full-course equivalents, including Educational Research 700 (a full course) the first year of program. The remaining required half-course is normally a course in research methods suited to the student's area of research;

b) Additional graduate courses or seminars as determined by the supervisor in consultation with the student. The number of courses required for program completion must be approved by the Associate Dean of the Division and be finalized no later than the beginning of the second year of program.

Master of Arts, Master of Science

These degree programs may be completed on a full-time or part-time basis.

a) One full-course equivalent in research methods;

b) One full-course equivalent in the student's area of specialization;

c) Additional graduate courses or seminars as determined by the supervisor in consultation with the student. The number of courses required for program completion must be approved by the Associate Dean of the Division and be finalized no later than the beginning of the second year of program.

Master of Education

This degree may be done on a full-time or part-time basis on campus, or online.

a) A minimum of six full courses;
b) One full-course equivalent in research methods;

c) Two full-course equivalents in the student's area of specialization;

d) Additional graduate courses or seminars as determined by the supervisor in consultation with the student and approved by the Associate Dean of the Division.

## 6. Additional Requirements

None.

## 7. Credit for Undergraduate Courses

The Division does not normally accept undergraduate courses for credit toward graduate degrees.

## 8. Time Limit

Expected completion time for full-time students is two years in thesis-based Master's programs, three years in course-based programs and four years in doctoral programs. Maximum completion time is four years for thesis-based Master's programs, and six years for course-based Master's programs and doctoral programs.

## 9. Supervisory Assignments

A supervisor is normally appointed at the time of admission.

## 10. Required Examinations

Written Candidacy Process:
A written paper will be prepared by the student to demonstrate her/his knowledge of the Field of Study and preparedness to conduct research in this field. The paper will be a response to one written question normally selected by the student from two or three questions prepared by the supervisor with the assistance of the supervisory committee members. The questions are to take into consideration a list of readings agreed to by the supervisory committee and the student as defining the student's Field of Study. These questions must be approved by the GDER Associate Dean or designate before being presented to the student.

On the date assigned to begin the Written Paper, the student may pick up the questions from the Graduate Secretary. The student then has twenty-eight days to prepare, independently, the paper. The paper normally will be twenty-five to forty double-spaced pages in length, exclusive of references and should use the standard format normally used within a given Area of Specialization. The student will provide a copy of the question and the paper to each member of the examining committee at least two weeks in advance of the Oral Examination.

Final thesis oral examinations are open.

## 11. Research Proposal Requirements

Questions on research proposals are not examined during the oral candidacy examination. Doctoral thesis proposals must be approved before the candidacy examination.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to the Division by 1 February.

## 14. Other Information

For information about Graduate Certificates, Graduate Diplomas, and Continuing Professional Development opportunities on-campus and online, please visit our website.

## 15. Faculty Members/Research Interests

Current faculty members and their areas of interest can be found at http://educ.ucalgary.ca

## Educational Research (EDER)

### Graduate Courses

**Educational Research 603** H(3-0)

*Research Methods*
Introduction to various approaches to research in education.
MAY BE REPEATED FOR CREDIT

**Educational Research 605** Q(1.5-0)

*Special Topics in Professional Development*
Consult current timetable for offerings.
MAY BE REPEATED FOR CREDIT

**Educational Research 606** F(3-0)

*Special Topics in Professional Development*
Consult current timetable for offerings.
MAY BE REPEATED FOR CREDIT

**Educational Research 607** H(3-0)

*Special Topics in Professional Development*
Consult current timetable for offerings.
MAY BE REPEATED FOR CREDIT

**Educational Research 609** H(3-0)

*Research Methods*
Various approaches to research in education.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

**Educational Research 611** H(3-0)

*Communication in Educational Administration*
To explore dominant areas of interpersonal communication which constantly challenge educational leaders.

**Educational Research 613** H(3-0)

*Change and Innovation in Education*
Examines both traditional and contemporary research literature relevant to change and innovation in educational settings.

**Educational Research 617** H(3-0)

*Organizational Theory and Analysis in Education*
Human organization as the setting for the delivery of educational services.

**Educational Research 619** H(3-0)

*Special Topics in Educational Leadership*
Consult current timetable for offerings.
MAY BE REPEATED FOR CREDIT

**Educational Research 621** H(3-0)

*Assessment of Classroom Learning*
Examines both traditional and emerging assessment techniques, including Performance Assessment and Learning Portfolios, for examining students' learning outcomes.

**Educational Research 623** H(3-2)

*Topics in Educational Technology*
Topics and issues in educational technology.
MAY BE REPEATED FOR CREDIT

**Educational Research 625** H(3-0)

*Teacher Evaluation*
Examines both traditional and emerging techniques, e.g. Portfolios, for assessing teacher performance.

**Educational Research 627** H(3-0)

*Program Evaluation*
Systematically examines the evaluation enterprise including concepts, procedures and uses of evaluation.

**Educational Research 629** H(3-0)

*Special Topics in Assessment/Evaluation*
Consult current timetable for offerings.
MAY BE REPEATED FOR CREDIT

**Educational Research 631** H(3-0)

*Special Topics in Workplace and Adult Learning*
Examines topics in Workplace and Adult Learning.
MAY BE REPEATED FOR CREDIT

**Educational Research 641** H(3-0)

*Research on the Reading Process*
Examination and criticism of competing theoretical discourses about the teaching and learning of reading in the elementary school.

**Educational Research 649** H(3-0)

*Special Topics in English Language Education*
MAY BE REPEATED FOR CREDIT

**Educational Research 651** H(3-0)

*Philosophy of Education*
Philosophical topics in the context of education. Consult current timetable for offerings.
MAY BE REPEATED FOR CREDIT

**Educational Research 653** H(3-0)

*Sociology of Education*
Sociological topics in the context of education. Consult current timetable for offerings.
MAY BE REPEATED FOR CREDIT

**Educational Research 655** H(3-0)

*Comparative Education*
Topics in comparative education. Consult current timetable for offerings.
MAY BE REPEATED FOR CREDIT

**Educational Research 657** H(3-0)

*Culture and Gender Studies*
Culture and gender topics in the context of education. Consult current timetable for offerings.
MAY BE REPEATED FOR CREDIT

**Educational Research 659** H(3-0)

*History of Education*
Historical topics in the context of education. Consult current timetable for offerings.
MAY BE REPEATED FOR CREDIT

**Educational Research 667** H(3-0)

*Second Language Reading and Writing*
Research and practice in second language reading and writing; instructional techniques for specific audiences; theories of reading and writing.

**Educational Research 669** H(3-0)

*Aspects of Second Language and Culture*
Introduction to research and issues on various aspects of second language and culture.
MAY BE REPEATED FOR CREDIT

**Educational Research 671** H(3-0)

*Conceptualizing Educational Technology*
Seminar to familiarize students with the terrain of educational technology.

**Educational Research 673** H(3-0)

*Instructional Design*
Integration of theory and practice associated with the selection and sequencing of content across the instructional spectrum and the matching of instructional strategies to characteristics of learners and content.

**Educational Research 675** H(3-0)

*Principles of Instructional Development*
Topics include the examination of a variety of instructional development models, the systems approach to developing instruction, front-end analysis and needs assessment, risk analysis, constraint analysis, resource analysis, task analysis, and evaluation.

**Educational Research 677** H(3-0)

*Distributed Learning*
Examination of distributed teaching and learning processes in educational systems with attention to computer mediated teaching and communication and integrated instructional design methodologies. Other topics include media selection, online team-building, social context issues, and leadership of distributed learning organizations.

**Educational Research 679** H(3-0)

*Special Topics in Educational Technology*
Examination of current topics and issues in educational technology and related areas.
MAY BE REPEATED FOR CREDIT

**Educational Research 681** H(3-0)

*Studying Curriculum*
Curriculum research, theory, and practice with particular reference to curriculum aims, content, organization and change.
Note: Not open to students with credit in Educational Research 665, 669.27 or 699.42.

**Educational Research 683** H(3-0)

*Curriculum Development, Implementation and Assessment*
Making sense of what happens when curriculum policy becomes reality and affects students, teachers, parents and politicians.

**Educational Research 685** H(3-0)

*Interpretive Curriculum Discourses*
The field of interpretive work in curriculum theory.

**Educational Research 689** H(3-0)

*Aspects of School Curriculum*
Introductory systematic study of research and issues focused on various areas of the school curriculum.
MAY BE REPEATED FOR CREDIT

**Educational Research 690** F(3-0)

*Professional Project*
Seminar course to facilitate the preparation and evaluation of an independent culminating project.

**Educational Research 691** H(3-0)

*Critical Issues in Education*
Culminating course focusing on the integration and

application of major themes covered in student's program.

Educational Research 693 H(3-0)

*Interpretive Study of Curriculum*
Introduction to the various forms of educational inquiry.
MAY BE REPEATED FOR CREDIT

Educational Research 695 H(3-0)

*Inquiry into Culture, History, Language and Cognition*
Examination of the foundations of interpretive studies.
MAY BE REPEATED FOR CREDIT

Educational Research 697 Q(1.5-0)

*Special Topics*
MAY BE REPEATED FOR CREDIT

Educational Research 698 F(3-0)

*Special Topics*
MAY BE REPEATED FOR CREDIT

Educational Research 700 F(3-0)

*Seminar for First-Year PhD/EdD Students*
Seminar on selected topics.
Prerequisite: Consent of the Division.
Note: Normally restricted to Doctoral students.
NOT INCLUDED IN GPA

Educational Research 701 H(3-0)

*Advanced Research Methods*
Advanced study in the conduct of research.
Note: Normally restricted to Doctoral students.
MAY BE REPEATED FOR CREDIT

Educational Research 703 H(3-0)

*Directed Study*
Individual doctoral study in a selected area.
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

Educational Research 705 H(3-0)

*Doctoral Seminar in Educational Leadership*
Provides doctoral students with a contemporary Canadian focus on significant issues in educational leadership.
Prerequisite: Consent of the Division.
Note: Normally restricted to Doctoral students.

Educational Research 719 H(3-0)

*Advanced Special Topics in Educational Leadership*
Prerequisite: Consent of the Division.
Note: Normally restricted to Doctoral students.
MAY BE REPEATED FOR CREDIT

Educational Research 733 H(3-0)

*Advanced Workplace and Adult Learning*
Advanced exploration of diverse topics in workplace and adult learning.
Prerequisite: Consent of the Division
Note: Normally restricted to doctoral students.
MAY BE REPEATED FOR CREDIT

Educational Research 741 H(3-0)

*Advanced Seminar in Theory and Research in Literacy Education*
A critical examination of theories, models, and research that underpin literacy education.
Prerequisite: Consent of the Division.
Note: Normally restricted to Doctoral students.

Educational Research 761 H(3-0)

*Research Seminar on Second Language Education*
Multidimensional perspectives on theory building about second language learning and teaching, including factors such as language, schooling, curriculum, culture, community and society.
Prerequisite: Consent of the Division.
Note: Normally restricted to Doctoral students.

Educational Research 771 H(3-0)

*Doctoral Seminar in Educational Technology*
Advanced doctoral seminar focused on defining issues and current research in educational technology.
Prerequisite: Consent of the Division.

Educational Research 779 H(3.0)

*Advanced Educational Technology*
Advanced concepts in educational technology.
Prerequisite: Consent of the Division
Note: Normally restricted to doctoral students.
MAY BE REPEATED FOR CREDIT

Educational Research 781 H(3-0)

*Conceptualizing Curriculum Research*
Analysis of different approaches to curriculum research, especially assumptions, meaning frameworks, and views of the theory/practice relationship.
Prerequisite: Consent of the Division.
Note: Normally restricted to Doctoral students.

Educational Research 783 H(3-0)

*Conceptualizing Instructional Research*
Critical examination of various theoretical frameworks and representative studies in the literature of research on instruction.
Prerequisite: Consent of the Division.
Note: Normally restricted to Doctoral students.

Educational Research 785 H(3-0)

*Advanced Study of Interpretive Curriculum Discourses*
An advanced study of interpretive curriculum discourses focussing on cutting-edge examples of such work.
Prerequisite: Consent of the Division.
Note: Normally restricted to Doctoral students.

Educational Research 789 H(3-0)

*Advanced Curriculum Study*
Research and issues in the study of a variety of topics and areas concerning the school curriculum.
Prerequisite: Consent of the Division.
Note: Normally restricted to Doctoral students.
MAY BE REPEATED FOR CREDIT

Educational Research 797 Q(1.5-0)

*Advanced Special Topics*
Prerequisite: Consent of the Division.
Note: Normally restricted to Doctoral students.
MAY BE REPEATED FOR CREDIT

Educational Research 798 F(3-0)

*Advanced Special Topics*
Prerequisite: Consent of the Division.
Note: Normally restricted to Doctoral students.
MAY BE REPEATED FOR CREDIT

## ENGINEERING PROGRAMS

### Contact Info

Location: ENC202
Faculty number: (403) 220-5738
Fax: (403) 284-3697
E-mail address: schulich@ucalgary.ca
Web page URL: http://schulich.ucalgary.ca/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based
Master of Engineering (MEng), thesis and course-based

Areas: Chemical and Petroleum, Civil, Electrical and Computer, Geomatics, and Mechanical and Manufacturing Engineering.

In addition, the Schulich School of Engineering offers PhD, MSc, and MEng degrees with interdisciplinary specializations in Environmental Engineering and Energy & Environment.

The University of Calgary and the University of Alberta offer a joint Biomedical Engineering Program. Further information on all programs and specializations is provided under individual separate listings in this Calendar.

Master's thesis and doctoral Graduate Students are normally admitted as full-time students. The Head of the Department or designate may however, approve requests for registration as part-time or transfer from a full-time to a part-time status.

### 2. Admission Requirements

The Schulich School of Engineering has established common minimum student admission requirements for all its graduate programs, with the exception of students with project management background entering the Manufacturing Engineering program. Departments and graduate programs may have additional requirements over and above those of the Schulich School of Engineering.

In addition to the Faculty of Graduate Studies requirements, the Schulich School of Engineering minimum requirements are as follows:

#### Master's Programs

a) BSc degree or equivalent
b) A minimum admission grade point average of 3.00 on a four-point scale or equivalent.
c) Holders of BSc or equivalent degrees in Science, Medicine, Kinesiology or other Engineering, if accepted, may be required to take additional senior undergraduate engineering courses. These courses will not be counted for credit toward their graduate program. Holders of Bachelor's degrees from disciplines other than Engineering, Science, Medicine or Kinesiology are required to complete a minimum of 10 make-up undergraduate engineering half-courses with a minimum GPA of 3.00 on a four-point scale before admission.
d) Two Reference Letters

In exceptional circumstances, students who do not meet the entrance requirements (but have BSc degrees in the same or equivalent Engineering discipline and a GPA of at least 2.7) may be considered for admission after upgrading requirements have been met. These include a minimum of 6 make-up half-courses, or 3 make-up half-courses if they have acceptable industrial experience, with a minimum grade of 3.00 on a four-point scale in each course. At least 4 or 2 of these half-courses, respectively, must be graduate level courses.

#### Doctor of Philosophy

a) MSc degree, or transfer from MSc program, or, in exceptional cases, BSc degree or equivalent.
b) A minimum admission grade point average of 3.50 on a four-point scale or equivalent.
c) Transfer from MSc to PhD program is allowed only after the successful completion of all courses required for the MSc degree with a minimum GPA of 3.50.
d) Two Reference Letters

Holders of MSc or equivalent degrees in Science, Medicine, Kinesiology or other Engineering, if accepted, may be required to take additional senior undergraduate Engineering courses. These courses will not count for credit toward their doctoral program.

### 3. Application Deadline

See departmental, program and specialization sections.

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process, in consultation with the proposed supervisor and the Graduate Director. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Students who receive advanced course credit when admitted to a Master's program may be able to accelerate the completion of their degree.

### 5. Program/Course Requirements

The Schulich School of Engineering has established common minimum program/course requirements for all its graduate programs. Departments and graduate programs may have additional requirements over and above those of the Schulich School of Engineering. In addition to Faculty of Graduate Studies requirements, the Schulich School of Engineering minimum requirements are as follows:

#### Master of Engineering (course-based)

A minimum of ten half-courses, of which at least six must be graduate courses.

#### Master of Engineering (thesis-based)

A minimum of four graduate half-courses.

#### Master of Science

A minimum of four graduate half-courses.

#### Doctor of Philosophy

A minimum of two graduate half-courses beyond the Master of Science course requirements. For students who transfer from an MSc program, 6 graduate half-courses beyond the BSc, or equivalent, degree.

#### All Degree Programs

After consultation with the supervisor and the Graduate Director, courses outside the Department or the University may be approved towards the degree requirements.

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

See Section 5.

### 8. Time Limit

Typical completion times are two years for full-time students in a Master's program and three to four years in a doctoral program. The Master of Engineering (course-based) can be completed in one year. Maximum completion times are four years for a Master of Science and a Master of Engineering (thesis-based), and six years for a Master of Engineering (course-based) or doctoral program.

### 9. Supervisory Assignments

Supervisors and supervisory committees are assigned according to the Faculty of Graduate Studies *Handbook of Supervision and Examination* and are approved by the Department Head or the Graduate Director.

### 10. Required Examinations

#### MEng (course-based) Comprehensive Examination

None.

#### MEng (thesis-based) MSc Final Oral Examination

The thesis examination is oral. In addition to Faculty of Graduate Studies regulations, the Schulich School of Engineering requires the examining committee to consist of a minimum of four voting members: the supervisor, one member external to the student's department of study, and two other members. The examination is chaired by a neutral chair (non-voting), proposed by the Department Head or Graduate Director, from outside the student's department. The examining committee must be approved by the Faculty of Graduate Studies.

The student shall make a public twenty-minute presentation of his/her thesis research, normally immediately before the oral examination. Examining committee members should attend this presentation but should refrain from asking questions. The maximum allowable 2-hour examination period does not include the time spent on student presentation.

#### Doctoral Candidacy Examinations

The candidacy examination is oral. In addition to Faculty of Graduate Studies regulations, the Schulich School of Engineering requires the examining committee to consist of a minimum of five voting members: the supervisory committee members and two additional members (one of them external to the program). The examination is chaired by a Neutral Chair, who is recommended by the Department Head or Graduate Director. The examining committee must be approved by the Faculty of Graduate Studies.

The student's background knowledge in his/her field of engineering and in-depth knowledge in his/her chosen research specialization is examined. At the discretion of the department, (i) the candidacy examination may have a written (minimum three hours) component, as well, given no more than seven days before the oral defence; and (ii) the student may make a presentation at the beginning of the oral candidacy examination. Questions on the research proposal will be included in the oral candidacy examination, unless otherwise specified under the individual Engineering Program entry.

#### Doctoral Final Oral Examination

The thesis defence examination is oral. The examining committee consists of a minimum of five voting members: the supervisory committee members, one member outside the student's department of study, and one member from outside the University of Calgary. The examination is chaired by a neutral chair (non-voting), proposed by the Department Head or Graduate Director, from outside the department. The examining committee must be approved by the Faculty of Graduate Studies.

The student shall make a public twenty-minute presentation of his/her thesis research, normally immediately before the oral examination. Examining committee members should attend this presentation but should refrain from asking questions during the presentation. The maximum allowable 2-hour examination period does not include the time spent on student presentation.

Thesis oral examinations are open.

### 11. Research Proposal Requirements

See departmental, program and specialization sections.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Candidates are typically admitted either self-funded or with financial support provided by an interested supervisor or the department. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to the Department by 1 February .

### 14. Other Information

Students enrolled in any of the engineering graduate programs may opt, in addition to their normal required course load, to undertake an international project outside Canada. The duration of the project should be between 4 and 6 months. Upon successful completion (on a credit/fail basis) of ENGG 689 , the statement "International Graduate Internship Project" will appear on the parchment. The course is not repeatable for credit.

### 15. Faculty Members/Research Interests

See departmental, program and specialization sections.

## ENGINEERING, CHEMICAL AND PETROLEUM ENCH

#### Contact Info

Location: Schulich School of Engineering, Room B202
Phone number: (403) 220-4802
Fax number: (403) 284-4852
E-mail address: chemandpetenggrad@ucalgary.ca
Web page URL:
http://www.eng.ucalgary.ca/Chemical/

### 1. Degrees and Specializations Offered

Degrees:
Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based
Master of Engineering (MEng), thesis-based and course-based

The Department offers specializations in Chemical Engineering, Petroleum Engineering, Environmental Engineering (Interdisciplinary), Energy and Environment (Interdisciplinary) and Biomedical Engineering. The Master of Engineering degree is also offered with specialization in Petroleum Reservoir Engineering, Petroleum Exploration Engineering and Reservoir Characterization (Interdisciplinary). For further information on the interdisciplinary specializations, see the separate listings in this Calendar.

The Universities of Calgary and Alberta offer a joint Biomedical Engineering Graduate Program. Further information can be obtained from the separate listing in this Calendar.

For registration status of thesis-based graduate students, see "Engineering Programs".

### 2. Admission Requirements

In addition to the requirements of the Faculty of Graduate Studies and the Schulich School of

Engineering, the Department requires:

Master of Engineering with Specialization in Petroleum Reservoir Engineering

- A Bachelor's degree in Chemical, Oil and Gas, or Petroleum Engineering

Exceptionally, students with a Bachelor's degree in another branch of Engineering and substantial experience in the petroleum industry may be considered for admission.

Doctor of Philosophy UPDATED

Acceptable MSc or transfer from MSc to PhD within the Department. In the latter case, the transfer requires successful completion of all MSc course requirements with a minimum GPA of 3.5 on a 4.0 scale and the approval of the supervisor and the Department Head or designate.
Applicants to a Master's program who hold a Bachelor's degree with Distinction may be considered for later transfer to the doctoral program. Effective July 01, 2011 the standard Engineering Program requirements will apply (See "Engineering Programs")

## 3. Application Deadline

Deadlines for submission of complete applications for students with international transcripts:

15 March for September admission
15 July for January admission
15 November for May admission

Deadlines for submission of complete applications for students with Canadian and US transcripts:

15 July for September admission
15 November for January admission
15 March for May admission

## 4. Advanced Credit

See "Engineering Programs."

## 5. Program/Course Requirements

See "Engineering Programs."

## 6. Additional Requirements

The Department has established the following two graduate courses as required courses for the Master of Science and Doctoral degrees:

Experimental Design and Error Analysis (ENCH 701); Advanced Mathematical Methods in Engineering (ENCH 703)

Regardless of their specialization, all Master of Science students must take at least one of these two required courses while all doctoral students must take both required courses.

In addition, core courses have been established for the Chemical Engineering specialization: ENCH 613, 623, 625, 631 and 633, the Petroleum Engineering specialization: ENCH 621, 629, 647, 657 and 677, and the Biomedical Engineering Specialization: ENCH 613, 623, 625, 631 and 633

All Master of Science students in the Chemical Engineering and Petroleum Engineering specializations must complete at least one of the core courses of their specialization and all doctoral students must complete at least two of the core courses of their specialization. Requirements for other specializations are listed under the corresponding sections.

All Master of Science and Doctoral students (Chemical, Petroleum, and Energy & Environment specializations) are required to register and participate in the Research Seminar course (Chemical Engineering 601) for each of the first two terms of their degree program. Each student (Chemical, Petroleum, and Energy & Environment specializations) must also present one research seminar in ENCH 601.

All Master of Science and Doctoral students (Biomedical Engineering specialization) are required to register and participate in the Research Seminar course (ENCH 601) in one Fall term and the Biomedical Engineering equivalent (BMEN 607) in one Winter term usually during the first year of their degree program. Each student (Biomedical Engineering specialization) must present one research seminar in BMEN 607.

For more details, students must refer to the guidelines for the Research Seminar course. Requirements for other specializations are listed under the corresponding sections.

## 7. Credit for Undergraduate Courses

Not applicable.

## 8. Time Limit

See "Engineering Programs".

## 9. Supervisory Assignments

All students are required to have a supervisor before the second annual registration. For students in the Master of Science and Doctor of Philosophy degree programs, a supervisor is normally appointed at the time of admission.

## 10. Required Examinations UPDATED

All final thesis oral examinations involve a public seminar/presentation before the oral examination.

PhD candidacy examination will not involve questions on the research proposal but will include questions on background knowledge needed to carry out the proposed research. (See "Engineering Programs")

## 11. Research Proposal Requirements

Doctor of Philosophy

A research proposal must be submitted to and approved by the supervisory committee before the candidacy examination.

## 12. Special Registration Information

None

## 13. Financial Assistance

See "Engineering Programs."

## 14. Other Information

See "Engineering Programs."

## 15. Faculty Members/Research Interests

The current research interests of the academic staff can be found at http://www.eng.ucalgary.ca/ench/node/73, or from the Department.

## Graduate Courses

**Chemical Engineering 601** E(3S-0)

*Research Seminar*
Reports on studies of current research in the Department. All Master of Science and Doctoral students (Chemical, Petroleum, and Energy & Environment specializations) are required to register and participate in the course for each of the first two terms of their degree program. Each student must also present one research seminar. For more details, students must refer to the guidelines for the Research Seminar course.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

**Chemical Engineering 607** H(3-0)

*Natural Gas Processing Principles*
Physical and chemical properties of natural gases; vapour-liquid equilibrium data and computations; flow of gas and gas-liquid mixtures; separation of gaseous mixtures; heat transfer in gas processing; production of natural gas and its associated liquids.

**Chemical Engineering 609** H(3-0)

*Natural Gas Processing Technology*
Design and operational criteria in transporting and processing of natural gas; refrigeration and compression; cryogenics; hydrocarbon dew point control; LPG recovery; sulphur recovery; mechanical flow diagrams; process simulation.
Prerequisite: Chemical Engineering 607.

**Chemical Engineering 613** H(3-0)

*Advanced Topics in Mass Transfer*
Advanced concepts in mass transfer in multiphase systems. Mass transfer with simultaneous chemical reaction and heat transfer.

**Chemical Engineering 615** H(3-1.5)

*Model Predictive Control*
Review of process dynamics and control fundamentals (step response curves, PID control structures and PID controller tuning). Identification of finite impulse response models from plant data. Model predictive Control (MPC) algorithms (e.g. Dynamic Matrix Control). Applications of Linear Programming to determine optimal MPC setpoints respecting unit constraints. Computer simulation using the MATLAB MPC toolbox. Introduction to univariate controller performance assessment techniques.

**Chemical Engineering 617** H(3-1.5)

*Modelling and Identification Advanced Control*
First-principles dynamic models of complex chemical processes. Comparison of dynamic simulation models generated using MATLAB/Simulink with those imbedded in commercial process simulators. Consideration of operability in plant design. Introduction to time series analysis and closed-loop identification. Causality versus correlation. Multivariate regression methods for soft sensor design.

**Chemical Engineering 619** H(3-0)

*Special Problems*
Advanced studies on specialized topics in chemical, petroleum, biochemical and environmental engineering.
MAY BE REPEATED FOR CREDIT

**Chemical Engineering 620** F(0-4)

*Graduate Project*
Individual project in the student's area of specialization under the guidance of a faculty member. A written proposal, one or more written progress reports, and a final written report are required. An oral presentation is required upon completion of the course. Open only to students in the MEng (course-based) program.
Prerequisite: Consent of the Department Head or Associate Head Graduate Studies.
Note: Credit for both Chemical Engineering 620 and 699 will not be allowed.

Chemical Engineering 621 H(3-0)

*Reservoir Simulation*
Enhanced recovery modelling (generalized black-oil models, compositional and miscible), well treatment, grid orientation. New developments in gridding, thermal models, naturally fractured reservoirs, modelling of induced fractures (hydraulic and waterflood), reservoir geomechanics, and practical aspects of conducting simulation studies.
Prerequisite or Corequisite: Petroleum Engineering 429 or Petroleum Engineering 523 or consent of Department.

Chemical Engineering 623 H(3-0)

*Chemical Reactor Design*
Advanced study of design and operation of chemical reactors for both homogeneous and heterogeneous systems, batch, continuous flow stirred tank, tubular and multibed adiabatic reactors.Cold shot cooling in reactors. Optimal temperature gradients and yields. Catalyst effectiveness factors and optimal control with decaying catalysts. Analysis of sulphur plant reactor design including cost optimization.

Chemical Engineering 625 H(3-0)

*Advanced Topics in Heat Transfer*
Diffusive and convective transport of heat. Analytical and approximate solutions to steady state and transient conduction and convection problems. Superposition techniques. Forced convection of heat in laminar and turbulent regimes.

Chemical Engineering 627 H(3-0)

*Chemical Process Simulation*
Object oriented programming applied to the design of a steady state chemical process simulator via the sequential modular approach and by the equation based approach. Material and energy balances for systems of process units.

Chemical Engineering 629 H(3-0)

*Secondary and Tertiary Recovery*
Displacement processes for improved recovery of hydrocarbons. Waterflooding, gas flooding, solvent flooding and chemical flooding. Performance prediction techniques. Comparative economics.
Prerequisite: Petroleum Engineering 525 or consent of Department.

Chemical Engineering 631 H(3-0)

*Advanced Topics in Fluid Mechanics*
Constitutive equations for viscous flow and methods of solution. Laminar, transition and turbulent flows. Hydrodynamic stability. Vortices. Boundary layers.

Chemical Engineering 633 H(3-0)

*Chemical Thermodynamics*
Advanced application of thermodynamic principles. Calculation of thermodynamic properties; ideal and non-ideal solution theory; calculation of phase equilibria; properties of reacting mixtures.
Prerequisite: Chemical Engineering 427 or consent of Department.

Chemical Engineering 639 H(3-0)

*Applied Numerical Methods in Engineering*
Numerical solution of systems of linear and non-linear algebraic equations, eigenvalue problems. Numerical solution of systems of ordinary and partial differential equations. Initial value and boundary value problems. Finite difference and finites element methods. Numerical stability.
Prerequisite: Engineering 407 or consent of Department.
Note: Knowledge of a programming language is necessary.

Chemical Engineering 643 H(3-0)
(Environmental Engineering 641)

*Air Pollution Control Engineering*
Introduction to air quality and air pollution. Impact of air pollution and greenhouse gases on health and climate change. Energy and air pollution. Fundamentals of fossil fuel combustion and related air pollution. Pre-combustion air pollution control strategies: fossil fuel cleaning/refinery, renewable energy (wind, solar, biomass, etc.), and alternative energy sources (hydrogen, etc). In-combustion air pollution control. Post-combustion air pollution control. Industrial air pollution control. Control of particulate matter. Control of VOCs, SOx, and NOx. Adsorption and absorption of air pollutants. GHG emission control. Indoor air quality engineering. Recent advances on related topics.
Note: Credit for both Chemical Engineering 643 and Environmental Engineering 641 will not be allowed.

Chemical Engineering 645 H(3-0)
(Environmental Engineering 661)

*Industrial and Produced Wastewater Treatment*
Sources and characterization of industrial wastewater. Treatment objectives and regulations. Unit and process design. Physical/chemical treatment including sedimentation, coagulation, filtration, absorption, adsorption, ion exchange, membrane processes and pH adjustment.
Note: Credit for both Chemical Engineering 645 and Environmental Engineering 661 will not be allowed.

Chemical Engineering 647 H(3-0)

*Thermal Recovery Methods*
Oil sands and heavy oil resources. Fluid and rock properties. Heat transfer processes in porous media. Comparative analysis of viscous oil recovery methods: steam flooding, cyclic steam stimulation, in-situ combustion and steam-assisted-gravity-drainage. Surface equipment and operation. Laboratory and field performance evaluation of thermal recovery methods. Process economics.

Chemical Engineering 649 H(3-0)

*Naturally Fractured Reservoirs*
Classification and characterization of naturally fractured reservoirs. Drilling and completion methods. Production characteristics. Tight gas reservoirs. Reserve estimation. Emphasis is placed on the relationship between geology, log interpretation, well testing, and primary-secondary recovery of hydrocarbons from naturally fractured reservoirs.

Chemical Engineering 651 H(3-0)
(formerly Chemical Engineering 619.51)

*Engineering Fuel Cells*
Overview of Fuel Cells. Comparison of fuel cells with other energy technologies. Types of fuel cells; electrochemical reactions; materials and balance of plant.

Chemical Engineering 653 H(3-0)

*Horizontal Wells for Petroleum Production*
Drilling and completion methods for horizontal wells; mathematical analysis of steady state flow to horizontal wells and well combinations; pseudo steady state and constant well bore pressure models; theoretical comparisons of predicted performance and coning behaviour of horizontal and vertical well patterns; performance in fractured reservoirs; potential for horizontal wells in heavy oil and bitumen production; basic conceptual ideas of steam-assisted gravity drainage.
Prerequisite: Petroleum Engineering 429 or Petroleum Engineering 523 or consent of Department.

Chemical Engineering 657 H(3-0)

*Advanced Reservoir Engineering*
Formulation and solution of reservoir-engineering problemsincluding combination of variables, Laplace transform, approximate Integral methods, and solution methods of moving boundary problems. Examples from thermal processes (e.g. hot waterflooding, SAGD), different recovery mechanisms (e.g. imbibition, expansion drive, solution-gas drive), well testing problems and naturally fractured reservoirs.
Prerequisite: Petroleum Engineering 429 or Petroleum Engineering 523 or consent of Department.
Note: Prior knowledge of reservoir engineering and analytical solution methods of differential equations is necessary.

Chemical Engineering 659 H(3-0)

*Advanced Cell and Tissue Engineering*
Current challenges in tissue engineering. Focus on specific tissues. Course topics include a brief biology review, cell fate processes, stem cells, tissue microenvironments and mass transfer, biomaterials, bioreactors, and clinical delivery of tissue engineered constructs.
Prerequisite: Consent of the Department.
Note: Credit for both Chemical Engineering 659 and Biomedical Engineering 619.06 will not be allowed.

Chemical Engineering 661 H(3-0)

*Geostatistics for Reservoir Characterization*
Statistical/probability concepts, exploratory data analysis, spatial structural analysis, estimation theory (Kriging), integration of auxiliary information and conditional stochastic simulation. Special emphasis on reservoir characterization and the particular problems encountered in that area. The geostatistical methodology for reservoir characterization will be demonstrated on a fluvial reservoir example.
Prerequisite: Petroleum Engineering 429 or Petroleum Engineering 523 or consent of the Department.
Note: Open to graduate Chemical Engineering, Civil Engineering and Geophysics students, and Geology graduate students with sound quantitative skills. Prior exposure to statistical/probability theory is required.

Chemical Engineering 665 H(3-0)
(Environmental Engineering 665)

*Wastewater Issues for the Oil and Gas Industry*
Produced water characteristics, regulations governing produced water management, management options. Technologies used for produced water treatment, novel/emerging technologies. Process design approaches and comparative evaluation of various technologies. Case Studies.
Note: Credit for both Chemical Engineering 665 and Environmental Engineering 665 will not be allowed.

Chemical Engineering 677 H(3-0)

*Advanced Topics in Oil and Gas Production*
Problems related to production of conventional oil, heavy oil and natural gas; analysis of the interactions of oil, water and gas, effects of fluid properties, rock structure and capillary, gravity and viscous forces acting on the reservoir system; application to the design of improved oil and gas recovery methods. New processes in oil and gas recovery.
Prerequisite: Petroleum Engineering 429 or Petroleum Engineering 523 or consent of the Department.

Chemical Engineering 687 H(3-0)
(formerly Chemical Engineering 619.87)

*Petroleum Economics*
Economic principles and risk management practices in the petroleum industry. Project selection; investment ranking; budgeting; and portfolio development. Decision making under uncertainty and risk.

Chemical Engineering 698 F(3-0)
Geology 698
(formerly Chemical Engineering 619.95 and 619.96)

*Reservoir Characterization for Field Development*
A team-based, integrated reservoir description experience working with geophysical, geological, petrophysical, and engineering data to produce a field development plan.
Prerequisites: Chemical Engineering 621, Geology 697, Human Resources and Organizational Dynamics 789 or equivalent.
Note: This course is intended for graduate students in the Master of Engineering with Reservoir Characterization.Specialization

Chemical Engineering 699 H(0-4)

*Special Project*
Project study conducted under the guidance of a faculty member and intended to expose the student to the tools, techniques and basic aspects of research. A written comprehensive report and one or more written progress reports are required.
Prerequisite: Consent of the Department Head or Associate Head Graduate Studies.
Note: Credit for both Chemical Engineering 699 and 620 will not be allowed.
Note: May be repeated once for credit.
MAY BE REPEATED FOR CREDIT

Chemical Engineering 701 H(3-0)
(Environmental Engineering 621)

*Experimental Design and Error Analysis*
Statistical analysis and design of engineering experiments. Random variables and sampling distributions; estimation and hypothesis testing; concepts of central tendency, variability, confidence level; correlation, regression and variation analysis; robust estimation; experiments of evaluation; experiments of comparison; factorial experiments (analysis of variance); experimental designs (involving randomization, replication, blocking and analysis of covariance).
Note: Intended for MSc/PhD students. MEng students may be able to register with Instructor's Permission.
Note: Credit for more than one of Chemical Engineering 701, Environmental Engineering 621, Chemical Engineering 619.45 and 619.82 will not be allowed.

Chemical Engineering 703 H(3-0)

*Advanced Mathematical Methods in Engineering*
Review of theory of linear algebra. Review of ordinary differential equations: linear, non-linear; series solutions; special exact solutions; applications. Partial differential equations: geometric interpretation; characteristic curves; separation of variables; the Sturm-Liouville problem and Fourier series; eigenfunction expansion; Fourier, Laplace and Hankel transforms; self similarity; Green's function; applications.
Note: Intended for MSc/PhD students. MEng students may be able to register with Instructor's Permission.
Note: Credit for both Chemical Engineering 703 and Chemical Engineering 619.83 will not be allowed.

## ENGINEERING, CIVIL ENCI

### Contact Info

Location: Schulich School of Engineering, Room F262
Faculty number: (403) 220-5821
Fax: (403) 282-7026
E-mail address: civgrad@ucalgary.ca
Web page URL: http://www.schulich.ucalgary.ca/civil/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based
Master of Engineering (MEng) thesis-based and course-based

Areas of Study:

Civil Engineering
Biomedical Engineering
Energy and Environment (Interdisciplinary)
Environmental Engineering (Interdisciplinary)

Specializations include: Avalanche Mechanics; Biomechanics; Bituminous Materials; Geotechnical Engineering; Materials Engineering; Project Management; Structures & Solid Mechanics; Transportation Engineering; Water Resources

### 2. Admission Requirements

Master's Programs
See "Engineering Programs."

Doctor of Philosophy
See "Engineering Programs."

Project Management Specialization
In addition to the "Engineering Program" degree requirements, a minimum of five years industrial experience, except in thesis-based degrees.

### 3. Application Deadline

Deadlines for submission of complete applications:

Canadian and Permanent Resident Applications
1 May for September admission
1 September for January admission
1 January for May admission

International Admissions
1 April for September admission
1 August for January admission
1 December for May admission

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Successful completion of "make-up" work does not guarantee admission. It is recommended that applicants discuss this option with the Departmental Graduate Student Advisor before taking any courses.

### 5. Program/Course Requirements

Note: If the student does not consult the supervisor before selecting courses, Department approval may be withheld.

In addition to Faculty of Graduate Studies and the Schulich School of Engineering requirements, the Department normally requires:

Master of Science
a) A minimum of four and a maximum of eight half-courses
b) Research and thesis work as major components of the program

Master of Engineering (thesis-based)
a) Five to eight half-courses
b) A thesis related to original analysis and/or design

Master of Engineering (course-based)
a) Ten to twelve half-courses

Doctor of Philosophy
a) A minimum of six half-courses beyond the baccalaureate
b) A minimum of two and a maximum of six half-courses beyond the Master's degree
c) A detailed research proposal
d) A candidacy exam which has both a written and oral component. The written component will be a four hour open book exam usually held a week prior to the oral exam.

### 6. Additional Requirements

All full-time Master of Science and doctoral students, except for those registered in ENEN 601or BMEN 605 or BMEN 607, are required to register and participate

in the Research Seminar course Civil Engineering 601. Please note: These seminars are offered multiple times on different research topics and as such, Master of Science students are required to take ENCI 601 two times and doctoral students three times while in program.

All graduate students who require access to Civil Engineering laboratories are required to complete a Workplace Hazardous Materials Information Systems (WHMIS) course and other required safety training courses before gaining access to the laboratories.

### 7. Credit for Undergraduate Courses

Not more than two of the half-courses required in the thesis-based programs and not more than four of the half-courses taken in the MEng program may be taken at the 500-level.

### 8. Time Limit

See "Engineering Programs".

### 9. Supervisory Assignments

See “Supervisors/Advisors” in the General Regulations section of this calendar.

### 10. Required Examinations

See “Engineering Program.”

### 11. Research Proposal Requirements

A detailed research proposal will be required for PhD students.

### 12. Special Registration Information

Not applicable

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for University of Calgary scholarships must submit their applications to the Department by 1 February.

### 14. Faculty Members/Research Interests

Information about faculty members and their research interests may be found at http://www.schulich.ucalgary.ca/enci/faculty

### Undergraduate Courses

Only where appropriate to a student’s program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

**Civil Engineering 513** H(3-3/2)

*Concrete Materials for Sustainable Construction*
Production and use of concrete for sustainability. Fundamental and engineering properties of cements, aggregates, supplementary cementing materials, chemical admixtures, concrete and other ingredients used to improve the performance and sustainability of concrete structures. Methods to reduce energy consumption and environmental impact associated with materials production and construction are emphasized.
**Prerequisite:** Civil Engineering 413.

**Civil Engineering 523** H(3-1T-2/2)

*Soil Mechanics and Foundation Engineering*
Earth embankments; sub-surface investigations; compaction; seepage analysis and slope stability; lateral earth pressures and retaining structures; shallow and deep foundations in sands and clays; bearing capacity and settlement of structures; selected laboratory, design exercises, solution to slope stability and other problems using computer programs.
**Prerequisite:** Civil Engineering 423.

**Civil Engineering 525** H(3-1)

*Applied Geotechnical Engineering*
Selected topics from: soil improvement; foundations in permafrost; machine foundation analysis and soil dynamics; tunneling; geotechnical aspects of mining engineering; deep foundations; retaining structures; computer applications.
**Prerequisites:** Civil Engineering 423 and 523.

**Civil Engineering 533** H(3-1)

*Engineering Hydrology and Hydraulics*
Introduction to engineering hydrology; Meteorological factors Physical hydrology including measurement and estimates of precipitation, inputs, losses, and rainfall-runoff relations; stream flow measurement, hydrograph analysis including baseflow separataion andunit hydrographs; Reservoir and river flood routing; Statistical hydrology, probability distributions, frequency analysis; Hydrological design, design storms, design flows; Open channel hydraulics; Design of channels for uniform flow; Gradually varied steady flow, classification and computation of flow profiles; Flow around bridge piers and flow through culverts; Storm sewer design.
**Prerequisite:** Mechanical Engineering 341.

**Civil Engineering 545** H(3-1)

*Theory of Structures I*
Structural analysis' role in design: idealized models. Review of analysis of statically determinate structures. Static indeterminacy; kinematic indeterminacy; principle of superposition; general methods for the analysis of statically indeterminate structures: the force (flexibility) method and the displacement (stiffness) method. Flexibility and stiffness matrices. Effects of moving loads. Strain energy and virtual work; calculation of displacements by virtual work. Use of computers for the analysis of plane frames and grids. Plastic analysis of continuous beams and frames. Visualization of deflection, bending moment and shearing force diagrams; comparison with diagrams generated by computers.
**Prerequisite:** Civil Engineering 461.

**Civil Engineering 547** H(3-1)

*Theory of Structures II*
Energy theorems: application to transformation of forces, displacements, and stiffness and flexibility matrices. Application of the force method: column analogy. Application of the displacement method: moment distribution, Muller-Breslau principle; influence lines for beams and frames, arches, grids and trusses. Effects of axial forces on flexural stiffness of members. Plastic analysis of plates: yield line theory. Applications using available computer programs. Topics selected annually from the analysis of funicular systems, introduction to structural reliability analysis, analysis of shear wall systems, introduction to finite element analysis, and methods of fatigue and cumulative damage analysis.
**Prerequisite:** Civil Engineering 545.

**Civil Engineering 553** H(3-1)

*Structural Masonry Design*
Component materials and their properties, masonry properties, quality control, plain and reinforced masonry, beams, walls, slender walls, columns, load-moment interaction curves, shear load distribution, shear walls, code provisions, building envelope, detailing, geometric walls, prestressed masonry.
**Prerequisite:** Civil Engineering 451.

**Civil Engineering 555** H(3-1)

*Structural Concrete Design*
Structural systems for buildings. Analysis and design of continuous beams and one-way slabs using moment coefficients as well as analysis and design by computer. Shear and torsion (general method). Bond and development. Serviceability. Two-way slabs and flat plates by direct design method, punching shear. Long columns. Walls: laterally loaded walls, bearing walls, shear walls. Footings: wall footings, isolated footings. Prestressed concrete: introduction, elastic analysis, deflections, flexural and shear strength. Use of computer programs where applicable.
**Prerequisite:** Civil Engineering 451.
**Corequisite:** Civil Engineering 545.

**Civil Engineering 557** H(3-1)

*Structural Steel Design*
Principles of limit states design of steel structures. Floor systems, resistance to horizontal forces. Properties of steel. Tension members. Eccentrically-loaded bolted and welded connections; connection details. Axially-loaded compression members. Laterally unsupported beams. Members subjected to bending and axial forces; beam-column effect. Composite beams. Plate girders. Use of available computer programs to assist in analysis and design of steel structures.
**Prerequisites:** Civil Engineering 451 and 545.

**Civil Engineering 565** H(3-1)
(formerly Civil Engineering 465)

*Engineering and Construction Management*
Introduction to engineering and construction management; planning, scheduling, estimating, cost control; project organization, human resource management; specifications; construction processes; manpower requirements; disputes and their resolution, social, economic and environmental impacts; regulatory requirements; project completion and commissioning.
**Prerequisite:** Civil Engineering 471.

Civil Engineering 569 H(3-1)

*Design of Public Transit Systems*
Role of public transport in a city; concepts of public and private benefits; economies of scale; main modes of urban public transport systems: rail, bus, van and other vehicles; mathematical analysis of mode of operation, route alignment, access, station & stop location, transfer protocols, time table, vehicle & fleet size, reliability; concepts of utility and value of time; detailed functional design & optimization of a bus route, rail line; introduction to design of bus and rail networks; and application of ITS concepts to public transport.
Prerequisite: Civil Engineering 473.

Civil Engineering 570 F(0-4)

*Group Design Project*
A team design project applying engineering and project management principles to prepare a multidisciplinary design and bid document for a civil engineering project. Students are expected to consult with local industry and professors in the Department. Teams will prepare a final report and will present this report to a committee, comprising of representatives from the Department and industry. Proposals should document and discuss the project development, design and execution plan with an emphasis on the technical, human resources and business aspects of the project. Initial engineering design for all Civil Engineering design aspects including: Environmental, Geotechnical, Hydraulics, Materials, Structural and Transportation. Preparation of design documents and specifications and presentation of competitive bids.
Prerequisites: Civil Engineering 413, 423, 451, 461, 473, and 481 or Department approval. Departmental approval will only be granted in exceptional cases if students are missing no more than two of the courses listed.

Civil Engineering 571 H(3-1)

*Introduction to Road Safety*
Theory and evidence in accident analysis and prevention. Topics include Haddon's matrix, crash data analysis, traffic enforcement, road safety advertising, fleet safety, road safety audits, vehicle safety and program evaluation.
Prerequisites: Civil Engineering 473 and one of Biomedical Engineering 319 or Engineering 319.

Civil Engineering 573 H(3-1)

*Highway Engineering*
Introduction to highway planning and engineering; human factors; road vehicle performance characteristics; highway capacity and level of service; highway classification; design consistency; alignment elements, cross section elements, intersections, interchanges, traffic barriers; road safety audits. Planning and design of bicycle facilities. Environmental impact of highways. Explicit evaluation of safety in road design.

Civil Engineering 575 H(3-1)

*Traffic Engineering and Operations*
Introduction to traffic engineering, traffic stream components, traffic stream characteristics, traffic studies, data collection, speed, travel time and delay studies, speed limits and advisory speeds, accident studies, parking studies, traffic barriers, traffic noise, capacity and level of service, warrants for traffic control devices, principles of intersection signalization, actuated and pretimed signals, signal control systems, progression, traffic systems management, local area traffic management studies, intelligent transportation systems, road safety audits.
Prerequisite: Biomedical Engineering 319 or Engineering 319 or equivalent.

Civil Engineering 577 H(3-1)

*Modelling of Transportation Systems*
Approaches to mathematical and computer-based modelling for transportation planning; trip generation models, trip distribution models, mode split processes, assignment models; direct demand models; discrete-choice behavioural models; simplified transportation demand models; use of models in design and evaluation.
Prerequisite: Civil Engineering 473.

Civil Engineering 579 H(3-1)

*Asphalt Pavement Design and Management*
Planning, designing, constructing and maintaining asphalt pavement: physical parameters, economic considerations and governing specifications; optimum design based on: design loads, subgrade soil mechanics and aggregates; asphalt mix selection and preparation; construction methods; pavement failure mechanisms; prediction of long-term performance based on field and laboratory tests; performance criteria and the implementation of rehabilitation and recycling programs.
Prerequisites: Civil Engineering 423 and Geology 471.

Civil Engineering 581 H(3-1)

*Water and Wastewater Engineering*
Water and wastewater quantities and quality, water distribution and wastewater collection systems, hydraulic considerations, flow through pipes and networks, design of sanitary sewers, storm drainage systems, physical, chemical, and biological processes for water and wastewater treatment: aeration, coagulation, flocculation, sedimentation, single and multi-media filtration, disinfection, activated sludge system and trickling filter, design considerations, sludge processing and disposal.
Prerequisites: Civil Engineering 481 and Mechanical Engineering 341.

Civil Engineering 587 H(3-1)

*Site Assessment and Remediation*
Environmental impact assessments, environmental audit protocols and plans, pre-assessment planning and preliminary assessment of contaminated sites, site investigation, field techniques and program implementation, remedial planning and design, cost and time analysis, physical, chemical and biological remediation techniques, land treatment, soil vapour extraction and solidification.
Prerequisite: Civil Engineering 481.

Civil Engineering 589 H(3-1)

*Air and Water Pollution*
Sources of air and water pollution, acute and chronic health effects of pollution, environmental quality standards and compliance criteria, monitoring environmental quality, sampling techniques, fate and transport of pollutants in environmental media, particulates and gaseous pollutants in air medium, dissolved and suspended solids in water medium, air and water quality modelling, introduction to software.
Prerequisite: Civil Engineering 481.

Civil Engineering 591 H(3-1)

*Solid and Hazardous Waste Engineering*
Integrated waste management, solid and hazardous waste characterization and classification, reduce, reuse, recycle, resource recovery and utilization, composting, thermal techniques of waste treatment, fundamentals of waste degradation and disposal, geo-environmental aspects of landfill design, leachate and gas management at landfills.
Prerequisite: Civil Engineering 481.

Civil Engineering 595 H(3-1)

*Special Topics*
Current topics in Civil Engineering.
Prerequisite: Consent of the Department Head.
MAY BE REPEATED FOR CREDIT

Civil Engineering 597 H(0-5)

*Civil Engineering Project I*
Individual work on an assigned Civil Engineering topic under the supervision of a faculty member. The project will normally involve a literature review, theoretical and laboratory or field work. Submission of a mid-term progress report defended orally and a final report.
Note: Open to students who have completed the third year Civil Engineering program with a GPA of 3.00 or better and/or Department Heads approval.

Civil Engineering 599 H(0-5)

*Civil Engineering Project II*
Individual project intended for students who have completed a suitable Civil Engineering Individual Project and wish to continue the assigned research project by completing a more extensive investigation. A comprehensive written report is required which is defended and presented orally in a Department seminar.
Prerequisites: Civil Engineering 597 and formal approval from the project supervisor and course Graduate Program Director(s).

## Graduate Courses

Registration in all courses requires the approval of the Department of Civil Engineering. For a more complete listing of Environmental Engineering graduate courses see the Environmental Engineering (Interdisciplinary) Specialization listing in this calendar.

**Civil Engineering 601** Q(32 hours)

*Graduate Research Seminar*
Reports on studies of the literature or of current research.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

**Civil Engineering 611** H(3-1)

*Bituminous Materials*
Origin of bituminous materials. Production, composition, and internal structure. Natural and petroleum-refined bituminous materials. Characteristics of bituminous materials and their measurement. Basic material and rheological tests. Application of bituminous materials in asphalt paving technologies. Hot mixes and asphalt emulsions. Paving mix design, properties and testing. Main failure modes of asphalt pavements. Industrial asphalts. Environmental impacts of asphalt technologies.

**Civil Engineering 615** H(3-0)

*Rheology of Engineering Materials*
Elements of tensor calculus. Constitutive equations. Linear and nonlinear viscoelasticity. Dielectric properties of materials. Rheometry. Temperature and molecular mass dependencies of material functions. Relations between material functions. Microstructure and rheology of materials.

**Civil Engineering 617** H(3-0)

*Fracture of Civil Engineering Materials*
Cohesive strength; plasticity. Fracture mechanics in relation to structural steel, stress intensity, fracture toughness, energy release rate, LEFM, COD, J-Integral, R-Curve, fatigue. Compressive fracture of concrete, masonry and rocks; cracking patterns, fracture theories, damage models, test methods and effects.

**Civil Engineering 619** H(3-0)

*Special Problems*
Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member. Students would be required to consider problems of an advanced nature.
MAY BE REPEATED FOR CREDIT

**Civil Engineering 621** H(3-0)

*Computer Analysis of Structures*
Review of the displacement method of structural analysis, energy theorems, and transformation of force and displacement matrices. Computer analysis of framed structures: banded stiffness matrices, assemblage of stiffness matrices, displacement and support conditions and calculation of reactions, solution of banded equations. Structural symmetry, anti-symmetry and cyclic symmetry. Analysis of large structures by substructuring. Analysis of shear wall structures. Introduction to the finite element method: displacement functions, stiffness matrix formulation, consistent load vectors, isoparametric elements. Nonlinear analysis: effect of axial forces combined with large displacements, geometric stiffness matrix, Newton-Raphson techniques, examples of geometric nonlinearity, nonlinear buckling, cable networks including membrane elements, analysis of structures made of nonlinear materials. Structuring and composition of available structural analysis computer programs, and their applications.

**Civil Engineering 623** H(3-0)

*Behaviour and Design of Reinforced Concrete Members*
Behaviour and strength of reinforced concrete members; materials; safety; design of members subjected to flexure, compression, compression and flexure including biaxial bending, shear, torsion; bond and anchorage; slender columns; deep beams; serviceability; rotation capacity; relation between results of research and current design codes.

**Civil Engineering 627** H(3-0)

*Serviceability of Concrete Structures: Advanced Topics*
Material properties affecting serviceability: creep and shrinkage of concrete and relaxation of prestressed steel. Displacement method of analysis of strains and stresses due to temperature, creep and shrinkage; composite sections; cracked sections. Time-dependent internal forces; effects of loading, prestressing and construction in stages. Displacements of cracked members; crack spacing; stabilized cracks; force-induced and displacement-induced cracking. Deflections of beams, frames, slabs and floor systems. Non-linear effects of cracking on internal forces. Effects of temperature. Fatigue of cracked prestressed members. Corrosion; effects of cracking. Serviceability considerations of miscellaneous structures, e.g., bridges, water-retaining structures and pavements.

**Civil Engineering 629** H(3-0)

*Computational Modelling of Concrete Structures*
Discussion of linear finite element analysis; nonlinear analysis and iterative techniques; constitutive relations and failure theories; modelling of reinforcement and prestressing; cracking models and post-cracking behaviour; tension stiffening and strain softening; models for shear transfer; time-dependent effects of creep, shrinkage and temperature; behaviour under cyclic loading and dynamic effects; numerical examples and computer applications on analysis of beams, frames, slabs, shear panels and walls, thin shells, axisymmetric solids and three dimensional structures.

**Civil Engineering 633** H(3-0)

*Fibre Reinforced Polymers for Construction and Repair of Structures*
Properties and behaviour of various types of Fibre-Reinforced Polymers (FRP)materials. Limit States Design, procedures and design philosophy of structures reinforced or strengthened with FRP. Flexural and shear design. FRP systems for flexural and shear strengthening of structures. Axial strengthening of columns. Concrete prestressed with FRP. Durability and fire resistance, blast mitigation and repair using FRP. Case studies and fieldapplications.

**Civil Engineering 635** H(3-0)

*Behaviour and Design of Prestressed Concrete Bridges and Other Structures*
Forces due to prestressing in statically indeterminate structures such as continuous beams, frames, slabs, using load balancing method, force method and prestressing influence coefficients. Limit analysis of continuous prestressed concrete structures. Design of prestressed flat slabs. Initial and time-dependent deflections. Effect of creep and shrinkage in statically indeterminate structures; effect of differential settlement; creep behaviour of structures made continuous by cast-in situ concrete. Discussion of various types of prestressed concrete bridges; selection of cross-section, pier arrangement, abutments, approach slab, bearings. Loads. Design of skew and curved bridges. Cable layout in skew and curved bridges. Methods of bridge construction. Aesthetic considerations in bridge design.

**Civil Engineering 637** H(3-0)

*Behaviour and Design of Prestressed Concrete Members*
Flexural analysis and design of prestressed and partially prestressed concrete members based on stresses, deflections and strength. Design of members subjected to shear, torsion, compression or tension. Fire resistance. Composite members. Bond and anchorage zones. Prestressing losses and time-dependent deformations. Discussion of current design standards.

**Civil Engineering 639** H(3-0)

*Structural Dynamics*
Numerical analysis of simple systems; rigorous analysis of one-degree systems; lumped mass multi-degree systems and structures with distributed mass and load; approximate analysis and design methods; earthquakes, blast-resistant design, beams subjected to moving loads; calculation of results by analog and digital computer.

**Civil Engineering 641** H(3-0)

*Seismic Analysis and Design*
Introduction to seismology, ground movements, typical accelograms. Response spectra for linear and non-linear responses, role of damping and inelastic behaviour. Equivalent lateral load for design, code requirements. Structural design concepts to mitigate seismic effects. Design of steel structures for earthquake motions. Design of concrete frames and walls for earthquake motions.
Prerequisite: Civil Engineering 639.

Civil Engineering 643 H(3-0)

*Structural Masonry Design*
Component materials and their properties, masonry properties, quality control, plain and reinforced masonry, beams, walls, slender walls, columns, load-moment interaction curves, concentrated load bearing, shear load distribution, shear walls, code provisions, building envelope, detailing, differential movement, geometric walls, prestressed masonry, arches.
Note: Not open to students with credit in Civil Engineering 553 or 595.05.

Civil Engineering 645 H(3-0)

*Risk Analysis*
The objective of this course in engineering risk analysis and risk assessment is to familiarize students with the principles and techniques of quantitative risk analysis. Key focus points are the treatment of uncertainties, the attitude of conservatism, risk perception, the careful use of quantitative risk measures, and a discussion of the dangers tasks facing risk-based decision makers. Includes: Hazards, risk, risk analysis, risk assessment; risk measures; probability, uncertainty modelling, stochastic variables; using and misusing data, reliability, tails; risk assessment frameworks, models in health and environmental risk analysis, models in engineering risk analysis; risk perception, risk comparison; and practical case studies.

Civil Engineering 647 H(3-0)

*Structural Reliability Techniques*
The concepts of risk and reliability, uncertainties, and engineering decision making. Focuses on both aspects of uncertain systems, mainly structures, but also soils and environments, namely analysis and design. Techniques for structural reliability-based design and optimization are discussed and supplemented by practical applications.

Civil Engineering 649 H(3-0)

*Stochastic Dynamics*
Basic topics in probability theory. Random processes: time and frequency domain characteristics, differentiation and integration, stationary and ergodic processes; review of basic structural dynamics; random structural vibrations on simple oscillators and multiple degree-of-freedom systems. Response of linear and nonlinear systems; examples; threshold crossing, extreme peaks, reliability; applications in earthquake and offshore engineering.

Civil Engineering 651 H(3-0)

*Finite Element Modelling*
Terminology. Conceptual framework of method; shape function; continuity at nodes; numerical integration; matrix assembly; solution methods; sources of error and poor performance; mesh sensitivity; element types, their selection and behaviour; use of software.

Civil Engineering 653 H(3-0)

*Theory and Applications of the Finite Element Method*
Theory of the finite element method with emphasis on applications to structural analysis. Scope of the method, use of basic equations of elasticity, displacement (stiffness) method of analysis, energy theorems applied to finite elements, element matrices; the isoparametric formulation; applications in structural analysis, heat conduction and other non-structural problems. Use of available finite element programs for analysis of space frames, plates subjected to in-plane forces, plates in bending, spatial structures and heat transfer.

Civil Engineering 655 H(3-0)

*Numerical Methods for Modelling Geomaterials*
Methods of theoretical analysis for solving partial differential equations associated with Geotechnical and Structural Engineering. Variational Principles, Principle of Virtual Work and Galerkin Method. Theory of finite element and focus on its computer implementation for analysis of engineering problems. Typical applications include two- and three-dimensional stress analysis, seepage flow, and coupled fluid flow-solid deformation problems. Advanced topics: numerical strategies for solving material and geometric non-linearities (plasticity and large deformations), poro-elasticity and plasticity, strain localization, and presentation of other numerical techniques such as finite difference, boundary element, discrete element methods.

Civil Engineering 665 H(3-0)

*Fundamentals of Soil Behaviour*
Principle of effective stress in saturated soil, unsaturated soil and clay. Engineering properties of soils. Shear strength and deformation characteristics of soils in static, cyclic, drained and/or undrained loading. Laboratory testing of soils. One-dimensional consolidation, poro-elastic deformation, swelling mechanism, time-dependent deformation and soil contamination in soils.

Civil Engineering 667 H(3-0)

*Applied Rock Engineering*
Engineering properties of intact rock and rock mass. Rock classification. Slope and underground excavation; groundwater flow in fractured rock; poro-elastic deformation analyses; hydraulic fracturing.

Civil Engineering 671 H(4-0)

*Advanced Foundation Engineering*
Design and analysis of foundations. Spread footings, rafts, piled foundations. Marine foundations. Foundations in difficult soils. Embankments, retaining walls, excavations. Soil improvement. Soil liquefaction. Design problems and computer applications in foundation engineering.

Civil Engineering 673 H(3-0)

*Constitutive Laws for Geomaterials*
Definition of a continuous medium. Description of deformable continuous media; concepts of stress, strain and their invariants. Constitutive equations geomaterials as a generic for soil, rock and concrete materials in civil engineering. Review of elasticity theory. Introduction to yielding, plastic flow and failure phenomena in geomaterials. Limit analysis with applications to both geotechnical and structural engineering. Stress-strain behaviour for both cohesive and granular materials. Constitutive models based on critical state theory will be presented. Other topics such as strain localization and fracture phenomena may be included as appropriate.

Civil Engineering 689 H(3-0)

*Advanced Project Management Practices and Principles*
Advanced practices, tools and concepts in managing complex volatile or large projects. SMART™ project management based on best practices in diverse industries forms the basis of this course.
Prerequisites: Civil Engineering 691, 697 and consent of the Program Director.

Civil Engineering 691 H(3-0)
(Business and Environment 691)

*Fundamentals of Project Management*
Application of management principles to the project environment; planning, control, scope, time and cost processes; project organization and human resource issues. Students review aspects of a current major capital project and submit and defend a project report.
Prerequisite: Consent of the Program Director.

Civil Engineering 693 H(3-0)

*Project Engineering Management*
Role of the engineering manager in the project management team. The engineering firm, its organization and function; project development, engineering project control; design control; scope and estimate control; engineering interfaces with procurement and construction; engineering responsibility in project commissioning start-up and operations.
Prerequisite: Consent of the Program Director.

Civil Engineering 695 H(3-0)

*Project Construction Management*
Role of the construction manager in the project management team; project options for the management of construction; managing the contractor's business; labor relations; claims; contractor(s) responsibility in project commissioning start-up and operations.
Prerequisite: Consent of the Program Director.

Civil Engineering 697 H(3-0)

*Project Planning and Control*
Strategic and tactical planning; planning for scope, quality, time and cost; selection and implementation of project management information system; economic and risk analysis; planning for construction labor relations.
Prerequisite: Consent of the Program Director.

Civil Engineering 699 H(3-0)

*Law for Project Managers*
Legal issues related to the effective management of projects. Introduction to the legal system and processes; environmental law; intellectual property nondisclosure; professional liability; contract law; strategic alliances; employment law; the builder's lien act. Cases are reviewed and students are expected to complete a number of assignments requiring research into case law.
Prerequisite: Consent of the Program Director.
Note: This course may not be taken for credit towards the LLB or LLM degrees.

Civil Engineering 703 H(3-0)

*Fundamentals of ITS and Transportation System Performance*
Definition of ITS, with particular emphasis on advanced traffic management and control and advanced traveler information issues; traffic assignment and dynamic traffic assignment, traffic simulation tools; various traffic flow models: from microscopic to macroscopic traffic flow theory; traffic and incident management; surface street control; freeway control.
Prerequisite: An undergraduate degree in engineering or instructor approval.

Civil Engineering 705 H(3-0)

*Traffic Engineering*
Traffic stream characteristics, related field surveys; advanced probability distributions of headway, flow and speed under peak, off-peak, platoon-flow conditions; analysis of density contours; the generalized car-following model, related macro-models of traffic streams, practical applications; Traffic incident analysis; Two-lane highways; actuated and pretimed traffic signals; two-way coordination of signals; introduction to network controls.

Civil Engineering 707 H(3-0)

*Theory of Transport Demand Modelling*
Modelling for transport planning; data in transport modelling; trip generation modelling; trip distribution modelling; modal split modelling; direct demand models; traffic assignment; equilibrium in transport modelling; discrete-choice models; specification and estimation of logit models; aggregation issues; simplified transport demand models; model updating and transferability.
Prerequisite: Consent of the Department.

Civil Engineering 709 H(2-4)

*Practice of Transport Demand Modelling*
Sample enumeration modelling; practical aspects of logit model estimation and calibration; disaggregate choice behaviour data; practical 4-step transport demand modelling using conventional software packages; application of computer-based network assignment models.
Prerequisite: Civil Engineering 707 or consent of the Department.

Civil Engineering 711 H(3-0)

*Advanced Analysis and Modelling of Public Transit Systems*
Role of public transport in a city; concepts of public and private benefits; economies of scale; main modes of urban public transport systems: rail, bus, van and other vehicles; advanced mathematical modeling of mode of operation, route alignment, access, station & stop location, transfer protocols, time table, vehicle & fleet size, reliability; concepts of utility and value of time; detailed functional design & optimization of a bus route, rail line; bus, rail and metro networks.
Prerequisite: An undergraduate degree in engineering or instructor approval

Civil Engineering 713 H(3-1)

*Mountain Highway Engineering*
Road vehicle performance in mountainous terrain; the slow moving vehicle problem; highway capacity and level of service; terrain classification; alignment elements, cross section elements, intersections, traffic barriers; planning and design of passing lanes, climbing lanes, truck escape ramps, turnouts, and low-volume roads; traffic management in avalanche zones; environmental impact of highways in mountainous terrain. Vehicle operating costs; engineering evaluation of mountain highway projects.

Civil Engineering 715 H(3-0)

*Transport Economics*
Economic characteristics of transport; movement and location; transport demand; direct costs of transport; the value of travel time; external costs of transport; shadow prices; pricing of transport services; containment of external costs of transport; private and public sector investment analysis in transport; transport and economic development; transport policy.
Prerequisite: Consent of the Department.

Civil Engineering 721 H(2-1)

*Modelling for Water Supply and Distribution*
Planning and management of water supply systems. Components of water supply systems. Water supply systems. Water demand forecasting. Simulation modelling of water distribution systems. Design of water distribution systems. Operational control and pump scheduling. Reliability and security of supply. Water losses and leakage control. Water pricing and water conservation. Introduction to optimization.
Prerequisite: Civil Engineering 581 or consent of the Department.
Note: Not open to students with credit in Civil Engineering 619.52 or 719.

Civil Engineering 723 H(3-3)

*Hydrological Theory and Design*
Overview of physical and statistical hydrology. Theory of unsteady flow, simplified equations, applications in overland flow and channel flood routing using numerical techniques. Linear theory of hydrologic systems, instantaneous unit hydrograph. Precipitation analysis, probable maximum precipitation, design storms. Design flood hydrograph studies, application of the Soil Conservation Service method. Statistical analysis of hydrological variables, some probability distributions and their applications: regionalization, droughts, reservoir yield analysis and introduction to stochastic modelling.
Prerequisite: Civil Engineering 533 or equivalent.

Civil Engineering 741 H(3-0)
(Environmental Engineering 663)

Biological Processes for Wastewater Treatment
Specialized biological wastewater treatment processes for removal of impurities not effectively removed by conventional secondary wastewater treatment systems, such as nutrients (e.g. nitrogen and phosphorus), residual organics, residual solids, bacteria and viruses. Wetlands. Activated sludge modelling. Biological nutrient removal. Sludge management. Disinfection.
Note: Credit for both Civil Engineering 741 and Environmental Engineering 663 will not be allowed.

Civil Engineering 743 H(3-0)
(Environmental Engineering 625)

*Computational Methods for Environmental Engineering*
Taylor series, numerical integration. Linear and nonlinear algebraic equations and solvers. Ordinary and partial differential equations. Finite difference methods: explicit, implicit and Crank-Nicholson methods. Finite difference, finite element or finite volume numerical approximations. Initial and boundary value problems. Boundary conditions, discretization considerations, and design of approximations, accuracy and error reductions. Applications in environmental engineering, such as pollutant dispersion and transport, will be discussed.
Note: Credit for both Civil Engineering 743 and Environmental Engineering 625 will not be allowed.

Civil Engineering 745 H(3-0)
(Environmental Engineering 655)

*Hazardous Waste and Contaminated Sites Management*
Integrated waste management. Functional and fundamental properties of hazardous waste. Toxicological properties of contaminants. Contaminant release mechanisms. Fate and transport of contaminants in the environment. Contaminated site assessment principles. Quantitative human health risk assessment (QHHRA) as applied to contaminated sites. Hazard identification, exposure pathway analysis, risk characterization. Risk management and site remediation. Methods of hazardous waste treatment and contaminated site remediation. Secure land disposal of hazardous waste and contaminated soils and sludges.
Note: Credit for both Civil Engineering 745 and Environmental Engineering 655 will not be allowed.

Civil Engineering 747 H(3-0)
(Environmental Engineering 653)

*Contaminated Soil Remediation*
Overview of soil remediation engineering. Contaminant partitioning in air, water and gas phases. Phases of site assessments, Physical and chemical treatment processes, soil vapour extraction, air sparging, soil washing, soil flushing, thermal desorption and incineration, solidification and stabilization, vitrification, biological treatment processes, bioremediation kinetics, ex situ and in situ techniques. Liquid phase bioremediation as it pertains to soil remediation.
Note: Credit for both Civil Engineering 747 and Environmental Engineering 653 will not be allowed.

Civil Engineering 749 H(3-0)

*Environmental Aspects of Waste Disposal Systems*
Soil-chemical interactions and implications in waste disposal system design; landfill design principles; leachate production, leachate migration in the unsaturated/saturated zones; analytical and numerical solution of flow and transport equations; applications and case studies of groundwater contamination; design and construction of barrier systems; bioreactor landfills; landfill closure issues; greenhouse gas control systems.
Note: Credit for both Civil Engineering 749 and Environmental Engineering 651 will not be allowed.

Civil Engineering 751 H(3-0)

*Snow Avalanche Dynamics and Hazard Mitigation*
Avalanche motion and protection including avalanche terrain, frictional flow, impact pressures, avalanche risk for fixed structures, elements of structural defence, and run-out estimation based on statistical models, dynamic models, air photo interpretation, field studies of vegetation and historical records.

Civil Engineering 753 H(3-0)

*Snow Avalanche Formation and Release*
Snowpack properties and processes including meteorological and ground effects on the snowpack, energy balance at the snow surface, snowpack stratigraphy, metamorphism of snow grains, bonding, as well as spatial and temporal variability of the snowpack. Avalanche initiation including deformation and failure of weak layers, models of slab failure and fracture propagation. Concepts of snow stability, avalanche forecasting and avalanche risk for recreationists.

## ENGINEERING, ELECTRICAL AND COMPUTER ENEL

### Contact Info

Location: ICT Building, Room 402
Faculty number: (403) 220-7596
Fax: (403) 282-6855
E-mail address: grad-studies@enel.ucalgary.ca
Web page URL: http://www.enel.ucalgary.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based
Master of Engineering (MEng), thesis and course-based

The Master of Science and Doctor of Philosophy degrees with a specialization in Software Engineering are offered jointly through the Department of Electrical and Computer Engineering and the Department of Computer Science.

The Department also offers specializations in Telecommunications, VLSI and Microelectronics, Image Processing, Computer Engineering, Power Electronics, Control Systems, Power Systems, Energy and Environment (Interdisciplinary), Environmental Engineering (Interdisciplinary) and Biomedical Engineering.

The Universities of Calgary and Alberta offer a joint Biomedical Engineering Program. Further information can be obtained from the separate listing in this Calendar.

All programs are available to both full-time and part-time students. For details, see the Schulich School of Engineering.

### 2. Admission Requirements

In addition to Faculty of Graduate Studies and the Schulich School of Engineering requirements, the Department requires:

Master of Engineering and Master of Science

A Bachelor's degree in electrical engineering or computer engineering

Master of Science, Specialization in Software Engineering

a) At least one year of experience in software development
b) Background knowledge in C or C++
c) Knowledge of object-oriented design and human-computer interaction

Note: Applicants with degrees in other disciplines may be considered, but additional undergraduate courses in electrical engineering may be required prior to admission.

Doctor of Philosophy

A Master's degree in electrical engineering, computer engineering, or software engineering

Note: Transfer to the doctoral program without completing the Master's degree may be approved for exceptional students whose BSc degrees are in electrical engineering, computer engineering or software engineering.

### 3. Application Deadline

The preferred starting date for all graduate degrees is September.

Deadlines for submission of complete applications:
1 March for September admission
30 June for January admission

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission or for grades below B.

### 5. Program/Course Requirements

In addition to Faculty of Graduate Studies and the Schulich School of Engineering requirements, the Department requires:

Master of Engineering (course-based)

a) Ten to twelve half-courses of which at least seven must be graduate courses in electrical engineering
b) Students are encouraged to include Electrical Engineering 698 - Graduate Project in their programs. Normally ENEL 698 is taken as the last course, or concurrently with the last courses of the program. A copy of the Procedures and Guidelines is found on the departmental website.

Master of Engineering (thesis-based)

Normally, five to eight graduate half-courses

Master of Science

Normally, five to seven graduate half-courses of which at least three must be in the area of specialization

Master of Science, Specialization in Software Engineering

a) 2.5 full-course equivalents selected from a specified list of courses
b) An applied software engineering project written up as a Master of Science thesis and examined by an examination committee as specified in the Faculty regulations

Doctor of Philosophy

a) Normally, seven to ten graduate half-courses (at least seven in electrical engineering) beyond the Bachelor's degree, or two to five graduate half-courses beyond the Master's degree with no fewer than half the courses in electrical engineering
b) A written and an oral candidacy examination

### 6. Additional Requirements

While studying full-time in the MSc or PhD program:

a) Students will be required to attend only two semesters of ENEL 605/607 at the beginning of their graduate studies program. That is, students starting in the Fall will take ENEL 605 in the Fall, and ENEL 607 in the Winter. Similarly, students starting in the Winter semester will start with ENEL 607 and follow with ENEL 605 in the Fall.
b) Students in the PhD program who completed the course in the MSc program will not be required to take the ENEL 605/607 for the second time.

### 7. Credit for Undergraduate Courses

Where appropriate, and with approval of the supervisor and the Department, fourth year undergraduate courses (a maximum of two half-courses for the Master of Science and one half-course for Doctor of Philosophy) may be taken for credit toward a graduate degree.

### 8. Time Limit

Expected completion time is 20 months of full-time study for the Master of Science and four years for the Doctor of Philosophy. The maximum completion time is four years for the Master of Science and the Master of Engineering (thesis-based) and six years for the Master of Engineering (course-based) and the Doctor of Philosophy.

### 9. Supervisory Assignments

In all programs, a supervisor to provide guidance to the student is normally selected at the time of admission.

### 10. Required Examinations

See "Engineering Programs".

### 11. Research Proposal Requirements

Master of Science and Master of Engineering (thesis-based): As required by the supervisor.

Doctor of Philosophy: The research proposal is approved during the candidacy examination.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance in the form of scholarships, teaching assistantships and research assistantships may be available through the Department. International students may be eligible for reimbursement of the tuition fee differential. Applications for scholarships must be submitted by 15 January.

## 14. Other Information

Students enrolled in any of the engineering graduate programs may opt, in addition to their normal required course load, to undertake an international project outside Canada. The duration of the project should be between four and six months.

Details of research, courses, and financial assistance and other information are on the Departmental website.

## 15. Faculty Members/Research Interests

The active research interests of individual faculty members can be found at http://www.enel.ucalgary.ca.

### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses. Registration in all courses requires the approval of the Department of Electrical and Computer Engineering.

**Electrical Engineering 519** H(3-2)

*Special Topics in Electrical Engineering*
Current topics in electrical engineering.
Prerequisite: Consent of the Department.
Note: Consult Department for announcement of topics.
MAY BE REPEATED FOR CREDIT

**Electrical Engineering 525** H(3-2)

*Neuro-Fuzzy and Soft Computing*
Neural networks: neuron models and network architectures; preceptrons; Widrow-Hoff learning and the backpropagation algorithm; associative memory and Hopfield networks; unsupervised learning. Fuzzy systems: basic operations and properties of fuzzy sets; fuzzy rule generation and defuzzification of fuzzy logic; fuzzy neural networks. Applications in areas such as optimization, signal and image processing, communications, and control. Introduction to genetic algorithms and evolutionary computing. Introduction to chaos theory.
Prerequisite: Electrical Engineering 327.

**Electrical Engineering 527** H(3-2)

*Design and Implementation of FPGA-Based DSP Systems*
The design and implementation of digital systems for digital signal processing applications. Introduction to Hardware Design Languages. VHDL. Introduction to digital filter design and computational units for digital arithmetic. Interface standards. Interfacing to peripheral devices. Printed circuit board design and implementation. Design for testability.
Prerequisites: Electrical Engineering 453 and 471.

**Electrical Engineering 529** H(3-1T-1)

*Wireless Communications Systems*
Overview of terrestrial wireless systems including system architecture and industry standards; propagation characteristics of wireless channels; modems for wireless communications; cells and cellular traffic; cellular system planning and engineering; fading mitigation techniques in wireless systems; multiple access techniques for wireless systems.
Prerequisites: Electrical Engineering 471 and one of Biomedical Engineering 319 or Engineering 319 or Electrical Engineering 419.

**Electrical Engineering 541** H(3-1T-3/2)

*Control Systems II*
Introduction to sampled-data control systems, discretization of analog systems, discrete-time signals and systems, causality, time-invariance, z-transforms, stability, asymptotic tracking, state-space models, controllability and observability, pole assignment, deadbeat control, state observers, observer-based control design, optimal control.
Prerequisite: Electrical Engineering 441.

**Electrical Engineering 559** H(3-2)

*Analog Filter Design*
This class deals with the theory and design of active filters, for audio-frequency applications, using op amps. It consists, basically, of two phases. Phase 1 deals with the realization of a given transfer function using cascade of first and/or second-order RC-op amps circuits. In phase II, the transfer functions of filters are studied in combination with frequency-response approximations such as Butterworth, Chebyshev, Inverse-Chebyshev, Cauer (or Elliptic) and Bessel-Thompson.
Prerequisites: Electrical Engineering 465 and 471.

**Electrical Engineering 563** H(3-2)

*Biomedical Signal Analysis*
Introduction to the electrocardiogram, electroencephalogram, electromyogram, and other diagnostic signals. Computer techniques for processing and analysis of biomedical signals. Pattern classification and decision techniques for computer-aided diagnosis. Case studies from current applications and research.
Prerequisite: Electrical Engineering 327.

**Electrical Engineering 565** H(3-1T-3/2)

*Digital Integrated Electronics*
Semiconductor devices, modelling of CMOS switching, CMOS logic families, performance and comparison of logic families, interconnect, semiconductor memories, design and fabrication issues of digital IC's.
Prerequisite: Electrical Engineering 465.

**Electrical Engineering 567** H(3-1T-3/2)

*CMOS VLSI Engineering*
Introduction to CMOS very large-scale integrated (VLSI) circuit design. Review of MOS transistor theory and operation. Introduction to CMOS circuits. CMOS processing technology and design rules. Circuit characterization and performance estimation. CMOS circuit and logic design. VLSI design methods and tools. Basic concepts of design for testability. CMOS subsystem and system design.
Prerequisite: Electrical Engineering 465 or Computer Engineering 467.

**Electrical Engineering 569** H(3-1T-3/2)

*Electronics for Instrumentation*
Error analysis. Component specification. Power supplies. Switched power supplies. Operational amplifier non-idealities. Noise in devices. Instrumentation and isolation amplifiers. Logarithmic principles. Multipliers, dividers. RMS to DC conversion. Voltage-to-frequency conversion. Bridge circuits.
Prerequisite: Electrical Engineering 465.

**Electrical Engineering 571** H(3-1T-1.5/2)

*Digital Communications*
Fundamentals of digital communication systems. Digital coding of analog waveforms; digital pulse modulation, pulse code modulation, delta modulation. Intersymbol interference; baseband transmission, correlative coding. Probability theory. Optimal demodulation of data transmission; matched filtering; bit error rate.
Prerequisite: Electrical Engineering 471 and one of Biomedical Engineering 319, or Engineering 319, or Electrical Engineering 419.

**Electrical Engineering 573** H(3-1T-1)

*Telecommunications and Computer Communications*
Fundamentals of telecommunication system and teletraffic engineering; transmission systems; switching networks and congestions. Characterization of teletraffic; queueing theory; mathematical modelling of queueing systems; the birth and death process. Erlang loss and delay formulas; Engset loss and delay formulas. Computer communication networks; multiple access techniques.
Prerequisite: Biomedical Engineering 319 or Engineering 319 or Electrical Engineering 419.

**Electrical Engineering 575** H(3-1T-3/2)

*Radio-frequency and Microwave Passive Circuits*
Study and design of radio-frequency and microwave passive circuits such as filters, couplers, splitters, combiners, isolators, circulators; advanced transmission lines; network analysis;; advanced topics.
Prerequisite: Electrical Engineering 475.

**Electrical Engineering 577** H(3-1T-1)

*Transmission Media*
Transmission lines: characterization, analog and digital transmission. Terrestrial radio: very high frequency and ultra high frequency, propagation and noise. Microwave propagation. Satellite communication. System designs; modulation requirements and error control.
Prerequisites: Electrical Engineering 471 and 475.

**Electrical Engineering 579** H(3-1T-3/2)

*Optical Fibre Communications*
Electromagnetic wave progagation and Maxwell's equations. Modal analysis of the dielectric slab waveguide together with the step-index and graded-index cylindrical optical fibre. Dispersion and attenuation. Fibre design considerations and a review of fibre chemistry and production techniques. Measurement of fibre parameters. Optical transmitters, photodetectors and receivers, modulation, multiplexing, splices and connectors. Multiterminal analog and digital network analysis and design. Optical fibre local area networks. Optical switching and integrated optics.
Prerequisites: Electrical Engineering 463 and 475.

Electrical Engineering 581 H(3-1T-3/2)

*Renewable Energy and Solid State Lighting for Human Development*
Introduction to solid state lighting (SSL) and renewable energy (RE) systems. Topics include: history of lighting, illumination standards, incandescent bulbs, fluorescent tubes, White LEDs their properties and measurement; photovoltaic, wind power, hydro power, human and animal power, thermoelectric, biomass energy, biodiesel, fuel cells and SSL system design. SSL project planning and financing, environmental and social impact assessments, carbon credits and SSL system metrics for the developing world.
Prerequisite: Electrical Engineering 489 or permission of the instructor.
Note: Credit for both Electrical Engineering 581 and Electrical Engineering 519.39 will not be allowed.

Electrical Engineering 583 H(2-4)

*Fourth Year Computer, Electrical, and Software Engineering Team Design Project, Part A*
Preliminary and detailed engineering design of a system with the emphasis on the design process as it is associated with electrical, computer and software engineering. Topics include design methodology and general design principles for engineers, and project management. The team-based design project may be sponsored by industry or the department.
Prerequisite: Electrical Engineering 107

Electrical Engineering 585 H(3-2/2)

*Introduction to Power Electronics*
Commutation. Diode rectifiers. Fully controlled 3-phase rectifiers. Choppers, inverters, ac controllers. Single-phase switch mode converters: dc-to-dc, ac-to-dc, dc-to-ac. Circuit and state-space averaging techniques. Switching devices and magnetics.
Prerequisite: Electrical Engineering 465 or 469.

Electrical Engineering 587 H(3-1T-3/2)

*Power Systems*
Three-phase systems, per unit representation, power system elements and configurations, transmission system representation and performance, power flow studies, symmetrical components, fault studies, economics of power generation, transient and steady-state stability, swing equation.
Prerequisite: Electrical Engineering 489.

Electrical Engineering 589 H(2-4)

*Fourth Year Computer, Electrical, and Software Engineering Team Design Project, Part B*
Continues upon the foundations of theory, experience and practice established in Part A.
Prerequisite: Electrical Engineering 583.
Note: Electrical Engineering 107, 583 and 589 are a required three-course sequence that shall be completed in the same academic year.

Electrical Engineering 591 H(2-4)

*Individual Computer, Electrical, and Software Engineering Project*
This project involves individual work on an assigned Computer, Electrical or Software Engineering topic under the supervision of a faculty member. The topic would normally involve a literature review, theoretical and experimental or computer work. A final report is required which is defended and presented orally.
Prerequisites: Formal approvals from the project supervisor and course Graduate Program Director(s).

Electrical Engineering 593 H(3-1T-2/2)

*Digital Filters*
Discrete-time systems. The Z transform and its properties. Sampling and aliasing. Input-output and state-variable representations. Recursive and nonrecursive discrete-time filter structures. Time-domain and frequency-domain analysis. Classification and design of filter transfer functions. Bilinear transform. Implementations in software and hardware. Nonideal performance, finite precision arithmetic, limit cycles, noise, dynamic range, scaling. Applications in engineering, chosen from telecommunications, audio hi-fi, television, graphics, multimedia.
Prerequisite: Electrical Engineering 327.

Electrical Engineering 597 H(3-1T-3/2)

*Power Systems Management and Electricity Markets*
Power system operation and economic load dispatch, concept of marginal cost, Kuhn-Tucker's conditions of optimum, unit commitment, hydro-thermal coordination, power flow analysis, optimal power flow, probabilistic production simulation, power pools and electricity markets, market design, auction models, power system reliability, primary & secondary frequency control and AGC, steady-state and transient stability, power sector financing & investment planning.
Prerequisite: Electrical Engineering 487 or Electrical Engineering 587.

Electrical Engineering 599 H(2-4)

*Individual Computer, Electrical, and Software Engineering Project - Part B*
This individual project is intended for students who have completed a suitable Electrical Engineering 591 Individual Project and wish to continue the assigned research project by completing a more extensive investigation. A comprehensive written report is required which is defended and presented orally in a department seminar.
Prerequisite: Electrical Engineering 591 and formal approval from the project supervisor and course Graduate Program Director(s).

Graduate Courses
Registration in all courses requires the approval of the Department of Electrical and Computer Engineering.

Electrical Engineering 601 H(3-1.5)

*Power System Operation*
Energy transfer in power systems; real and reactive power flows; VAR compensation. Power system control, interconnected operation. Power system stability, techniques of numerical integration. Load representation, power quality. Computational paradigms for typical power system problems. Computer simulation of representative power system problems.

Electrical Engineering 603 H(3-0)

*Rotating Machines*
General theory of rotating machines providing a unified approach to the analysis of machine performance. General equations of induced voltage and torque. Transient performance of machines.

Electrical Engineering 605 Q(1.5S-0)

*Research Seminar*
Reports of studies of the literature or of current research. This course is compulsory for all full-time graduate students.
NOT INCLUDED IN GPA

Electrical Engineering 607 Q(1.5S-0)

*Research Seminar*
Reports of studies of the literature or of current research. This course is compulsory for all full-time graduate students.
NOT INCLUDED IN GPA

Electrical Engineering 609 Q(3-1)

*Special Topics*
Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member.
MAY BE REPEATED FOR CREDIT

Electrical Engineering 611 H(3-1)

*Digital Systems*
Introduction to digital system design for mask programmable and field programmable gate arrays. CMOS digital logic design. Flip-flop timing and metastability. Design for testability. CAD tools for digital systems design.

Electrical Engineering 615 H(3-1)
(formerly Electrical Engineering 619.16)

*Nonlinear Control*
Nonlinear systems; phase portraits, equilibrium points, and existence of solutions. Lyapunov stability definitions and theorems. Nonlinear control design; feedback linearization, sliding modes, adaptive control, backstepping, and approximate-adaptive control. Frequency domain stability analysis using describing functions.

Electrical Engineering 619 H(3-1)

*Special Problems*
Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member.
MAY BE REPEATED FOR CREDIT

Electrical Engineering 623 H(3-1)

*Biomedical Instrumentation*
Introduction to biomedical instrumentation. The four elements of an electronic monitoring system. Errors and error handling. Instrument modelling. Sensors: Basic concepts. Conversion of different processes into voltages or currents. Introduction to biomedical amplifiers. Ideal op amp. The concept of patient protection. Differential and instrumentation amplifiers. Non-idealities in biomedical amplifiers. Noise and noise sources. Error analysis. Offsets and offset compensation. Power supplies for instrumentation circuits. Frequency characteristics of biomedical amplifiers. Frequency conditioning circuits. Active filters. Isolation amplifiers and details on patient protection. Analog-to-Digital conversion. Basic principles and conversion errors. Nyquist theorem of discretization and antialiasing requirements. Multichannel data acquisition. Real-time requirements. Real-time digital conditioning of monitored biomedical signals. The concept of closed-loop real-time control of biomedical systems.

Electrical Engineering 625 H(3-1)

*Estimation Theory*
Estimation theory as applied in communication systems, signal processing, measurement systems, geophysical systems, biomedical engineering and geomatics engineering. Estimators covered include: MVU, BLUE, LS, ML, Bayesian and MMSE. Concepts covered include: CRLB, Neyman-Fisher and Sufficient Statistics.

Electrical Engineering 627 H(3-1)

*Antennas*
Foundations of theory and practice of modern antennas. Topics covered will include: theoretical background, antenna parameters, simple radiators, antenna array theory, wire antennas, broadband antennas, microstrip antennas, aperture radiators, base station antennas, antennas for mobile communications, antenna measurements.
Note: Students registering in this course should have a background in electromagnetics and basic microwave engineering.

Electrical Engineering 629 H(3-1)

*Advanced Logic Design of Electronic and Nanoelectronic Devices*
Two-level and multi-level logic synthesis; flexibility in logic design; multiple-valued logic for advanced technology; multi-level minimization; Binary Decision Diagrams, Word-level Decision Diagrams, sequential and combinational equivalence checking; technology mapping; technology-based transformations; logic synthesis for low power, optimizations of synchronous and asynchronous circuits, logical and physical design from a flow perspective; challenges of design of nanoelectronic devices.

Electrical Engineering 631 H(3-1)

*System Identification and Parameter Estimation*
Parametric models of linear time-invariant systems. System and noise models. Estimation of model parameters. Structure and order selection. Model validation. Convergence and sensitivity analysis. Experiment design. MIMO systems. Subspace methods. Introduction to nonlinear and/or time-varying systems.
Prerequisite: Electrical Engineering 649.

Electrical Engineering 633 H(3-1)

*Wireless Networks*
Overview of the components and architectural alternatives for wireless networks. Review of existing and proposed wireless network standards (e.g. Advanced Mobile Phone System - AMPS, Digital AMPS, Interim Standard 95 - IS95, Global System for Mobile Communications - GSM, Code division Multiple Access 2000 - CDMA 2000, Universal Mobile Telecommunications System - UMTS, etc.). Discussion of wireless network communication protocols including network access control protocols, routing congestion and flow control protocols, mobility and resource management protocols. Modelling and analysis of wireless network performance in the context of voice, data and video services, making use of mathematical and simulation techniques. Outline of current and future research challenges in wireless networks.

Electrical Engineering 639 H(3-1)

*Radio Frequency and Microwave Circuit Design*
Circuit design via transmission line elements: special emphasis on microstrip circuits and effects of discontinuities (corners, Tees, and impedance steps). Analysis of passive impedance matching and filtering circuits using distributed and lumped elements. Narrow band matching and wide band matching techniques as well as wide band matching to a complex load. One and two port small signal amplifiers. Scattering parameter design methods: amplifier gain, input and output matching and stability. Computer aided design methods and broadband design methods. Large signal transistor amplifiers: device nonlinearities and design methodologies.

Electrical Engineering 643 H(3-1)

*Fibre Optics Transmission*
Fundamental theory of cylindrical optical waveguides by way of Maxwell's equation and the modal analysis of the slab waveguides, step-index and graded-index fibres, review of fibre chemistry and production techniques. Problem areas relating to measurement of fibre parameters. Optical transmitters, photodetectors and receivers, modulation and multiplexing techniques, splices and connectors. Multiterminal analog and digital system analysis and design. Optical switching and amplification, integrated optics.

Electrical Engineering 645 H(3-1)
(formerly Electrical Engineering 619.51)

*Data Mining and Knowledge Discovery*
Types of data mining: classification, clustering, association, prediction. Processes: data preparation, model building. Techniques: decision tree, neural network, evolutionary computing, Bayesian network. Applications: multi-media, text and web mining.

Electrical Engineering 647 H(3-1)

*Analog Integrated Circuit Design*
Review of static and dynamic models of bipolar and field effect transistors. Basics of analog integrated circuit design. Computer-aided modelling. Fabrication processes and their influence on analog design. Operational voltage amplifier and transconductance amplifier design techniques. Case studies of bipolar and complementary metal oxide semiconductor (CMOS) designs. CMOS analog integrated circuit design project.

Electrical Engineering 649 H(3-1)
(formerly Electrical Engineering 619.22)

*Random Variables and Stochastic Processes*
Axiomatic view of probability; continuous and discrete random variables; expectation; functions of random variables; conditional distributions and expectations; stochastic processes; stationarity and ergodicity; correlation and power spectrum; renewal processes and Markov chains; Markov and non-Markovian processes in continuous time.

Electrical Engineering 651 H(3-1)
(formerly Electrical Engineering 619.04)

*Resource Management for Wireless Networks*
Qualitative and mathematical formulation of the resource management problem in wireless networks; elements of radio resource management: power and Walsh code allocation and control. Call admission control, traffic load control, packet scheduling; radio resource management algorithms: fixed resource allocation, handover resource management, transmitter power management, dynamic resource allocation, and packet scheduling algorithms; quality-of-service (QoS) and resource management; joint radio resource management problem across heterogeneous wireless networks; applications and case studies: resource management in third generation (3G) and beyond 3G wireless Internet Protocol (IP) networks; open research challenges in resource management for wireless networks.

Electrical Engineering 653 H(3-1)
(formerly Electrical Engineering 619.23)

*Theory & Practice Advanced DSP Processor Architecture*
Architecture and capabilities of SISD, SIMD and VLIW processors; Developing high speed algorithms: code timing, reliability, background DMA activity, maintainability; Developing a personal software process appropriate for embedded systems.

Electrical Engineering 655 H(3-1)

*Discrete Time Signal Processing*
Discrete-time signals and systems, discrete-time Fourier transform and Fourier series, discrete-time random signals, linear time-invariant systems. Sampling of continuous-time signals, decimation and interpolation. Fundamentals of multirate systems, special filters and filter banks. The z-transform, transform analysis of linear time-invariant systems. Structures for discrete-time systems, FIR and IIR structures, finite-precision arithmetic effects. Filter design techniques. The discrete Fourier transform. Discrete Hilbert transforms.

Electrical Engineering 657 H(3-1)
(formerly Electrical Engineering 619.73)

*Detection of Signals in Noise*
Detection of distorted and noise corrupted deterministic and random signals. Application to optimum statistical signal processing algorithms in data communications, GPS, radar, synchronization and image processing.
Prerequisite: At least one of Electrical Engineering 675, Electrical Engineering 649, Electrical Engineering 625 or permission from the instructor.

Electrical Engineering 659 H(3-1)

*Active-RC and Switched-Capacitor Filter Design*
The filter design problem; operational amplifier characteristics; cascade methods of RC-active filter design; filter design with the active biquad; active filter design based on a lossless ladder prototype. Switched-capacitor (SC) integrators; design of cascade, ladder, and multiple feedback SC filters; non ideal effects in SC filters; scaling of SC filters; topics in fabrication of SC filters.

Electrical Engineering 661 H(3-1)
(formerly Electrical Engineering 619.18)

*Grid-Connected Inverters for Alternative Energy Systems*
Analysis and design of grid-connected inverters fed by an alternative energy source. Switch mode converters, inverter topologies, harmonics, drive electronics, control methodologies, implementation techniques, course project.

Electrical Engineering 663 H(3-1)
(formerly Electrical Engineering 619.09)

*Numerical Electromagnetic Field Computation*
Solution techniques for electromagnetic fields: finite difference, finite elements/volumes, boundary elements, finite difference time domain, and moment methods. Practical aspects concerning computer implementation: accuracy, speed, memory, and solvers.

Electrical Engineering 665 H(3-1)
(formerly Electrical Engineering 619.21)

*Bioelectromagnetism*
Generation, transmission, and measurement of electromagnetic events generated by excitable cells (heart, brain, muscle). Topicscover the scale from membrane and cell dynamics to tissue behaviour and body surface recordings.

Electrical Engineering 667 H(3-1)
(formerly Electrical Engineering 619.25)

*Intelligent Control*
Application of machine learning algorithms in control systems: neural networks, fuzzy logic, the cerebellar model arithmetic computer, genetic algorithms; Stability of learning algorithms in closed-loop nonlinear control applications.
Prerequisite: At least one undergraduate level course in control systems.

Electrical Engineering 669 H(3-1)
(formerly Electrical Engineering 619.52)

*Renewable Energy and Solid State Lighting for the Developing World*
History of Lighting, Illumination Measurements & Standards – Incandescent, Fluorescent, LEDs & OLEDs. Generation using Hydro, Solar, Photovoltaic, Wind, Thermoelectric, Biomass, Thermal. Energy Storage & Supply Chains. System Design, Analysis & Life Cycle Assessment. Kyoto Protocol, Carbon Credits and Trading.

Electrical Engineering 671 H(3-1)

*Adaptive Signal Processing*
Fundamentals: Performance objectives, optimal filtering and estimation, the Wiener solution, orthogonality principle. Adaptation algorithms: MSE performance surface, gradient search methods, the Widrow-Hoff LMS algorithm, convergence speed and misadjustment. Advanced techniques: recursive least-squares algorithms, gradient and least-squares multiple filter, frequency domain algorithms, adaptive pole-zero filters. Applications: system identification, channel equalization, echo cancellation, linear prediction, noise cancellation, speech.

Electrical Engineering 673 H(3-1)

*Wireless Communications Engineering*
The basics of mobile radio telephone: mobile telephone frequency channels, components of mobile radio, objectives of mobile telephone systems, major problems and tools available. The mobile radio environment: fading and propagation loss, propagation loss prediction, channel and signal models, fading statistics, classification of fading channels. Methods of reducing fading effects: diversity techniques and diversity combining methods. Signaling over fading channels. Frequency reuse schemes: cellular concept, mobile radio interference, FDMA, TDMA, and spread spectrum techniques. Portable systems, air-to-ground systems, and land mobile/satellite systems, processing.
Prerequisite: Electrical Engineering 571 or equivalent.

Electrical Engineering 675 H(3-1)

*Digital Communications*
Physical layer design of digital communications systems. Linear modulation techniques are using signal space concepts. Demodulator and detector design, optimal detection rules for recovering digital information from a noisy signal. Pulse shaping using the Nyquist criterion and practical pulse shaping filters, linear equalizer design for dispersive channels, optimal detection of sequences with memory, Viterbi algorithm, error correction using channel codes.
Prerequisite: Electrical Engineering 649 or permission of the instructor.

Electrical Engineering 677 H(3-1)

*Information Theory Applied to Digital Communications*
Understanding of the digital communication link in a noisy channel with distortion. Fundamentals of information theory applicable to the statistical signal processing of digital communication receivers, presented in depth that will provide insights into optimum receiver architecture, processing and error coding. Capacity analysis of SISO and MIMO multiple antenna communication systems as well as other forms of diversity, derived within the framework of information theory.
Prerequisite: Electrical Engineering 675 or equivalent.

Electrical Engineering 679 H(3-1)
(formerly Electrical Engineering 619.60)

*Digital Video Processing*
Fundamentals of digital video representation, filtering and compression, including popular algorithms for 2-D and 3-D motion estimation, object tracking, frame rate conversion, delinterlacing, image enhancement, and the emerging international standards for image and video compression, with such applications as digital TV, web-based multimedia, videoconferencing, videophone and mobile image communications.
Prerequisites: At least one undergraduate level course in Signal Processing.

Electrical Engineering 681 H(3-1)
(formerly Electrical Engineering 619.76 and 619.82)

*VLSI and SOC*
Timing and power models; Issues in BIST for SOC; System and Circuit Optimization for SOC applications using compiler techniques; System-on-a-chip design methodology; Topics in Architectural low-power techniques; Design methodology for embedded architectures; Advanced architectures for image/video/speech/audio/internet/wireless applications; Topics in algorithm/architecture design under timing and throughput constraints.
Prerequisite: At least one undergraduate level course in Microelectronics or VLS.I

Electrical Engineering 683 H(3-1)
(formerly Electrical Engineering 619.19)

*Algorithms for VLSI Physical Design Automation*
Aspects of physical design including: VLSI design cycle, fabrication processes for VLSI devices, basic data structures and algorithms, partitioning, floor planning, placement and routing.

Electrical Engineering 687 H(3-1)

*Switch Mode Power Converters*
Design and analysis of dc-to-dc and ac-to-ac single-phase power converters. Device characteristics. Dc-to-dc topologies, dc-to-ac topologies and ac-to-ac topologies. Linearized models. Classical feedback control; introduction to state-space analysis methods. Input harmonic analysis, output harmonic analysis, and techniques to obtain unity input power factory.

Electrical Engineering 697 H(3-1)

*Digital Image Processing*
Image formation and visual perceptual processing. Digital image representation. Two dimensional Fourier transform analysis. Image enhancement and restoration. Selected topics from: image reconstruction from projections; image segmentation and analysis; image coding for data compression and transmission; introduction to image understanding and computer vision. Case studies from current applications and research.
Prerequisite: Electrical Engineering 327 or equivalent.

Electrical Engineering 698 F(0-4)

*Graduate Project*
Individual project in the student's area of specialization under the guidance of the student's supervisor. A written proposal, one or more written progress reports, and a final written report are required. An oral presentation is required upon completion of the course.
Note: Open only to students in the MEng Courses Only Route.

Electrical Engineering 699 H(3-1)

*Multidimensional Signal Processing*
Characterization of multidimensional (MD) signals, the MD Laplace, Fourier and Z transforms. Practical analog and digital signals and their MD energy density spectra. Aliasing, convolution, boundary conditions, causality, and stability in MD. Characterization of linear shift-invariant systems using MD transform transfer functions. State variable representations of MD systems. Elementary decompositions of MD transfer functions and bounded-input bounded-output stability. Design and implementation of MD digital filters. Applications of MD signal processing in engineering systems. Two- and three-dimensional digital signal processing in seismic, sonar, imaging and broadcast television.

## Software Engineering (SENG)

### Graduate Courses

Software Engineering 605 Q(3-1)

*Industrial Topics in Software Engineering*
A study of practical approaches of industrial relevance to students specializing in Software Engineering.
Note: Consult Department (Computer Science or Electrical and Computer Engineering) for details regarding offerings in the upcoming academic year.
MAY BE REPEATED FOR CREDIT

Software Engineering 607 H(3-1)

*Special Topics in Software Engineering*
A study of problems of particular interest to students specializing in Software Engineering.
Note: Consult Department (Computer Science or Electrical and Computer Engineering) for details regarding offerings in the upcoming academic year.
MAY BE REPEATED FOR CREDIT

Software Engineering 609 Q(3-1)

*Special Topics in Software Engineering*
A study of problems of particular interest to students specializing in Software Engineering.
Note: Consult Department (Computer Science or Electrical and Computer Engineering) for details regarding offerings in the upcoming academic year.
MAY BE REPEATED FOR CREDIT

Software Engineering 611 Q(3-1)

*Requirements Engineering I*
The elicitation, modelling, expression, and validation of requirements.

Software Engineering 613 Q(3-1)

*Requirements Engineering II*
Applications of requirements engineering to the management of the lifecycle of software development from requirements elicitation through analysis, design, coding, testing, enhancement and reuse.
Prerequisite: Software Engineering 611.

Software Engineering 615 H(3-2)
(formerly Computer Science 601.93)

*Agile Software Engineering*
Investigation and application of agile software development practices.
Prerequisite: Consent of the Department.
Note: Students are expected to have some background in software development as preparation for this course.
Note: Lectures may run concurrently with Software Engineering 515.

Software Engineering 627 H(3-1)

*Software Engineering Decision Support*
Provides methodological foundations of software engineering decision-making and how to apply them to make better decisions about processes, products, and resources as well as for selection of tools and techniques.
Note: Credit for both Software Engineering 625 and 627 will not be allowed.

Software Engineering 629 Q(3-0)
(formerly Software Engineering 609.17)

*Software Engineering Standards and Models*
Formal description of algorithms for current software engineering standards and models. Trends and future development in software engineering standardization.

Software Engineering 637 H(3-2)

*Dependability, Reliability, and Testing of Software Systems*
Principles of software dependability techniques, and techniques to improve, to predict, and to test software reliability.
Note: Credit for both Software Engineering 637 and either Software Engineering 631 or 635 will not be allowed.
Note: Engineering 319, Software Engineering 511, and Software Engineering 421, or their equivalents, are recommended as preparation for this course.

Software Engineering 641 H(3-1)
(formerly Computer Science 601.33)

*Software Evolution and Reuse*
Phenomena and approaches involved in the evolution and reuse of large-scale software, including design for modifiability and tool support. Strengths and weaknesses of industrially-current techniques as well as recent research results.
Prerequisite: Consent of the Department.
Note: Software Engineering 301 or Computer Science 301 or equivalent are recommended as preparation for this course. Lectures may run concurrently with Software Engineering 531

Software Engineering 651 H(3S-0)

*Half-Course Project*
A project in either software development or software best practice and experience.
Note: Credit for both Software Engineering 651 and 652 will not be allowed.
Note: This course is only available to students registered in the course-based MSc in Computer Science with the Software Engineering Specialization.
Note: Students should register for this course in the semester when they will complete it.

Software Engineering 652 F(3S-0)

*Full-Course Project*
A project in either software development or software best practice and experience.
Note: Credit for both Software Engineering 652 and either 651 or Electrical Engineering 698 will not be allowed.
Note: This course is only available to students registered in the course-based MSc in Computer Science with the Software Engineering Specialization or to MEng students with a specialization in Software Engineering.
Note: Students should register for this course in the semester when they will complete it.

Software Engineering 697 Q(3-0)
(formerly Software Engineering 609.22)

*Agent-Based Software Engineering*
Principles and practices of engineering agent-based software systems.
Note: Credit for both Software Engineering 697 and Computer Science 609 will not be allowed for programs offered by the Department of Computer Science.

## ENGINEERING, GEOMATICS ENGO

### Contact Info

Location: Schulich School of Engineering, Room E228
Faculty number: (403) 220-4979
Fax: (403) 284-1980
E-mail address: lamarkla@ucalgary.ca
Web page URL: http://www.geomatics.ucalgary.ca/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based
Master of Engineering (MEng), thesis and course-based

Areas: Positioning, navigation and wireless location; Earth observation; Digital imaging systems (Biomedical Engineering); and GIS and land tenure
See "Engineering Programs" for further degree specializations.

### 2. Admission Requirements

See "Engineering Programs."

### 3. Application Deadline

Deadlines for submission of complete applications:

Canadian and Permanent Resident Admissions

1 September for September admission
1 January for January admission
1 May for May admission
1 July for July admission

International Admissions

31 March for September admission
31 July for January admission
30 November for May admission
30 January for July admission

### 4. Advanced Credit

See "Engineering Programs."

### 5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements and the Schulich School of Engineering, the Department requires:

Students in all thesis programs must complete a Technical Report Writing course. In consultation with the Supervisor and the Graduate Director, this requirement can be waived for students with prior experience and skills in technical report writing.

Master of Engineering (course-based)

See "Engineering Programs."

Master of Engineering (thesis-based)

a) A minimum of five half-courses, of which at least three must be graduate courses
b) After satisfactory progress in the student's own research work, enrollment in the ENGO 605 Research Seminar course
c) A thesis related to original engineering analysis or design

### Master of Science

a) A minimum of five half-courses, of which at least three must be graduate courses
b) After satisfactory progress in the student's own research work, enrollment in the ENGO 605 Research Seminar course
c) Attend 6 seminars [ENGO 605, 607, and/or 609] in total – a maximum of 4 of these in the student's area of specialization and the remaining in other areas. One page report should be submitted for each seminar.
d) A thesis related to original engineering research

### Doctor of Philosophy

a) A minimum of three graduate half-courses beyond the Master of Science course requirements. For students who transfer from a Master of Science to a doctoral program, a minimum of two graduate half-courses beyond the Master of Science course requirements.
b) After satisfactory progress in the student's own research work, enrollment in the ENGO 607 and 609 Research Seminar courses, normally not to be taken in the same term
c) Attend 6 seminars [ENGO 605, 607, and/or 609] in total – a maximum of 4 of these in the student's area of specialization and the remaining in other areas. One page report should be submitted for each seminar.
d) A written and an oral candidacy examination based on the graduate course work
e) A thesis related to advanced original engineering research

## 6. Additional Requirements

None.

## 7. Credit for Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

## 8. Time Limit

See "Engineering Programs".

## 9. Supervisory Assignments

See "Engineering Programs."

## 10. Required Examinations

### Master's Programs

See "Engineering Programs."

### Doctoral Programs

*Doctoral Candidacy Examination*

The candidacy examination has a written and an oral component. The student's background knowledge in the field of Geomatics Engineering and in-depth knowledge in his/her chosen research specialization is examined.

The written examination is an open book examination of one day's duration. It consists of a comprehensive examination in the candidate's field of specialization and of a general examination in at least one of the other graduate streams in Geomatics Engineering, referred to as major and minor parts in the following. The major part will usually be of three hours duration and will count for 2/3 of the mark of the written component. The minor part will last one-and–a-half hours and will count for 1/3 of the mark of the written component. Passing marks in both the major and the minor parts are required to pass the written examination. A recommended reading list for the written examination will be made available to the student upon request.

The oral examination will further test the candidate's knowledge of his/her field of study in particular, and of geomatics in general, in addition to providing an opportunity to clarify, defend and extend answers in the written examination. Questions on the research proposal will not be included in the oral candidacy examination.

*Doctoral Final Oral Examination*

See "Engineering Programs."

## 11. Research Proposal Requirements

### Master of Engineering (thesis-based)

A preliminary thesis proposal, consisting of five to eight pages, accepted by the supervisor, is required no later than 16 months after initial registration. Contents of the thesis, reflecting an applied approach to a problem, should contain new elements of engineering principles and applications.

The thesis proposal should include the following:

1. Statement of the problem
2. Research objectives
3. Literature review
4. Methodology and procedures
5. Outline of thesis contents
6. Proposed time schedule
7. Bibliography and references

### Master of Science

The Master of Science thesis proposal requirements, including the outline of the proposal's contents, are the same as those for the Master of Engineering (thesis-based). The thesis topic, however, should deal with original theoretical or practical research in Geomatics Engineering.

### Doctor of Philosophy

The doctoral thesis proposal requirements, including the outline of the proposal's contents, are the same as those for the Master of Engineering (thesis-based). The thesis, however, must demonstrate the candidate's ability to pursue original research at a high level and represent a distinct advance in knowledge on the subject. The research should be of the recognized standard of technical journals requiring critical review. The supervisor and supervisory committee will normally require progress reports every six months during the doctoral program.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Candidates are not admitted unless self-funded or with financial support provided by an interested supervisor. For information on awards, see the Awards and Financial Assistance section of this Calendar.

## 14. Other Information

See "Engineering Programs."

In addition, the Department offers a designated set of graduate half-courses in each of the five specialization areas. Additional graduate courses are offered as Special Studies and Project courses. The Department also offers a Distinguished International Lecturer Series, which consists of approximately 4-5 courses offered annually by invited professors and researchers.

## 15. Faculty Members/Research Interests

Information about the Department's research areas may be found at http://www.geomatics.ucalgary.ca/research/

## Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

**Geomatics Engineering 500** F(1-5)

*Geomatics Engineering Project*

Principles of project management and applications in geomatics projects. Group project, under the supervision of a faculty member, on an assigned Geomatics Engineering topic. The project will normally involve a literature review, theoretical work, and laboratory or field work. Submission and defence of progress reports and a final report are required.
**Prerequisites** Communications Studies 363.
**Corequisite:** Geomatics Engineering 501.

**Geomatics Engineering 501** H(152 hours)

*Field Surveys*

Field exercises include: instrument familiarization, highway design and construction survey, boundary survey problems, astronomic azimuth, precise engineering survey, geodetic control survey, satellite surveys. Emphasis is placed on practical and professional experience and students participate in organizational, planning, scheduling, and logistical aspects of field operations. In addition to group field reports on each exercise, each student is required to prepare a complete report on one selected major exercise. In addition there will be a two day series of seminars and case studies on the practice and profession of Land Surveying.
**Prerequisites:** All third year courses or consent of the Department Head.
**Note:** A two-week field camp will be held at the Kananaskis Centre for Environmental Research Field Station prior to the start of the Fall Session lectures.

**Geomatics Engineering 531** H(2-2)

*Advanced Photogrammetric and Ranging Techniques*

Analogue and digital imaging systems, frame versus line cameras, stereo-coverage configurations of line cameras, geometric modelling of line cameras (rigorous versus approximate sensor modelling), geo-referencing requirements of frame and line cameras, high-resolution imaging satellites, active imaging systems (LIDAR/RADAR), data integration and fusion.
**Prerequisites:** Geomatics Engineering 421, 431, and 435.

**Geomatics Engineering 545** H(2-2)

*Hydrography*

Elements of oceanography, tides and water levels. Fundamentals of RF and acoustic propagation. Marine positioning: shore-based and satellite-based radionavigation systems, positioning accuracies. Underwater acoustic positioning. Sounding methods: shipborne single beam and multibeam echo-sounding, sonars, related corrections. Practical examples: data acquisition and processing.
**Prerequisites:** Geomatics Engineering 361 and 465.

Geomatics Engineering 551 H(2-2)

*Special Topics in Geospatial Information Systems*
Special topics in the research, development and applications of geospatial information systems. Internet and Web GIS, Mobile/Wireless GIS and Location Based Services (LBS), 3D GIS, GIS Interoperability, Ontology, Spatial Data Infrastructures, Geo-Sensor Networks and Spatial Sensor Web, Social Networks, and Collaborative GIS. GIS Applications in Energy and Environment related topics will be introduced in group projects.
Prerequisite: Fourth Year Standing.

Geomatics Engineering 559 H(2-2)

*Digital Imaging and Applications*
An introduction to digital image processing (IP) and computer vision (CV) concepts, methods and algorithms which will enable the students to implement IP/CV systems or use IP/CV software with emphasis on remote-sensing and photogrammetry applications and problem solving. Course components include: digital image acquisition and sampling, image enhancement and restoration, image segmentation, and introduction to image compression.
Prerequisites: Electrical Engineering 327 and Geomatics Engineering 435.

Geomatics Engineering 563 H(2-2)

*Data Analysis in Engineering*
Fundamental of matrix theory, linear systems, probability and statistics. Data classification, analysis and bias identification. Random data acquisition, qualification and analysis. Least squares estimation and data analysis. Random process, stationarity test and kinematic modelling. Kalman filtering and real-time data analysis. Introduction to signal processing and time series analysis. Practical applications of data analysis and processing in geomatics engineering.
Prerequisite: Geomatics Engineering 361.

Geomatics Engineering 567 H(2-3)

*High-Precision Surveys*
Instrument systems and procedures for high-precision surveys: precise levels, high-precision theodolites, electronic distance measurement instruments. High-precision industrial surveys: computation of three-dimensional orientations and rotations by autoreflection and autocollimation; computation of three-dimensional coordinates and coordinate changes by theodolite intersection methods, total station methods, scale bar on target methods, digital camera methods, laser scanner methods; systematic errors and their control; geometric form fitting. Case studies in high precision surveys.
Prerequisites: Geomatics Engineering 343, 361 and 419.
Corequisite: Geomatics Engineering 501.

Geomatics Engineering 573 H(2-2)

*Digital Terrain Modelling*
Digital Terrain Modelling (DTM, DEM, DHM, DTEM) concepts and their implementation and applications in geomatics engineering and other disciplines. Emphasis will be on mathematical techniques used in the acquisition (e.g. photogrammetric data capture, digitized cartographic data sources capturing, other methods: IFSAR, and laser altimeters) processing, storage, manipulation, and applications of DTM. Models of DTM (Grids, Contours, and TINS). Surface representation from point data using moving averages, linear projection, and Kriging techniques. Grid resampling methods and search algorithms used in gridding and interpolation. DTM derivatives (slope maps, aspect maps, viewsheds, and watershed). Applications of DTM in volume computation, orthophotos and drainage networks.
Prerequisites: Engineering 407 and Geomatics Engineering 431.

Geomatics Engineering 579 H(2-3)

*Survey Law and Practice*
Review of legislation, standards of practice and case law affecting property interests, property boundaries and boundary surveys. Evidence and Boundary Survey Principles, Riparian rights, Title to land, Canada lands, Aboriginal rights, inter-jurisdictional boundaries. Reforms in the Surveying Profession. Field exercises may take place off campus over weekends.
Prerequisite: Geomatics Engineering 443.
Corequisite: Geomatics Engineering 501.

Geomatics Engineering 581 H(2-2)

*Land Use Planning*
Theoretical and historical bases of planning. Urban reform and development of planning in Canada. Sustainable development. Subdivision planning process. Provincial and municipal planning approval requirements. Public participation. Site assessments. Field exercises may take place off campus over weekends.
Prerequisite: Geomatics Engineering 455.
Corequisite: Geomatics Engineering 579.

Geomatics Engineering 583 H(2-2)
(Environmental Engineering 635)

*Environmental Modelling*
Nature and purpose of environmental modeling; the top-down and the bottom-up approaches; typology of environmental models; definition of fundamental concepts; steps involved in designing and building a model; calibration, verification and validation of models; scale dependency; sensitivity analysis; characteristics, architecture and functioning of selected environmental models.
Prerequisite: Fourth year standing.

Geomatics Engineering 585 H(2-2)

*Wireless Location*
Fundamentals of radio-frequency propagation, principles of radio-frequency positioning, observations and their associated error sources. Introduction to self-contained inertial sensors including odometers, gyros, accelerometers, and augmentation of RF methods with self-contained sensors and other data sources. Current systems: Assisted GPS, cellular telephone location techniques, pseudolites, location with wireless computer networks, ultra-wideband. Applications: outdoor and indoor personal location, asset tracking.
Prerequisites: Electrical Engineering 327, Geomatics Engineering 465.

## Graduate Courses

The following Graduate Courses are normally offered in the Department. Additional courses are also offered by visiting international lecturers. Please refer to the Department web site (http://www.geomatics.ucalgary.ca) for current course listings.

Geomatics Engineering 601 H(0-4)

*Graduate Project*
Individual project in the student's area of specialization under the guidance of the student's supervisor. A written proposal, one or more written progress reports, and a final written report are required. An oral presentation is required upon completion of the course.
Note: Open only to students in the course-only route MEng.

Geomatics Engineering 605 Q(0-1S)

*Research Seminar I*
Seminar presentation of studies related to the student's research.
Note: Compulsory for all MSc graduate students.
NOT INCLUDED IN GPA

Geomatics Engineering 607 Q(0-1S)

*Research Seminar II*
Seminar presentation of studies related to the student's research. Should not normally be taken in the same term as Geomatics Engineering 609.
Note: Compulsory for all PhD graduate students.
NOT INCLUDED IN GPA

Geomatics Engineering 609 Q(0-1S)

*Research Seminar III*
Seminar presentation of studies related to the student's research. Should not normally be taken in the same term as Geomatics Engineering 607.
Note: Compulsory for all PhD graduate students.
NOT INCLUDED IN GPA

Geomatics Engineering 615 H(3-0)

*Advanced Physical Geodesy*
Potential theory and geodetic boundary value problems (GBVPs). Solution approaches to the Molodensky problem. Least-squares collocation (LSC). Hilbert spaces with kernel functions. Variational principles, improperly posed problems and regularization. The altimetry-gravimetry and overdetermined GBVPs. Solution of GBVPs by integral techniques, fast Fourier transforms and LSC. Use of heterogeneous data sets and noise propagation. Applications to gravity prediction, geoid determination, deflection estimation, satellite altimetry and airborne gravimetry and gradiometry. Current research activities.
Note: Not open to students with credit in Geomatics Engineering 611 or 617.

Geomatics Engineering 623 H(3-0)

*Inertial Surveying and INS/GPS Integration*
Inertial sensors and their application in inertial navigation, existing inertial systems, new developments in strapdown technology. Practical aspects of inertial positioning definition of an operational inertial frame, inertial error models. Effect of inertial sensor errors on the derived navigation parameters, performance characteristics of inertial sensors, calibration of inertial sensors. Mechanization equations in different coordinate frames, step by step computation of the navigation parameters from the inertial sensor data introduction to Kalman filtering for optimal error estimation, modelling INS errors by linear state equations, practical issues for the implementation of update measurements (ZUPT, CUPT, Integrated systems), current research activities.

Geomatics Engineering 625 H(3-2)

*Advanced GNSS Theory and Applications*
Overview of space positioning and navigation systems; concepts and general description. Global Navigation Satellite System signal description. Receiver and antenna characteristics and capabilities; signal measurements indoor; GNSS error sources and biases; atmospheric delays, signal reflection and countermeasures. Mathematical models for static point and relative positioning. Kinematic single point and differential post mission and real time positioning, navigation and location. Augmentation methods. Land, marine, airborne and indoor applications. Case studies.

Geomatics Engineering 629 H(3-0)

*Advanced Estimation Methods and Analysis*
Concepts of optimal estimation and different optimization criteria. Least squares estimation and different adjustment models. Fundamental of random process and kinematic modelling. Development of the Kalman filter equations. Implementation aspects of Kalman filtering. Concept of signal and least squares collocation. Robust estimation and analysis. Error analysis and advanced statistical testing. Applications to geomatics engineering problems.

Geomatics Engineering 633 H(3-0)

*Atmospheric Effects on Satellite Navigation Systems*
Theoretical and observed aspects of radio wave propagation in the ionosphere and troposphere, with an emphasis on L-band (GPS) signals. Fundamentals of absorption, attenuation, depolarization, anddefraction will be covered, in addition to characteristics and physical properties of the propagation medium and atmospheric constituents. The impact of such effects, and methods of mitigation, will be interpreted with respect to satellite navigation applications.

Geomatics Engineering 638 H(2.5-1)

*GNSS Receiver Design*
Global Navigation Satellite System signal structure, overview of receiver architecture, measurements, antenna design, receiver front-end, reference oscillator, sampling and quantization, phase lock loops, frequency lock loops and delay lock loops, tracking loop design and errors, signal acquisition and detection, interference effects.

Geomatics Engineering 639 H(3-0)

*Advanced Topics in Digital Image Processing*
Review of basic digital imaging; advanced topics in multispectral or hyperspectral analysis, multiresolution analysis, image segmentation, image transform, data fusion, pattern recognition or feature matching; current research applications especially in Geomatics.

Geomatics Engineering 649 H(3-1)

*Random Variables and Stochastic Processes*
Axiomatic view of probability; continuous and discrete random variables; expectation; functions of random variables; conditional distributions and expectations; stochastic processes; stationarity and ergodicity; correlation and power spectrum; renewal processes and Markov chains; Markov and non-Markovian processes in continuous time.

Geomatics Engineering 655 H(3-0)

*Advanced Remote Sensing*
Advanced techniques for analysis and interpretation of remotely sensed imagery, with emphasis on data acquired from satellite and airborne platforms. Topics include: review of physical principles, including governing equations; imaging system geometries; radiometric corrections, including calibration and atmospheric correction; spatial filtering for noise removal and information extraction; geometric corrections, including rectification and registration; geophysical algorithms such as leaf area index and biomass and land cover classification algorithms.

Geomatics Engineering 658 H(3-0)

*Geocomputation*
Overview of the fundamental concepts, approaches, techniques, and applications in the field of Geocomputation: Geocomputation, Complexity theory, Computational intelligence, Cellular automata modelling, Multi-agent system modelling, Artificial neural network, Scale, Data mining and knowledge discovery, Post-normal science.

Geomatics Engineering 663 H(3-0)

*Satellite Altimetry and Applications*
Overview of satellite altimetry missions, achievements and potentials. Altimeter measurement analysis technology and specifications. Orbit determination with ground tracking and perturbation analysis. Altimetry profile data processing, regularization and gridding. Sea surface topography, ocean and coastal geoid modelling. Inversion for gravity and mass anomalies. Ocean and related monitoring applications. Geodetic, global change and geophysical exploration applications. Current research activities.

Geomatics Engineering 667 H(3-0)

*Advanced Topics in Photogrammetry*
Overview of aerial triangulation procedures (strip triangulation, block adjustment of independent models, bundle block adjustment, automatic aerial triangulation, direct versus indirect orientation). Mapping from space (modelling the perspective geometry of line cameras, epipolar geometry for line cameras). Multi-sensor aerial triangulation (integrating aerial and satellite imagery with navigation data). Photogrammetric products (Digital Elevation Models, ortho-photos). The role of features in photogrammetric operations (utilizing road network captured by terrestrial navigation systems in various orientation procedures).

Geomatics Engineering 671 H(3-1)

*Adaptive Signal Processing*
Fundamentals: performance objectives, optimal filtering and estimation, the Wiener solution, orthogonality principle. Adaptation alogorithms: MSE performance surface, gradient search methods, the Widro-Hoff LMS algorithm, convergence speed and misadjustment. Advanced techniques: recursive least-squares algorithms, gradient and least-squares multiple filter, frequency domain algorithms, adaptive pole-zero filters. Applications: system identification, channel equalization, echo cancellation, linear prediction, noise cancellation, speech.

Geomatics Engineering 675 H(3-0)

*Spatial Statistics*
Spatial phenomena and spatial processes. Spatial data analysis and the importance of spatial data in scientific research. Methods will range from exploratory spatial data analysis through to recent developments such as nonparametric semivariogram modeling, generalized linear mixed models, estimation and modeling of nonstationary covariances, and spatio-temporal processes.

Geomatics Engineering 678 H(3-0)

*Dynamic Satellite Geodesy*
Covers advanced aspects of satellite motion and orbit design. Orbit perturbations from gravitational and drag forces will be treated in analytical and numerical ways. The emphasis will be on current research and current satellites, in particular the gravity mapping missions CHAMP, GRACE and GOCE. Further topics: satellite altimetry, GNSS orbit characteristics, formation flying.

Geomatics Engineering 681 H(3-0)
(Geophysics 681)

*Advanced Global Geophysics and Geodynamics*
Elasticity, figure of the Earth, Earth structure and seismology, gravity and its temporal variations, isostasy, tides, Earth rotation and orientation, time, plate flexure, glacial rebound, continental drift, geodetic observation methods for geodynamics.

Geomatics Engineering 699 H(3-0)

*Special Studies*
Focus on advanced studies in specialized topics. Students may also conduct individual studies under the direction of a faculty member.
MAY BE REPEATED FOR CREDIT

## ENGINEERING, MECHANICAL AND MANUFACTURING ENME

Contact Info

Location: Mechanical Engineering Building, Room 506
Faculty number: (403) 220-4154/3541
Fax: (403) 282-8406
E-mail address: grad.enme.ucalgary.ca
Web page URL:
http://www.schulich.ucalgary.ca/Mechanical/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc) thesis-based
Master of Engineering (MEng), thesis and course-based

Areas: applied mechanics, automation, control, robotics and nano MEMS, biomechanics, design, manufacturing systems, materials and manufacturing processes, thermo-fluids, energy systems and environment.

Specializations:

- Pipeline Engineering
- Engineering, Energy & Environment - Interdisciplinary Specialization (ENEE)
- Environmental Engineering – Interdisciplinary Specialization (ENEN)

A Biomedical Engineering program (BMEN) is offered jointly with the University of Alberta.

Further information on the Pipeline Engineering specialization may be found at www.schulich.ucalgary.ca/PEC. Information on the ENEE and ENEN interdisciplinary specializations and the BMEN program may be found in their separate listings in this Calendar.

### 2. Admission Requirements

In addition to the Faculty of Graduate Studies and the Schulich School of Engineering's minimum requirements, the Department's requirements are as follows:

Master's Programs

a) BSc degree or equivalent.
b) A minimum admission grade point average of 3.00 on a four-point scale or equivalent.

Doctor of Philosophy

MSc degree, or transfer from MSc program with a BSc degree grade point average of 3.60 or higher on a four-point scale. Transfer from MSc to PhD program is allowed only after the successful completion of all courses required for the MSc degree with a grade point average of 3.50 or higher on a four-point scale.

### 3. Application Deadline

Deadlines for submission of complete applications:
15 April for September admission
15 August for January admission
15 December for May admission

### 4. Advanced Credit

See "Engineering Programs".

### 5. Program/Course Requirements

In addition to Faculty of Graduate Studies and the Schulich School of Engineering minimum requirements, the Department requires:

Master of Engineering (course-based)

Ten half-courses, no more than four of which can be senior undergraduate courses.

Master of Engineering (thesis-based)

(a) Five to six half-courses.
(b) Presentation of one research seminar when registered in ENME/ENMF 613.

Master of Science

(a) Five to six half-courses of which two may be taken from outside the Department.
(b) One course to be selected from Mechanical Engineering 631 - Numerical Methods for Engineers or Mechanical Engineering 633 - Mathematical Techniques for Engineers.
(c) Presentation of one research seminar when registered in ENME/ENMF 613.

Doctor of Philosophy

(a) Seven to ten half-courses at the graduate level (up to two half-courses may be taken from outside the Department:): one to be selected from Mechanical Engineering 631 or Mechanical Engineering 633, or two to six half-courses beyond the Master's degree.
(b) Presentation of one research seminar when registered in ENME/ENMF 713.

Note: Further details of Departmental requirements are listed in the Department's Graduate Studies Guidebook.

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

See Section 5 for details.

### 8. Time Limit

See "Engineering Programs".

### 9. Supervisory Assignments

See "Engineering Programs."

### 10. Required Examinations

See "Engineering Programs."

### 11. Research Proposal Requirements

None beyond Graduate Studies' requirements.

### 12. Special Registration Information

None.

### 13. Financial Assistance

See "Engineering Programs."

### 14. Other Information

See "Engineering Programs."

### 15. Faculty Members/Research Interests

Active research programs and research interests of current faculty can be found at
http://www.eng.ucalgary.ca/enme/research

Graduate Courses

Manufacturing Engineering (ENMA)

Manufacturing Engineering 601 H(3-0)

*Artificial Intelligence Applications in Manufacturing*
Artificial intelligence; expert systems, system components and architecture, knowledge representation, search techniques, uncertainty; AI planning, problem representation, solution methods; programming languages and expert system shells for developing expert systems; introduction of neural networks, basic neuron model, multilayer perception, self organizing networks, adaptive resonance memory. Applications to design, manufacturing planning and robotics.

Manufacturing Engineering 605 H(3-0)

*Planning and Control of Computer Integrated Manufacturing*
Advanced techniques for the design, planning, and control of integrated manufacturing systems. Course elements include: a framework for manufacturing planning and control; data flow and structured modelling methodologies; hierarchical models of manufacturing; cellular manufacturing organization; databases and communications; forecasting, demand management, capacity planning and master production scheduling; materials requirements planning, manufacturing resource planning, Just-in-Time manufacture, and Optimized Production Technology; control of independent demand inventory items; production activity control, shop floor control, scheduling, order release and dispatching; simulation in planning and control.

Manufacturing Engineering 607 H(3-0)

*Total Quality Management*
Statistical Process Control (SPC) for discrete and continuous manufacturing processes. Acceptance Sampling. Process capability analysis. Introduction to design of experiments (DOE). Overview of quality economics, quality standards and management philosophy.

Manufacturing Engineering 609 H(3-0)

*Design and Analysis of Experiments*
Statistical Design of Experiments (DOE) techniques for efficient data collection, analysis and interpretation. Analysis of Variance (ANOVA), including blocking and nesting, in full and fractional factorial designs. Robust design, including classical response surface and Taguchi techniques. Applications to product and process improvement.

Manufacturing Engineering 611 H(3-0)

*Multi-Agent Systems*
Historical background; types and definitions of agents; knowledge representation and reasoning; agent theories, architectures and languages; possible world model and alternatives; symbolic, reactive and hybrid architectures; agent communication; coordination, cooperation, negotiation and planning; agent frameworks; example multi-agent systems are considered throughout the course.

Manufacturing Engineering 613 H( 3S-0)

*Research Seminar I*
Reports on studies of the literature or of current research. This course is compulsory for all MSc and thesis-route MEng students and must be completed before the thesis defence.
NOT INCLUDED IN GPA

Manufacturing Engineering 617 H(3-0)

*Real-time Distributed Control Systems*
Shop floor control systems. Programmable logic controller (PLC) concepts, languages and models (e.g., IEC 61131-3). Real-time distributed control models (e.g., IEC 61499, RT-UML). Intelligent control: real-time distributed control system design; safety-critical system issues; reconfiguration issues.

Manufacturing Engineering 619 H(3-0)

*Special Problems in Manufacturing Engineering*
Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member. Students would be required to consider problems of an advanced nature.
MAY BE REPEATED FOR CREDIT

Manufacturing Engineering 621 H(3-0)

*Optimization Methods with Robotics Applications*
Designed for graduate and senior undergraduate students interested in advanced topics in robotics. Based on the students' research topics, contents may vary. These include: fundamental theory in robotics, mathematical toolbox for optimization, differential kinematics, kinematics and actuation redundancy, optimal control, cooperating manipulators, redundancy in force sensing and sensor fusion.

Manufacturing Engineering 623 H(3-0)

*CAD/CAM/CAE*
Components of CAD/CAM/CAE systems. Geometric modeling. Development of customized CAD systems. Complex shape modeling. Computer-aided process planning. CNC machining. Rapid prototyping. Finite element analysis and motion analysis. Engineering optimization. Virtual design and manufacturing.

Manufacturing Engineering 698 F(0-4)

*Graduate Project*
Individual project in the student's area of specialization under the guidance of the student's supervisor. A written proposal, one or more written progress reports, and a final written report are required. An oral presentation is required upon completion of the course. Open only to students in the MEng (courses only) program.

Manufacturing Engineering 713 H(0-3S)

*Research Seminar II*
Reports on studies of the literature or of current research. This course is compulsory for all PhD students and must be completed before the candidacy examination.
NOT INCLUDED IN GPA

## Mechanical Engineering (ENME)

Mechanical Engineering 603 H(3-0)

*Physical Fluid Dynamics*
Physical phenomena of incompressible fluid motion for a variety of flows, e.g. pipe and channel flow, flow past a cylinder, and convection in horizontal layers. The derivation of the basic equations of fluid mechanics using Cartesian tensor notation. High and low Reynolds number flows including some solutions of the viscous flow equations, inviscid flow, and elementary boundary layer theory. Thermal free convective flows.

Mechanical Engineering 605 H(3-0)

*Combustion Processes*
Review of thermodynamics and chemical kinetics of combustion. Fluid mechanics, heat and mass transfer in combustion phenomena. Autoignition and source ignition, flames and detonation. Quenching and explosion hazards, flammability and detonation limits. Heterogeneous combustion, combustion practical systems, combustion as affecting pollution and efficiency, some experimental combustion methods.

Mechanical Engineering 607 H(3-0)

*Mechanics of Compressible Flow*
One-dimensional steady and unsteady motion with application to the analysis of supersonic nozzles, diffusers, flow in conduits with friction, shock tubes. Two-dimensional flow of ideal fluid. Small perturbation theory, method of characteristics with application to design of supersonic nozzles. Waves in two-dimensional flow.

Mechanical Engineering 613 H( 3S-0)

*Research Seminar I*
Reports on studies of the literature or of current research. This course is compulsory for all MSc and thesis-route MEng students and must be completed before the thesis defence.
NOT INCLUDED IN GPA

Mechanical Engineering 615 H(3-0)

*Instrumentation*
The main topics covered are commonly used techniques for the measurement of temperature, pressure, velocity, mass-flow, concentration in binary and other mixtures, heat transfer rate and heat flux, calorific value of fuels, viscosity, thermal conductivity and diffusion coefficients. In addition, attention is given to flow visualization techniques and to the recording and handling of experimentally obtained data by various means including automatic recorders, high-speed photography and analog-to-digital data converters.

Mechanical Engineering 619 H(3-0)

*Special Problems*
Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member. Students would be required to consider problems of an advanced nature.
MAY BE REPEATED FOR CREDIT

Mechanical Engineering 625 H(3-0)

*Unsteady Gas Dynamics*
Origins of unsteady flow; one-dimensional unsteady flow in pipes and ducts; simplified method of analysis, method of characteristics; boundary conditions for method characteristics analyses; graphical and numerical procedures for solving the characteristics equations; application of solution techniques for practical problems; pressure exchangers and other devices utilizing unsteady flow.

Mechanical Engineering 629 H(3-0)

*Fuel Science and Technology*
Review origins of fuels, reservoir technology and geology. Past, present and future energy supply and demand. Classification of fuels. Physical and chemical properties. Fuel handling and fire hazards. Requirements of conventional and non-conventional power and heating plants. Ecological and efficiency considerations. Some non-conventional fuels.

Mechanical Engineering 631 H(3-0)

*Numerical Methods for Engineers*
Introduction, mathematical modelling, sources of errors in the process of numerical analysis and solution methodology; Elements of numerical analysis, Taylor series, round-off error, truncation error, concept of stability, consistency and convergence; Linear algebra, normal forms, Gauss elimination method, LU-decomposition, tridiagonal systems of equations; iterative methods, Jacobi, Gauss-Seidel, SOR, SSOR methods, conjugate gradient methods and preconditioning and principles of the multi-grid methods; Elliptic "equilibrium" equation, Laplace and Poisson equations, finite difference and finite control volume concepts and stability analysis; Parabolic equations: explicit, implicit and Crank-Nicolson methods, time-splitting method, method of lines, Stability analysis; Hyperbolic equations; Introduction to other methods; future challenging problems.

Mechanical Engineering 633 H(3-0)

*Mathematical Techniques for Engineers*
Application of mathematical techniques to the solution of ordinary and partial differential equations arising in engineering problems. Methods that will be considered are: separation of variables, method of characteristics, transform methods and complex variable methods.

Mechanical Engineering 637 H(3-0)
(Environmental Engineering 673)

*Thermal and Cogeneration Systems*
Fundamentals of thermodynamics, fluid mechanics and heat transfer; thermal and energy systems, heat exchangers, co-generation; Second law of thermodynamics and concept of entropy generation and thermo-economics; Environmental issues and pollution control; Renewable energy system; Co-generation design; Heat exchanger design; Energy storage systems; Optimization process.

Mechanical Engineering 639 H(3-0)

*Numerical Methods for Computational Fluid Dynamics*
Review of solution techniques for ordinary differential equations. Stability, consistency and convergence. Order of accuracy. Fourier methods for stability. Numerical techniques for one, two and three-dimensional linear parabolic problems. Courant condition. Implicit and semi-implicit schemes. Boundary conditions for parabolic problems. Techniques for linear hyperbolic problems. CFL condition. Characteristics, domain of dependence and domain of influence. Boundary conditions for hyperbolic problems. Nonlinear conservation laws. The Burger's equation as a test problem. Strong and weak solutions. Conservative and integral forms. Conservative schemes. Entropy condition. Godunov theorem and flux limiters. Godunov, ENO and TVD schemes. Implementation in gas dynamics.

Mechanical Engineering 641 H(3-0)

*Advanced Control Systems*
Introduction to multivariable systems; state space models; analysis of linear systems; stability; Cayley-Hamilton theorem; controllability and observability; state feedback control; pole placement designs; introduction to linear optimal control and estimation; Kalman filtering; separation theorem and duality; performance specifications; controller reduction concepts; introduction to robust control.

Mechanical Engineering 643 H(3-0)

*Optimal and Adaptive Control*
Discrete time and sampled-data system models and properties; discrete time domain controller design principles; system identification using least-squares analysis; self-tuning control; indirect adaptive control; model reference adaptive control; sliding mode control in continuous and discrete time; optimal design of sliding mode controllers; sensitivity functions and their role in control theoretic performance specification; robust stability and robust performance objectives; Kharitonov stability.

Mechanical Engineering 645 H(3-0)

*Robotics and Vision Systems*
An introduction to robotics. Kinematics, statics, dynamics, and control of robot arms. Digital image processing and robot vision. Robot programming and applications. Project: design of mechanisms or software related to these topics.

Mechanical Engineering 647 H(3-0)

*Combustion in Gas Turbines*
Basic design features of combustion chambers, their types and requirements for aero and industrial applications; combustion fundamentals relevant to gas turbines; aerodynamics; fuel types and fuel injection systems; ignition, flame stabilization, heat transfer, combustion efficiency and how they affect performance and emissions.

Mechanical Engineering 653 H(3-0)

*Continuum Mechanics in Engineering*
Review of linear algebra and tensor analysis; kinematics of deformation; deformation and strain tensors; strain rates; balance equations and equations of motion; stress principle; stress power and conjugated stress-strain couples; stress rates; elements of Lagrangian and Hamiltonian Mechanics for discrete and continuum systems; thermomechanics and constitutive theory; isotropic and anisotropic hyperelasticity; composite materials

Mechanical Engineering 655 H(3-0)

*Analysis of Shells and Plates*
General linear and nonlinear equations of the theories of thin shells. Approximate, membrane, and shallow shell theories. Plates as special cases of the shell. Finite elements for plates and shells. Stability and optimum design of plates and shells. Stress concentrations and local loads. Large deflections and limit loads. Applications to the design of pipelines, large containers, pressure vessels, and other mechanical structures.

Mechanical Engineering 661 H(3-0)

*Corrosion Science*
Electrochemical thermodynamics. Kinetics of electrode processes. Experimental polarization curves. Instrumentation and experimental procedures. Passivity. Galvanic, pitting, crevice and intergranular corrosion. Corrosion-deformation interactions. Atmospheric corrosion. Oxidation and high temperature corrosion. Protection techniques. Materials selection and design.

Mechanical Engineering 663 H(3-0)
(Medical Science 663) (Kinesiology 663)

*Advanced Biomechanics*
Theoretical and applied aspects of biomechanics in the acquisition and performance of sport skills.
Prerequisite: Consent of the Faculty.

Mechanical Engineering 665 H(3-0)

*Elements of Materials Engineering*
The course covers a variety of material aspects and provides a fundamental understanding of Materials Science and Engineering. The course emphasizes the understanding of advanced dislocation theory and its application in illustration of diffusion, deformation and fracture of metals. Fundamentals of material strengthening mechanisms are covered. Practical aspects that are relevant to material uses and failures, such as environmental-induced cracking, creep, fatigue, strain aging and corrosion, are discussed. Typical surface analysis techniques for material characterization are introduced.

Mechanical Engineering 667 H(3-0)

*Fracture Mechanics*
Basic fracture theory, failure criteria, overview of fracture mechanics, brittle and ductile failure, crack tip parameters, geometric considerations, methods of analysis, fracture toughness and testing standards. Applications in design, fatigue subcritical crack growth, creep and impact.

Mechanical Engineering 669 H(3-0)

*Fatigue of Materials*
History and origin of fatigue. Stress life, strain life and fracture mechanics approaches. Low and high cycle fatigue. Low and high temperature fatigue. Combined stresses, initiation, and propagation of cracks. Environmental and statistical effects. Testing techniques and variables. Design and specific material behaviour. Mechanisms of fatigue.

Mechanical Engineering 683 H(3-0)

*Applications of 3D Rigid Body Mechanics in Biomechanics*
Applications of 3D motion analysis and rigid body mechanics to musculoskeletal system locomotion, and movement. Experimental, theoretical and numerical methods for optical motion imaging, 3D analysis of joint kinematics and kinetics, joint angle representations, prediction of joint forces, data analysis and filtering, error propagation, inverse and forward dynamics approaches, and applications to clinical and orthopaedic engineering.

Mechanical Engineering 685 H(3-3)
(Medical Science 685) (Kinesiology 685)

*Biomechanics of Human Movement*
Introduction to the measuring methods (accelerometry, goniometry, film and film analysis, video systems) of biomechanical analysis of human movement (force and force distribution). Description of the mechanical properties of bone, tendon, ligaments, cartilage, muscles and soft tissues. The relation between structure and function of biomaterials. Introduction to descriptive analysis of human movement.
Prerequisite: Consent of the Faculty.

Mechanical Engineering 698 F(0-4)

*Graduate Project*
Individual project in the student's area of specialization under the guidance of the student's supervisor. A written proposal, one or more written progress reports, and a final written report are required. An oral presentation is required upon completion of the course. Open only to students in the MEng (courses only) program.

Mechanical Engineering 701 H(3-0)

*Advanced Mechanical Vibrations*
Introduction to nonlinear vibrating systems. Qualitative methods: autonomous conservative systems; concept of a phase plane; singular points and problem of stability; example of a nonlinear pendulum. Quantitative methods: perturbation method; method of slowly-varying amplitudes; energy balance method; piecewise-linear method.
Prerequisites: Mechanical Engineering 599, or equivalent.

## ENGLISH ENGL

### Contact Info

Location: Social Sciences Building, Room 1112
Faculty number: (403) 220-5484
Fax: (403) 289-1123
E-mail address: enggrad@ucalgary.ca
Web page URL
http://www.english.ucalgary.ca/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), course-based and thesis-based
Areas: British, American, Canadian and International literatures in English

A Creative Writing option is available in the Master of Arts (thesis-based) and Doctor of Philosophy programs.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts (course-based and thesis-based)

a) A University of Calgary Honours degree or its equivalent in English (10 full courses in English)
b) A Statement of Intent
c) A sample of critical writing; for creative writing applicants, an additional 10-page sample of creative writing
d) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 600 (written test), 100 (internet-based test), a MELAB score of 84, an IELTS score of 7.5, or a PTE score of 7.0
e) Two References Letters

Doctor of Philosophy

a) A Master of Arts Degree in English or its equivalent
b) A Statement of Intent
c) A sample of critical writing; for creative writing applicants, an additional 10-page sample of creative writing
d) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 600 (written test), 100 (internet-based test), a MELAB score of 84, an IELTS score of 7.5 or a PTE score of 70
e) Two Reference Letters

### 3. Application Deadline

The deadline for the submission of complete applications is January 10 for September admission.

### 4. Advanced Credit

Application for advanced credit must be made to the Department Head at the time of admission.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department normally requires:

Master of Arts (thesis-based)

a) Three full-course equivalents in English at the 600 or 700 level beyond the Honours BA
b) English 696 or its equivalent
c) A reading knowledge of a language other than English

Master of Arts (course-based)

a) Four full-course equivalents in English at the 600 or 700 level beyond the Honours BA or equivalent
b) English 696 or its equivalent
c) A reading knowledge of a language other than English

Note: Only the course-based Master of Arts program is open to part-time students.

Doctor of Philosophy

a) Six full-course equivalents in English at the 600, 700, or 800 level beyond the Honours BA or three full-course equivalents in English beyond the MA
b) English 696 or its equivalent
c) A reading knowledge of a language other than English
d) A Minor Field Examination
e) A Major Field Examination

## 6. Additional Requirements

All students must attend an orientation session.

### Second Language Requirement

The Department of English requires, for both the MA and PhD, knowledge of one language other than English. Students are encouraged to establish competency in a language that contains a body of texts relevant to their program of study. This requirement can be met in the following ways:

a) A minimum grade of B in a full course or each of two half-courses at a senior (300) level
b) Passing the department reading exam. Computer-based courses in French (French 235 - French 237 and French 335 - French 337) and German (German 201 - German 213) are available and would be helpful in preparing for the department set exam.
c) Documentation establishing native proficiency in a language other than English

It is the responsibility of the student to supply evidence of native proficiency or evidence that course work in a language at another university meets the requirement spelled out in this guide. Students who do not meet the requirement upon entry should consult with the Associate Head (Graduate Program) no later than the week before classes begin about the best approach to take.

## 7. Credit for Undergraduate Courses

With the approval of the Department, all graduate students may take for credit up to one full-course equivalent at the 500-level (excluding English 504).

## 8. Time Limit

Expected completion time is two years for the Master of Arts (thesis-based), and four years for the Master of Arts (course-based) and Doctor of Philosophy degrees. Maximum completion time is four years for the Master of Arts (thesis-based) and six years for the Master of Arts (course-based) and Doctor of Philosophy degrees.

## 9. Supervisory Assignments

For the first seven months of the program, students are assigned an interim advisor to give them time to familiarize themselves with faculty members' research before securing a permanent supervisor.

Master of Arts (thesis-based)

By 1 March of the first year, each student must submit a proposed field of research, and the name of a proposed supervisor to the Graduate Executive Committee for approval.

Master of Arts (course-based)

By 1 March of the first year of study, each student must submit the name of the proposed supervisor to the Graduate Executive Committee for approval (15 August for part-time students).

Doctor of Philosophy

By 1 April of the first year, each student must submit the name of the proposed supervisor and the proposed areas of the major and minor field examinations to the Graduate Executive Committee for approval. By June 30 of the first year, the supervisor, following consultation with the student, will submit the names of the proposed supervisory committee to the Graduate Executive Committee for approval.

## 10. Required Examinations

### Doctoral Candidacy Examinations

Before formally embarking on the writing of the PhD thesis, all students must pass the following:

1. A written Minor Field Examination based on one of the Department's Field Reading Lists and distinct from the Major Field.
2. A Major Field Examination that forms the basis of the candidacy oral. The written Major Field Examination is based on one of the Department's Field Reading Lists. Prepared by the Supervisory Committee, the examination consists of three parts, each requiring the student to answer one of two questions (for a total of three of six questions). The Major Field Examination forms the basis of, and must be completed no less than ten working days before, the Candidacy Oral Examination.

The Candidacy Oral Examination is a formal oral examination scheduled by the Faculty of Graduate Studies no later than 28 months after the student's initial registration in the program (for those who entered the program with an M.A. degree).

This oral examination should address issues arising from the written examination. Examiners are asked to record their assessment of the written component by commenting on the use of relevant literature and techniques, organization, literary competence, originality, argumentation leading to the conclusions, and anything else they consider important.

At the end of the Candidacy Oral Examination, the examiners judge the student's performance, including written and oral components, Pass or Fail. Questions on the Research Proposal will not be included in the Oral Examination.

Consult the Department website for details.
Final thesis oral examinations are open.

## 11. Research Proposal Requirements

Master of Arts (thesis-based)

By 1 May, no later than eight months after initial registration, each student must submit a thesis proposal on the form *Registration of MA Thesis Topic* to the Graduate Executive Committee. Further details are available from the department.

Doctor of Philosophy

By 30 September of the second year, each student must submit a thesis proposal on the form *Initial PhD Thesis Research Proposal and Supervisory Committee* to the Graduate Executive Committee.

The student must submit a *Final PhD Thesis Proposal and Bibliography* form along with a final thesis proposal and bibliography to the doctoral supervisory committee within three months of successful completion of the candidacy examinations. Further details are available from the department.

## 12. Special Registration Information

Students must register for courses by the end of June. Continuing students and new students who are able to do so should consult the course instructors before they register. Other new students should consult the course instructors as soon as they arrive on campus. Final approval to enter a course is given by the Head or Associate Head of the Department.

## 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships are advised to have their applications to the Department by 15 December.

## 14. Other Information

None

## 15. Faculty Members/Research Interests

Detailed information about faculty members and their research interests may be found at http://english.ucalgary.ca/contact-us/directory

### Graduate Courses

English 603 H(3-0)
*Studies in Genre*
MAY BE REPEATED FOR CREDIT

English 605 H(3-0)
*Studies in National or International Literatures*
MAY BE REPEATED FOR CREDIT

English 607 H(3-0)
*Theoretical and Cultural Studies*
MAY BE REPEATED FOR CREDIT

English 609 H(3-0)
*Studies in a Literary Period*
MAY BE REPEATED FOR CREDIT

English 612 F(3-0)
*Studies in Medieval and Renaissance Literature*
MAY BE REPEATED FOR CREDIT

English 618 F(3-0)
*Studies in Restoration and Eighteenth-Century Literature*
MAY BE REPEATED FOR CREDIT

English 676 F(3-0)
*Studies in Canadian Literature*
MAY BE REPEATED FOR CREDIT

English 680 F(3-0)
*Studies in Literary Criticism*
MAY BE REPEATED FOR CREDIT

English 684 F(3-0)
*Special Topics*
MAY BE REPEATED FOR CREDIT

English 696 H(1-0)

*Studies in Bibliography, Research Methods, and Palaeography*
Required of all graduate students who have not had an equivalent course.
NOT INCLUDED IN GPA

English 697 H(1-0)

*Studies in the Academic Profession*
Practical instructions in preparing materials necessary for the academic job market.
Note: Open only to post-candidacy doctoral students.

English 698 F(2-1T-1)

*Studies in Creative Writing*
Note: This course is double-numbered with English 598 (which will have separate and less strenuous student expectations). Though 598 and 698 may not both be counted for graduate credit, a student may take 598 as an undergraduate student and 698 as a graduate student in English.
Note: By mid-August, prospective students must submit a portfolio of their own work for evaluation before consent to register for this course will be given. Details of this procedure are available from the Department of English.
MAY BE REPEATED FOR CREDIT

English 701 H(1-0)

*Major Field*
Required of all doctoral students.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

English 703 H(1-0)

*Minor Field*
Required of all doctoral students.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

## ENVIRONMENTAL DESIGN EVDS

### Contact Info

Location: Professional Faculties - 2182
Faculty number: (403) 220-6601
Fax: (403) 284-4399
E-mail address: evdsinfo@ucalgary.ca; and evdsphd@ucalgary.ca
Web page URL: http://www.ucalgary.ca/evds/

### 1. Degrees and Specializations Offered UPDATED

Doctor of Philosophy (PhD)
Master of Environmental Design (MEDes), thesis-based
Master of Environmental Design (MEDes (Planning)), course-based
Master of Architecture (MArch), course-based

### 2. Admission Requirements

In addition to Faculty of Graduate Studies requirements, the Faculty of Environmental Design requires:

#### Doctor of Philosophy

a) For applicants required to prove proficiency in English, a TOEFL score of 600 (written test); or 100 (internet-based test); or an IELTS score of 7.5, or a MELAB score of 8, or a PTE score of 70.
b) An admission grade point average (GPA) above 3.50 on a 4-point scale.
c) A statement of interest that describes the nature of the thesis research the applicant expects to undertake. This is not a detailed thesis proposal, but will be used by an admissions committee as an indicator of the applicant's ability to conduct doctoral level research and to determine if adequate supervisory and research funding resources are available to support the proposed program. Only if such resources are available will the student be admitted.
d) A qualified supervisor from the Faculty of Environmental Design will be identified once admission is recommended by an admissions committee and the student has been admitted by the Faculty of Graduate Studies.
e) Three Reference Letters.

#### Master of Environmental Design (thesis-based)

In addition to Faculty of Graduate Studies requirements, the Faculty of Environmental Design requires:

As an interdisciplinary degree, applications are encouraged from a variety of academic backgrounds (including first professional degrees in planning and design) or a combination of undergraduate degree and work-related experience.
Applicants for the Master of Environmental Design must provide:

a) a clear, well written, statement of intent which describes how the applicant's specific educational background and professional or personal experience relates to Environmental Design as a field of study and the applicant's future 'vision' for pursuing a graduate degree in Environmental Design (related to personal and professional goals and intentions);
b) a clear, well written and substantive statement of thesis research interests which informs the Admissions Committee of the applicant's supervisory needs;
c) a 'portfolio' of the applicant's work, as selected by the applicant, to include at least one example of the applicant's previous academic or professional writing, such as a written essay, published research paper, major academic paper, design project or consulting report;
AND provides examples or illustrates the applicant's design work, graphics, visual communication, creative thinking, community action, or creative ideas as related to the applicant's statement of intent. If any of the work involves collaboration with others, please clearly identify what aspects of the work are from others. This portfolio should be submitted in digital form (pdf files) on a CD/DVD or in format easily downloaded to a CD or DVD
d) Three Reference Letters

#### Master of Environmental Design (Planning) (course-based) UPDATED

In addition to the Faculty of Graduate Studies requirements, the Faculty of Environmental Design requires:
a) a clear, well written, statement of intent which describes the applicant's preference for one of the planning streams and how the applicant's specific educational background and professional or personal experience relates to Planning as a field of study and the applicant's future 'vision' for pursuing a graduate degree in Environmental Design (related to personal and professional goals and intentions.;
b) Three Reference Letters.

#### Master of Architecture

In addition to Faculty of Graduate Studies requirements, the Faculty of Environmental Design requires:

a) Prospective applicants are advised to use opportunities within their four year recognized university undergraduate degree studies to develop knowledge in design, the humanities, social sciences, arts, engineering, biological and/or physical sciences – including, wherever possible, studio, laboratory and collaborative learning experiences.
b) Applicants must demonstrate successful completion of 10 pre-requisite half course requirements in 4 areas: Design, Technology, Communications, and History/Theory (equivalent to the courses taken in the minor in Architectural Studies).

Applicants may be admitted to the M.Arch 'Foundation' or qualifying year in order to complete these prerequisite requirements. An assessment of these prerequisite requirements will be made by an admissions committee and applicants will be informed in offers of admission which, if any, courses at the Foundation level will be required.
c) Applicants must provide evidence of original and/or creative work in any field or medium and demonstrate in writing the relevance of the skills shown by this work to the study of Architecture. This work should be presented in a compact form (box, envelope or binder no larger than 297 mm by 297 mm [11" x11"] format). If any of the work involves collaboration with others, please clearly identify what aspects of the work are from others.
d) Three Reference Letters

### 3. Application Deadline

#### Doctor of Philosophy UPDATED

The deadline for the submission of complete applications is 1 February for September admission. There is normally no January admission.

Deadlines for the submission of complete applications for students with Canadian or US transcripts:
1 April for September admission
1 September for January admission

#### Master of Environmental Design & Master of Architecture

Applications are accepted from 1 December through 1 February for September admission. There is no January admission. Please note that new admissions to both Masters Degree Programs may be limited in number on an annual basis.

### 4. Advanced Credit

Applicant must make advanced credit requests as part of the admission process. Advanced credit will not be given for courses taken more than five years prior to admission application. Credit will not be given for courses taken to bring the grade point average to a required level for graduate studies admission.

### 5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements, the Faculty of Environmental Design requires:

#### Doctor of Philosophy

a) Students complete EVDS 601 Interdisciplinary Seminar, one thematic elective relevant to their area of research, i.e. EVDS 723 – Interdisciplinary Intervention in Environmental Design (decimalized half course), and at least one other half-course recommended by the student's interim advisor. The PhD Coordinator must approve these courses.
b) Additional course work when recommended by the student's interim advisor or supervisor

Fieldwork and research done off-campus may be

counted towards fulfillment of the full-time study and research requirement.

Master of Environmental Design
MEDes (thesis-based)
UPDATED
An individual student Program of Study (POS) will be submitted by all students for approval by the MEDes Graduate Coordinator. The POS must include the following academic requirements:

a) Required Courses:
EVDS 603 (HCE): Design Thinking Studio
EVDS 601 (HCE): Interdisciplinary Seminar
EVDS 751(HCE): Thesis Research and Design Studio
b) A minimum of two half-course electives, one of which must be an approved EVDS or EVDP studio course (e.g. EVDS 618, EVDP 625, EVDS 628, EVDP 637, EVDS 723).
c) A research thesis based on an approved thesis proposal and signed by the Thesis Supervisor.. The approved student thesis proposal must form part of the POS for Unconditional POS approval.
d) Satisfactory annual Faculty of Graduate Studies student progress reports.

MEDes (Planning) (course-based)
An individual Program of Study (POS) will be submitted by all students for approval by the MEDes Graduate Director. The POS must include the following academic requirements totaling at least 17 HCEs:
a) Core Required Courses:
EVDS 601 (HCE)
EVDP 621 (HCE)
EVDP 623 (HCE)
EVDP 625 (HCE)
EVDP 627 (HCE)
EVDP 631 (HCE)
EVDP 633 (HCE)
EVDS 635 (HCE)
EVDP 637 (HCE)
EVDP 644 (FCE)
and any one of the following Planning Technology courses (or approved equivalent):
EVDS 602 (HCE)
EVDS 611 (HCE)
b) All of the required courses for one of the following three streams:

i) Regional & Environmental Planning
EVDS 624 (HCE)
EVDS 626 (HCE)
a minimum of three half course, approved, planning-related electives.

ii) City & Community Planning
EVDS 628 (HCE)
EVDS 618 (HCE)
EVDS 622 (HCE)
a minimum of two half course, approved planning-related electives

iii) Urban Design & Development
EVDS 618
EVDS 622
EVDS 671
a minimum of two half course, approved planning-related electives

Master of Architecture UPDATED
The MArch is a first professional degree in Architecture accredited by the Canadian Architectural Certification Board (CACB). The MArch is a two year course-based degree with a Foundation year for those applicants without a design-related four year undergraduate degree. After its last review in 2005, the University of Calgary Master of Architecture professional program was accredited for six years by the CACB. This is the maximum period for which programs can be accredited between reviews. Under NAFTA, this means that accredited Canadian degrees are fully recognized in the USA and vice versa. In Canada, all provincial associations recommend a degree from an accredited professional degree program as a prerequisite for licensure. The CACB, which is the sole agency authorized to accredit Canadian professional degree programs in architecture, recognizes two types of accredited degrees, the Bachelor of Architecture and the Master of Architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on the degree of conformance with established educational standards. Master's degrees 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. A student Program of Study (POS) will be submitted by all students registered in the two year MArch for approval by the MArch Graduate Coordinator. The POS must include the following academic requirements:

a) Foundation, First and Second Year required courses:
b) MArch students are required to take the Somerville Design Charrette (quarter-course), the Gillmor Theory Seminar (quarter-course) or the Taylor Practice Seminar (quarter-course), which are offered as one week block courses, at least once (may be repeated for elective credit).
c) Five half-course (or equivalent) electives are required.
d) Satisfactory annual Faculty of Graduate Studies student progress reports.

Required courses in the two year MArch program:
EVDA 682.02 (full course)
EVDA 619 (half course)
EVDA 663 (half course)
EVDA 621 (half course)
EVDB 697.xx (quarter course)
EVDA 682.04 (full course)
EVDA 611 (half course)
EVDA 613 (half course)
EVDA 615 (quarter course)
EVDA 617 (quarter course)
EVDA 661 (half course)
EVDA 782.xx (full course)
EVDA 782.xx (full course)

Required courses in the M.Arch Foundation year:
EVDS 503 (half course)
EVDS 501 (half course)
EVDA 511 (half course)
EVDA 523.01 (half course)
EVDA 541 (half course)
EVDA 582 (full course)
EVDS 523 (half course)
EVDA 523.02 (half course)
EVDA 543 (half course)

## 6. Additional Requirements

None.

## 7. Credit for Undergraduate Courses

Doctor of Philosophy
Not given.

Master of Environmental Design
Only where appropriate to a student's individual Program of Study may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

Master of Architecture
With the exception of Foundation year courses, only where appropriate to a student's Program of Study may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

## 8. Time Limit UPDATED

All PhD requirements must be completed within six registration years.

All MEDes (including MEDes (Planning)) and MArch requirements must be completed within four registration years, excluding the MArch Foundation year.

## 9. Supervisory Assignments

Doctor of Philosophy
At the time of admission, each student will be assigned an interim advisor, who may or may not become the student's thesis supervisor. The interim advisor, in consultation with the PhD Coordinator, will recommend a program of courses that must be approved by the PhD Coordinator.

During the first year of studies, the student, with the advice of the interim advisor and the PhD Coordinator, will prepare a thesis proposal and propose a supervisor and the other members of a supervisory committee for approval by the PhD Coordinator.

Master of Environmental Design UPDATED
(thesis-based)
Upon admission, each MEDes student will be assigned an interim Supervisor appropriate to their admissions statement of intent and thesis research area who may assist with POS development and thesis proposal development. Within twelve months of first registration a Thesis Supervisor will be approved specific to the student's approved thesis proposal.

Master of Environmental Design (Planning)
(course-based) UPDATED
Upon admission, each MEDes student will be assigned an academic advisor to assist with POS development.

Master of Architecture

Upon admission each MArch student will be assigned a Program Advisor to assist with POS development. As part of the MArch research studios in second year, research project advisor will be assigned to students on an individual interest basis.

## 10. Required Examinations

Doctor of Philosophy

Doctoral students are required to complete both a written and an oral candidacy examination. The written candidacy examination normally consists of a set of four questions set by the supervisory committee and taken in the second year of the program (or possibly the third year for students entering the program without a Master's degree), after the completion of course work and after approval of the doctoral thesis proposal.

At least six months before the written examination, the supervisory committee will prepare a written outline of the material to be covered in the exam, a recommended reading list and a draft examination schedule. Normally, the student will be given two weeks to complete the written candidacy papers. Within one month of completing the written candidacy, the student will take an oral examination.

The written papers will form the basis of the oral candidacy examination although questions may extend beyond the written papers to areas outlined in the notice of candidacy examination.

Final thesis oral examinations are open.

Master of Environmental Design UPDATED
(thesis-based)

Final thesis defence oral examination.

Master of Architecture

Comprehensive exit requirement is a research studio project presented in a review format.

## 11. Research Proposal Requirements

Doctor of Philosophy

Approval of the thesis proposal by the supervisory committee and the PhD Coordinator is required as noted in the "Supervisory Assignments" above. Thesis Proposals should clearly describe the project in terms of Title, Objectives, Background, Methodology and Results and must include an explicit interventionist or problem-solving component.

Master of Environmental Design UPDATED

Thesis proposals will be presented and reviewed upon completion of first year thesis research design studio. Final thesis proposals will be individually approved by an approved Supervisor.

Master of Architecture

Design research studio proposals will be approved by Research Studio Project Advisors.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Financial assistance may be available to qualified students but cannot be guaranteed. For information on admission and academic awards, see the Awards and Financial Assistance section of this calendar, the EVDS website and the Awards Data Base on the Faculty of Graduate Studies website.

## 14. Other Information

None.

## 15. Faculty Members/Research Interests UPDATED

Current information about faculty members and research interests can be found at http://www.ucalgary.ca/evds/people

## Environmental Design (EVDS)

The following list of courses, offered by members of the Faculty of Environmental Design and members of other departments in the University, is specific to the 2010-11 academic year.

Students are advised that some of the courses listed below may not be offered in 2010-11 if special circumstances require that they be dropped. Students should consult with their Faculty advisor before registering for any course.

See the online Graduate Calendar for a listing of Graduate level courses in Environmental Design.

## Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

Environmental Design 501 H(4-0)

*Interdisciplinary Seminar*

Conceptual frameworks in Environmental Design and theories related to design and environment that influence environmental design thinking and practice.
Prerequisite: Open only to students in the Foundation year in the MArch. Degree program.
Note: Credit for both Environmental Design 501 and Architectural Studies 483 will not be allowed.

Environmental Design 503 H(0-8)

*Studio I - Design Thinking*

Foundation concepts in design and form making involving a sequence of progress skill building, visual and spatial thinking and problem solving exercises.
Prerequisite: Open only to students in the Foundation year in the MArch. degree program..
Note: Credit for both Environmental Design 503 and Architectural Studies 485 will not be allowed.

Environmental Design 523 H(3-0)
(formerly Environmental Design 623)

*Sustainability in the Built Environment*

The principle of sustainability recognizes people as temporary stewards of their environments, working toward a respect for natural systems and a higher quality of life. Examination of the built environment and the tools to achieve a stable and balanced and a regenerative ecosystem in a process of responsible consumption, wherein waste is minimized and the built environment interacts with natural environments and cycles. Healthful interior environments, resource efficiency, ecologically benign materials, renewable energies and social justice issues are examined.

Prerequisite: Open to senior undergraduates with permission of instructor, and MArch Foundation year students.
Note: Credit for both Environmental Design 523 and Architectural Studies 423 will not be allowed.

Environmental Design 583 H(3-0)

*Special Topics in Environmental Design*

Thematic inquiry and design related to urban design, architecture, environmental science, industrial design and planning.

MAY BE REPEATED FOR CREDIT

Environmental Design 597 Q(3-0)

*Special Topics in Environmental Design*

Thematic inquiry and design related to urban design, architecture, environmental science, industrial design and planning.

MAY BE REPEATED FOR CREDIT

## Graduate Courses

Environmental Design 601 H(4-0)

*Interdisciplinary Seminar*
Conceptual frameworks in Environmental Design and theories related to design and environment that influence environmental design thinking and practice.
Note: Required course for students registered in the Master of Environmental Design.
Note: Credit for both Environmental Design 501 and 601 will not be allowed.

Environmental Design 603 H(0-8)

*Studio I - Design Thinking*
Foundation concepts in design and form making involving a sequence of progress skill building, visual and spatial thinking and problem solving exercises.
Note: Required course for students registered in the Master of Environmental Design.
Note: Credit for both Environmental Design 503 and 603 will not be allowed.

Environmental Design 621 H(3-1)

*Health in the Built Environment*
Concepts of health in an environmental context; historic approaches to preventative medicine; medical basis of building-related illness; case studies in indoor air quality; strategies for prescription and design of healthy indoor environments.

Environmental Design 643 H(3-0)
(formerly Environmental Design 683.40)

*Field Studies*
Introduction to the architecture, urban landscape, planning issues, design culture and other relevant faculty topics in an international setting. Specific destination and itinerary in any given year are dependent on availability and interest. Through a week long field trip students will learn about the built and natural environment of the selected city and its context.
Prerequisite: Open only to students in Environmental Design degree programs.
Note: Not open to students with credit in Environmental Design 683.40

Environmental Design 651 H(0-8)

*Studio in Environmental Design*
Exploration of design concepts and form making, spatial organizations, visualization, digital design, human factors and sustainability.
Prerequisite: Permission of Instructor.
MAY BE REPEATED FOR CREDIT

Environmental Design 671 H(3-0)

*Urban Design Theory*
Intended to provide students with an introduction to theories, concepts, methods and contemporary issues in urban design. The course consists of lectures, case studies, seminars and a short project.

Environmental Design 675 H(3-0)
(formerly Environmental Design 683.72)

*Urban Systems (Barcelona Studies)*
Provides a general overview of Barcelona's urban history, development and planning traditions. Lectures and field studies give a chronological overview of the city's urban, architectural and design history and the inter-relation to political programs, economic and strategic planning as well as cultural nationalism. From the Barcelona case the course will extract a number of more general issues about contemporary cities for debate.
Prerequisite: Open only to students in Environmental Design degree programs.
Corequisite: Environmental Design 702 (Barcelona only).
Note: Not open to students with credit in Environmental Design 683.72.

Environmental Design 683 H(3-0)

*Advanced Special Topics in Environmental Design*
Thematic inquiry and design related to urban design, architecture, environmental science, industrial design and planning.
Note: Block courses labelled EVDB will be graded on a CR/F basis.
MAY BE REPEATED FOR CREDIT

Environmental Design 697 Q(3-0)

*Advanced Special Topics in Environmental Design*
Thematic inquiry and design related to urban design, architecture, environmental science, industrial design and planning.
Note: Block courses labelled EVDB will be graded on a CR/F basis.
MAY BE REPEATED FOR CREDIT

**Environmental Design 702 F(0-16)**

*Advanced Environmental Design Practice*
Interdisciplinary training in environmental design practice at an advanced level, centred on case studies, information probing and analysis; culminates in a policy planning, design or management assignment and an environmental design presentation on a real world problem.
Prerequisite: Environmental Design 609 or 711 or permission of instructor.
Corequisite: Environmental Design 675 (Barcelona only).
Note: Offered in a single session.
Note: Graded on CR/C/F basis only.

Environmental Design 703 Q(0-3)

*Directed Study in Environmental Design*
Thematic research, readings or design studio project related to urban design, architecture, environmental science, ecological design, history and theory, industrial design or planning.
Prerequisite: Open only to Environmental Design students with consent of the Associate Dean (Academic).
MAY BE REPEATED FOR CREDIT

Environmental Design 705 Q(0-3)

*Directed Study in Environmental Design*
Thematic research, readings or design studio project related to urban design, architecture, environmental science, ecological design, history and theory, industrial design or planning.
Prerequisite: Open only to Environmental Design students with consent of the Associate Dean (Academic).
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

Environmental Design 711 H(0-8)

*Theoretical Basis for Interdisciplinary Intervention and Design*
Comparisons and contrasts among disciplinary, multidisciplinary and interdisciplinary intervention and research. Focus on interdisciplinary teamwork knowledge and skills, on the ability to integrate research into professional real world contexts and on the ability to communicate research results effectively. This course is open only to students registered in a PhD program.

Environmental Design 723 H(0-6)

*Interdisciplinary Intervention in Environmental Design*
Interdisciplinary teams will tackle client-based real world environmental design problems. Intervention strategies and design as a problem-solving approach to complex urban, ecological, social, and technological interactions will be addressed.
MAY BE REPEATED FOR CREDIT

Environmental Design 751 H(0-8)

*Research Design Studio*
Exploration of the research process in a design context and using design as a method of research. Design of innovative research methods appropriate for environmental design research in thematic areas related to urban design, industrial design, ecological design, sustainable design and digital design.
Prerequisite: Permission of instructor.
MAY BE REPEATED FOR CREDIT

Environmental Design 762 F(0-16)

*Advanced Studio in Environmental Design*
Topics vary from year to year, depending on such factors as current issues and contemporary problems. A number of studio topics may be offered to accommodate a variety of interests.
Note: Full course offered in single session only.
MAY BE REPEATED FOR CREDIT

Environmental Design 783 H(0-3)

*Directed Study in Environmental Design*
Thematic research, readings or design studio project related to urban design, architecture, environmental science, ecological design, history and theory, industrial design or planning.
Prerequisite: Open only to Environmental Design degree students with consent of the Associate Dean (Academic).
MAY BE REPEATED FOR CREDIT

Environmental Design 785 H(0-3)

*Directed Study in Environmental Design*
Thematic research, readings or design studio project related to urban design, architecture, environmental science, ecological design, history and theory, industrial design or planning..
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

Environmental Design 793 H(0-8)

*Workshop in Environmental Design*
Instruction and supervised experience in the use of tools and equipment for the development of study models, prototypes and graphic material related to student projects.
Prerequisite: Permission of instructor.

Environmental Design 799 H(3-0)

*Preceptorship*
A Preceptorship is a study and training arrangement made between a student and an employer or an equivalent supervisor which has specific educational objectives, a method of evaluation, and is an integral part of a student's Program of Studies.
Preceptorships offer a number of benefits: acquiring skills and knowledge which may be better obtained outside the University; developing first-hand experience of professional design practice; preparing for more focused studies in the Faculty; and conducting research. An approved preceptorship assignment is equivalent to full-time studies.
Preceptorships are not normally approved until a Program of Study is at least conditionally approved.
MAY BE REPEATED FOR CREDIT

## Environmental Design Architecture (EVDA)

### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

Environmental Design Architecture 511 H(3-1)

*Building Science and Technology I*
Functioning of the building enclosure: demonstration of the behaviour of building elements and their sub-assemblies under differential temperature and pressure stresses; fundamentals of acoustics; nature and use of building materials; response of building materials to climatic cycles radiation, precipitation, heating and cooling.
Note: Credit for both Environmental Design Architecture 511 and Architectural Studies 449 will not be allowed.

Environmental Design Architecture 523 H(3-0)

*History of Architecture and Human Settlements*
A survey history of architecture and human settlement from the prehistoric times until the present. The first course addresses the premodern traditions of the major world cultures. The second course explores the traditions of the Western world from the beginning of the Italian Renaissance until the present. The courses will examine the changes in world view that have altered the course of architecture through the study of selected works of architecture and urbanism.
523.01. History of Architecture and Human Settlements I - Premodern Traditions of the World
523.02. History of Architecture and Human Settlements II - The Western Tradition 1400 to Present
Note: Credit for both Environmental Design Architecture 523 and Architectural Studies 457 will not be allowed.

Environmental Design Architecture 541 H(100 hours)

*Graphics Workshop I*
A skill building course with instruction and supervised experience in basic drafting, sketching and rendering; principles of perspective, drawing and presentation conventions. A variety of instruction may be offered to accommodate the varied level of student development.
Note: Credit for both Environmental Design Architecture 541 and Architectural Studies 451 will not be allowed.

Environmental Design Architecture 543 H(100 hours)

*Graphics Workshop II*
Instruction and supervised experience in drafting, sketching and rendering; drawing and presentation conventions. Builds on Environmental Design Architecture 541. A variety of instruction may be offered to accommodate the varied level of student development.
Note: Credit for both Environmental Design Architecture 543 and Architectural Studies 453 will not be allowed.

Environmental Design Architecture 582 F(0-16)

*Studio II in Architecture*
An introduction to the application of ordering principles of architecture and to the numerous layers that contribute to the quality of inhabitation of place and space through design. Issues explored include the formal, the experiential and the theoretical concerns of architectural design in today's cultural context.
Note: Credit for both Environmental Design Architecture 582 and Architectural Studies 444 will not be allowed.

Note: Full course offered in single session only.

## Graduate Courses

Environmental Design Architecture 611 H(3-1)

*Building Science and Technology II*
Theory and principles of structural, foundation and building service systems. Application of building science principles to building structure and enclosure, examination of the types and manufacture of building elements and the application of building components to specific problems in architecture.

Environmental Design Architecture 613 H(3-0)

*Structures for Architects I*
Advanced structural systems for buildings including: structural connections and composite structures; system characteristics and architectural intent; and case studies in contemporary building structures.

Environmental Design Architecture 615 Q(3-0)

*Environmental Control Systems*
Approaches to the design of heating, cooling, and ventilation systems for buildings. Issues in system design such as energy efficiency and indoor air quality.

Environmental Design Architecture 617 Q(3-0)

*Architectural Lighting Design*
Fundamentals of light and visual perception. Approaches to the design of non-uniform and uniform lighting systems for buildings. Issues in system design such as human satisfaction and performance and energy efficiency. Development of skills in the selection and design of lighting systems.

Environmental Design Architecture 619 H(3-0)

*Structures for Architects II*
Fundamentals of Structural Analysis including: the characteristics and performance of the various components of structures; the terminology and notation necessary for effective teamwork with structural engineering consultants; and basic design calculations for simple structures.

Environmental Design Architecture 621 H(3-0)

*Formal Strategies in Architecture*
The relationship between architectural intention and a syntactic knowledge of architecture. Precedents used as vehicles of investigation to clarify the ways meaning is 'contained' in form. The formal strategies utilized by the architect in the generation of architectural meaning through built form.

Environmental Design Architecture 661 H(3-0)
(formerly Environmental Design Architecture 561)

*Architectural Professional Practice I*
An overview of the structure, organization and changing roles of the design professions through history with emphasis on emerging patterns of practice. The procedures, constraints and opportunities of practice in its legal, ethical and technical dimensions will be analyzed using a case study method.

Environmental Design Architecture 663 H(3-0)

*Architectural Professional Practice II*
The nature of the building industry, stakeholders and many of the participants and their responsibilities. Brings together the theoretical framework of the architect's role in society with the practicality of managing a practice. Project management and office administration, trends, liabilities and systems for project control such as building economics; cost analysis and estimating techniques; and cost controls during design and construction.

Environmental Design Architecture 682 F(0-16)

*Intermediate Architectural Design Studio*
An intermediate design studio in which students work on projects defined by the instructor. Topics may vary from year to year. They are determined by the creative interests of the faculty assigned to the course. Enrolment may be limited.
Note: Full course offered in single session only.
Note: Normally open only to students in Faculty of Environmental Design programs.
MAY BE REPEATED FOR CREDIT

Environmental Design Architecture 703 H(0-3)

*Directed Study in Architecture*
Research and readings in architecture and design related to the Senior Research Studio in Architecture.
MAY BE REPEATED FOR CREDIT

Environmental Design Architecture 782 F(0-16)

*Senior Research Studio in Architecture*
A research design studio in which students collaborate with design faculty in exploring projects that engage contemporary issues defining the built and natural environments. Students choose topics outlined by faculty research expertise, including sustainable design, digital design and fabrication, architecture and the contemporary city, and innovative practice. Studio to be taken with two EVDS half courses complimentary to the studio topic.
Note: Full course offered in single session only.
MAY BE REPEATED FOR CREDIT

# FRENCH, ITALIAN AND SPANISH FISL

### Contact Info

Location: Craigie Hall, Room D318
Faculty number: (403) 220-4001
Fax: (403) 284-3634
E-mail address: fisgrad@ucalgary.ca
Web page URL: http://fis.ucalgary.ca

### 1. Degrees and Specializations Offered

Master of Arts (MA), thesis and course-based routes, in French and Spanish.

Full-time and part-time studies are possible.

Areas: French Language Studies, French Literature from the Medieval to the Contemporary periods, French-Canadian Literature, Francophone Literatures and Film, Hispanic Language Studies and Literatures, Hispanic Cultures and Film, Comparative Literature, Literary Theory, Second Language Learning and Teaching (including computer-assisted language learning)

The Department also participates actively in interdisciplinary degree programs, such as Canadian Comparative Literature (with English) and Film.

## 2. Admission Requirements

### Doctor of Philosophy (PhD)

Applicants wishing to undertake a doctoral program on a special case basis should contact the Department.

### Master of Arts

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires students:

a) To demonstrate a sufficiently high level of oral and written competence in the French or Spanish language
b) To have an adequate academic background in the discipline
c) To submit an example of the applicant's written work: a term paper, research paper or other writing, which the applicant considers representative of his or her best work. The paper must be in either French or Spanish, depending on the language of study.
d) A 250-word (minimum) statement of research interest including research topic and the reasons for wishing to pursue graduate work in this Department
e) Two Reference Letters

## 3. Application Deadline

Deadlines for the submission of complete applications:

Special Case Doctor of Philosophy: 24 January for September admission (when accompanied by an Open Doctoral Scholarship application http://grad.ucalgary.ca//funding/onlineapp)

Master of Arts: 21 February for September admission (when accompanied by an Admission Award

http://fis.ucalgary.ca/graduate/application-information

All programs: 1 March for September admission (with no scholarship application)

Applications received later than the deadline will be considered for departmental funding, but chances of financial support are greatly reduced.

## 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be granted for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

## 5. Program/Course Requirements

### Master of Arts

Note: Normally no more than one half-course of Directed Reading may be taken for credit.

In addition to Faculties of Graduate Studies and Arts, requirements, the Department normally requires:

### Master of Arts (thesis-based)

Six half-course equivalents (including French 605 or Spanish 601, depending on the language of study)

### Master of Arts (course-based)

Ten half-course equivalents (including French 605 or Spanish 601, depending on the language of study)

Applicants lacking the requisite background in language or literature may be admitted as qualifying students. In this case, extra course work is normally required. A qualifying oral examination based on set texts may be required before the students attain regular Master of Arts status. Courses taken as a qualifying student do not normally count as part of the student's course requirements.

## 6. Additional Requirements

### Master of Arts

a) All students must attend an orientation session.
b) Both options have a *knowledge areas requirement* that must be satisfied before or after admission. Upon admission students will be advised of any specific course or other work needed to fulfill this requirement.
c) Before the end of their second year of study, MA Thesis students are required to make a departmental or external presentation relating to their research.
d) Students in the thesis-based and course-based programs are also expected to demonstrate their participation in university-wide research activities by attending at least five departmental or external scholarly presentations every year in their programs. Information on the presentations and a one page critical summary for each one must be submitted with the Annual Progress Report.

## 7. Credit for Undergraduate Courses

### Master of Arts

Only in exceptional circumstances and where appropriate to a student's program may graduate credit be received for courses numbered 500-599. No more than two half-courses can be at the 500 level.

## 8. Time Limit

### Master of Arts

Expected completion time for full-time students is two years for a thesis program and three years for a course-based program. Maximum completion time is four years for a thesis program and six years for a course-based program.

## 9. Supervisory Assignments

### Master of Arts

Newly admitted students begin their programs under the supervision of the departmental Graduate Coordinator. Students are expected to choose a permanent supervisor by the end of the second regular academic session after first registration (30 April for September registrants and 15 December for January registrants). Selection of a supervisor should be by mutual agreement between the student and the staff member concerned, approved by the Graduate Coordinator.

## 10. Required Examinations

### Master of Arts

Comprehensive examination (course-based)
The course-based program requires a comprehensive examination with a written and an oral component, taken after the completion of all course work and any other requirement such as the knowledge areas requirement. Students are required, as early as possible and, in any case, at least before registering for an eleventh semester to file the reading list on their chosen area of specialization with the Department's Graduate Committee. The list should be drafted after consultation with the student's supervisor and approved by that faculty member.

Final oral thesis examinations are open.

### Special Case Doctor of Philosophy (PhD)

Comprehensive Examination
The Comprehensive Examination tests a PhD candidate's knowledge of a field or fields related, but not identical to his/her research. It consists of a take-home written portion and a two-hour oral portion of the examination. This examination is a requirement of the Department of French, Italian and Spanish.

Candidacy Examination
The Candidacy Examination is designed to show the candidate's ability to work in depth with a research question essential to the dissertation research. The Department requires a written portion as well as an oral portion for the Candidacy Examination. Questions on the dissertation proposal will not be included in the oral candidacy examination of special case doctoral degree students.

Final oral thesis examinations are open.

## 11. Research Proposal Requirements

### Master of Arts

Thesis students are required to submit a written thesis proposal fourteen months after initial registration (31 October for September registrants and 21 February for January registrants.) This proposal should be approximately 1000 words in length and be accompanied by an abstract and an appropriately detailed preliminary bibliography. It should be drafted after consultation with the student's supervisor and have his/her preliminary approval. These documents will be circulated to the departmental Graduate Committee for approval. Abstracts of proposals may be reproduced for information purposes.

## 12. Special Registration Information

None.

## 13. Financial Assistance

### Master of Arts

Funding is available to qualified thesis-based students in the form of research and/or teaching assistantships. Students can expect to receive funding for a maximum of 20 months. Students applying for scholarships for the following academic year must submit their applications to the Department by 25 January. All students are strongly encouraged to seek external financial assistance throughout their program. For information on awards, see the Awards and Financial Assistance section of this Calendar.

## 14. Other Information

Master of Arts - Doctor of Philosophy
Prospective students are encouraged to consult either the Head of the Department or the Graduate Coordinator. Detailed information on our programs is also available at http://fis.ucalgary.ca

## 15. Faculty Members/Research Interests

Information about faculty members and their research interests may be found at http://fis.ucalgary.ca/

### French (FREN) Undergraduate Courses

Only in exceptional circumstances and where appropriate to a student's M.A. program may graduate credit be received for courses numbered 500-599.

Dans certaines circonstances exceptionnelles, les cours de niveau 500 pourront être crédités dans le cadre du programme de maîtrise.

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French 511 H(3-0)

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*Théories critiques*
Présentation de certaines théories contemporaines qui ont cours en études littéraires et culturelles. Le format et le contenu peuvent varier d'une année à l'autre.
Préalables: Trois demi-cours de français de niveau 400, ou autorisation du Département.
Remarque: Ce cours est obligatoire pour les étudiants inscrits au programme du baccalauréat spécialisé ("Honours") de français.
MAY BE REPEATED FOR CREDIT

French 539 H(3-0)

*Étude spécialisée du Canada français*
Séminaire sur des sujets avancés dans le domaine de la langue, de la littérature ou de la culture au sens large. Le format et le contenu peuvent varier d'une année à l'autre.
Préalables: Trois demi-cours de français de niveau 400 ou autorisation du Département.
MAY BE REPEATED FOR CREDIT

French 549 H(3-0)

*Étude spécialisée de la francophonie*
Séminaire sur des sujets avancés ayant trait à la langue, aux littératures ou aux diverses cultures de la francophonie. Le format et le contenu peuvent varier d'une année à l'autre.
Préalables: Trois demi-cours de français de niveau 400 ou autorisation du Département.
MAY BE REPEATED FOR CREDIT

French 557 H(3-0)

*Littérature et culture françaises du 17e siècle*
Étude de textes choisis du "Grand siècle". Le format et le contenu peuvent varier d'une année à l'autre.
Préalables: Trois demi-cours de français de niveau 400 ou autorisation du Département.
MAY BE REPEATED FOR CREDIT

French 559 H(3-0)

*Littérature et culture françaises du 18e siècle*
Étude de textes choisis du Siècle des Lumières en France. Le format et le contenu peuvent varier d'une année à l'autre.
Préalables: Trois demi-cours de français de niveau 400 ou autorisation du Département.
MAY BE REPEATED FOR CREDIT

French 599 H(3-0)

*Études spécialisées de la langue, de la littérature ou de la culture*
Séminaire sur des questions d'actualité ayant trait à la langue, à la littérature ou à la culture au sens large. Exemples de sujets traités: la littérature française du Moyen-Age, l'autobiographie, l'écriture des femmes de langue française, le créole dans les écrits de langue française, etc.
Préalables: Trois demi-cours de français de niveau 400, ou autorisation du Département.
MAY BE REPEATED FOR CREDIT

Graduate Courses

Details of the specific topics to be taught in all 600-level courses in French will be announced in the Departmental Graduate Program Web page and, when possible, in the Master Timetable.
All the following graduate courses may be repeated for credit:
Dans des cas considérés comme exceptionnels, le Département accordera des crédits au niveau du 2e cycle pour des cours de niveau 500. L'autorisation du Département sera alors indispensable.
The Department will give graduate credit at the MA level for 500 level courses in cases it deems exceptional. This option is subject to the approval of the Department.

French 605 H(3-0)

*Problématiques littéraires et culturelles*
MAY BE REPEATED FOR CREDIT

French 611 H(3-0)

*Langue française*
MAY BE REPEATED FOR CREDIT

French 615 H(3-0)

*Images, textes, performance*
MAY BE REPEATED FOR CREDIT

French 625 H(3-0)

*Études cinématographiques*
MAY BE REPEATED FOR CREDIT

French 635 H(3-0)

*Le texte narratif*
MAY BE REPEATED FOR CREDIT

French 641 H(3-0)

*Littérature et culture avant 1800*
MAY BE REPEATED FOR CREDIT

French 645 H(3-0)

*La Modernité*
MAY BE REPEATED FOR CREDIT

French 655 H(3-0)

*Francophonies*
MAY BE REPEATED FOR CREDIT

French 665 H(3-0)

*Études postcoloniales*
MAY BE REPEATED FOR CREDIT

French 675 H(3-0)

*Féminismes et Gender*
MAY BE REPEATED FOR CREDIT

French 685 H(3-0)

*Voix québécoises et canadiennes*
MAY BE REPEATED FOR CREDIT

French 691 H(3-0)

*Autour d'un auteur*
MAY BE REPEATED FOR CREDIT

French 695 H(3-0)

*Profession et recherche*
MAY BE REPEATED FOR CREDIT

French 699 H(3-0)

*Thèmes spéciaux*
MAY BE REPEATED FOR CREDIT

## Spanish (SPAN) - Undergraduate Courses

Only in exceptional circumstances and where appropriate to a student's M.A. program may graduate credit be received for courses numbered 500-599.

Spanish 533 H(3-0)

*Uses of Spanish as a Second Language*
Introduction to basic issues related to the teaching of Spanish as a second language. In special circumstances the theoretical component may be taught in English. The practical component may vary from year to year.
Prerequisites: Spanish 405, 407, 421 and 423 or consent of the Department.

Spanish 553 H(3-0)
(formerly Spanish 433)

*Spanish American Literature to 1900*
A survey of Spanish American literatures in its cultural and historical context. Includes the study of indigenous voices, literature of the conquest, as well as the colonial period and the major authors of the nineteenth century. Format and content of course may vary from year to year.
Prerequisites: Spanish 405, 407, 421 and 423 or consent of the Department

Spanish 555 H(3-0)

*Spanish American Literature after 1900*
Study of the major movements and authors of the twentieth century. Format and content of course may vary from year to year.
Prerequisites: Spanish 405, 407, 421 and 423 or consent of the Department.

Spanish 557 H(3-0)

*Current Trends in Hispanic Studies*
In-depth study of literary and cultural issues which could include marginalization, identity, nationalism, the emergence of silenced voices, or other new developments. Format and content of course may vary from year to year.
Prerequisites: Spanish 405, 407, 421 and 423 or consent of the Department.

Spanish 565 H(3-0)

*Medieval and Golden Age Literature*
Representative works of literature in the Spanish language from the 10th to the 17th centuries. Format and content of course may vary from year to year.
Prerequisites: Spanish 405, 407, 421 and 423 or consent of the Department.

Spanish 571 H(3-0)

*Art and Literature*
Study of the interrelations of the visual arts and literature, using as its reference Hispanic literary texts and works of art. Format and content of course may vary from year to year.
Prerequisites: Spanish 405, 407, 421 and 423 or consent of the Department.

Spanish 573 H(3-2)

*Critical Analysis of Hispanic Cinemas*
In-depth study of Hispanic Cinemas, including genres, movements, histories, industrial mechanisms of distribution, and cultural reception, in consolidated, developing and emerging film industries. Content can be organized based on region (Chicano/a, Mexican, Spanish cinema, etc); topic (identity, trans nationalism, women's cinema, etc); genre (road movie, documentary, border cinema, auteur cinema, etc); filmmakers and/or by identifiable traditions (cine de la movida, Nuevo cine latinomericano, New cinemas, etc.). Use of contemporary theories and study of cinematographic techniques.
Prerequisites: Spanish 405, 407, 421 and 423 or consent of the Department.

Spanish 581 H(3-0)
(formerly Spanish 481)

*Spanish Literature and Culture from the 18th Century to the Spanish Civil War*
Survey of major works and cultural movements from the 18th century to the early 20th century. Focus on reading and analytical skills. Format and content of the course may vary from year to year.
Prerequisites: Spanish 405, 407, 421 and 423 or consent of the Department.

Spanish 583 H(3-0)

*Spanish Literature and Culture from the Spanish Civil War to the Present*
Interdisciplinary course stressing the relationship between various cultural manifestations and their sociopolitical background. Format and content of course may vary from year to year.
Prerequisites: Spanish 405, 407, 421 and 423 or consent of the Department.

Spanish 593 H(3-0)

*Literary Theory*
An introduction to modern literary theory and its various schools of thought, with application to works of Hispanic literature.
Prerequisites: Spanish 405, 407, 421 and 423 or consent of the Department.
Note: This course is mandatory for students registered in the Spanish Honours Program.
MAY BE REPEATED FOR CREDIT

Spanish 599 H(3-0)

*Advanced Topics in Hispanic Studies*
A specialized course for advanced students. Course may function as a seminar or as a directed readings course.
Prerequisites: Spanish 405, 407, 421 and 423 or consent of the Department.
MAY BE REPEATED FOR CREDIT

### Graduate Courses

Details of the specific topics to be taught in all 600-level courses in Spanish will be announced in the Departmental Graduate Program Web page and, when possible, in the Master Timetable.

**All the following graduate courses may be repeated for credit**. It should be noted that the Department offers only a selection of its Graduate Courses in a given year. Please confer with the Graduate Coordinator and/or visit our website at http://fis.ucalgary.ca/courses to obtain a list of the current offerings.

Spanish 601 H(3-0)

*Literary and Cultural Theory*
MAY BE REPEATED FOR CREDIT

Spanish 613 H(3-0)

*Critical Analysis of Medieval Texts*
MAY BE REPEATED FOR CREDIT

Spanish 615 H(3-0)

*Golden Age Literature*
MAY BE REPEATED FOR CREDIT

Spanish 617 H(3-0)

*Theatre and Performance in the 19th or 20th Centuries*
MAY BE REPEATED FOR CREDIT

Spanish 619 H(3-0)

*Post-Franco Literature, Art and Film*
MAY BE REPEATED FOR CREDIT

Spanish 621 H(3-0)

*Art, Film and Literature in the Spanish Avant-Garde*
MAY BE REPEATED FOR CREDIT

Spanish 623 H(3-0)

*Spanish American Literature and Culture to 1900*
MAY BE REPEATED FOR CREDIT

Spanish 625 H(3-0)

*20th Century Spanish American Literature*
MAY BE REPEATED FOR CREDIT

Spanish 627 H(3-0)

*Avant-Garde Movements in Spanish America*
MAY BE REPEATED FOR CREDIT

Spanish 631 H(3-0)

*Popular Culture*
MAY BE REPEATED FOR CREDIT

Spanish 633 H(3-0)

*Writings in Exile*
MAY BE REPEATED FOR CREDIT

Spanish 635 H(3-0)

*Literature and the Visual Arts in Hispanic Culture*
MAY BE REPEATED FOR CREDIT

Spanish 637 H(3-0)

*Identities and Post-Colonial Voices*
MAY BE REPEATED FOR CREDIT

Spanish 639 H(3-0)

*Hispanic Female Voices*
MAY BE REPEATED FOR CREDIT

Spanish 641 H(3-0)

*Hispanic Cinema*
MAY BE REPEATED FOR CREDIT

Spanish 643 H(3-0)

*Special Topics in Hispanic Culture, Language or Literature*
MAY BE REPEATED FOR CREDIT

## GEOGRAPHY GEOG

### Contact Info

Location: Earth Sciences Building, Room 356
Department number: (403) 220-5584
Fax: (403) 282-6561
E-mail address: geograd@ucalgary.ca
Web page URL: http://geog.ucalgary.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), thesis-based
Master of Science (MSc), thesis-based
Master of Geographic Information Systems (MGIS), course-based with research component

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department of Geography requires all MA/MSc and PhD applicants to submit:

a) A proposal describing applicant's intended research area
b) A current curriculum vitae or résumé
c) Two Reference Letters

For MGIS applicants the Department requires:

a) A statement of interest outlining the applicant's goals, motivation for applying to the program, and research area of interest
b) A current curriculum vitae or résumé
c) Two Reference Letters

For the academic background requirements for the MGIS program, the Department will accept a four-year BA or BSc degree in Geography or in any related field that makes use of spatial data. Examples include, but are not limited to: Anthropology, Archaeology, Biological Sciences, Computer Science, Ecology, Environmental Science, Geology/ Geophysics, Geomatics Engineering, History, Management, Mathematics, Political Science, Psychology, Tourism, Transportation Studies or Engineering, and Urban Studies.

### 3. Application Deadline

Deadlines for submission of complete applications:

#### For thesis programs

15 January for September admission
15 August for January admission

#### For MGIS applicants

30 April

Files are reviewed on an ongoing basis. Applications may be accepted after the above deadline if the student has confirmed faculty supervision.

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires the following:

#### Master of Geographic Information Systems

Ten half-courses, eight at the 600 level or higher, must be completed while in the program. These will include:

a) Three core courses in Geographic Information Sciences in the areas of Remote Sensing, Spatial Analysis and Geographic Information Systems: Geography 633 Research and Applications in

Remote Sensing

Geography 639 Advanced Spatial Analysis and Modeling

Geography 647 Advanced Research and Applications in Geographic Information Systems

Each course assumes that the student has two undergraduate courses in the areas of Remote Sensing, analytical methods in Geography (or inferential statistics) and Geographic Information Systems, respectively.

b) Two research-based courses related to the area of Geographic Information Science:

Geography 681 GIS Project: Theoretical Issues

Geography 683 GIS Project: Application

These courses will be on a topic mutually agreed upon between the student and the supervisor. The first course will be concerned with gathering information and literature on the research topic and will provide a critical assessment of this literature. This will be written up as a course paper that will equate to the literature review chapter of a traditional thesis. The second research course will be concerned with carrying out a program of analysis in the chosen research area using the Geographic Information Science tools discussed in the core courses. The final paper produced for this course will equate to the analysis and discussion chapters of a traditional thesis.

c) Five additional half-courses chosen by mutual agreement between the student and the supervisor. These courses will support the student's chosen research project and understanding of the Geographic Information Sciences.

The MGIS program may be completed on a full-time or a part-time basis.

### Master of Arts, Master of Science

Requirements for the MA and MSc degrees:

a) Four half-course equivalents in a two-year period, including History and Philosophy of Physical or Human Geography, at least one of the core Geography Graduate Seminars, and at least one Methods course.

b) An approved thesis proposal completed within the first year of the program.

For detailed information on courses and program requirements please refer to:
http://www.geog.ucalgary.ca/

Full time status is expected. In some situations thesis programs may be completed on a part-time basis with approval from the Graduate Coordinator.

### Doctor of Philosophy

Requirements for the PhD degree:

a) Two half-course equivalents during the first two years in program, including at least one of the core Geography Graduate Seminars.

b) An approved thesis proposal completed within the first 18 months of the program.

c) A candidacy exam completed within the first 24 months of the program.

For detailed information on courses and program requirements please refer to:
http://www.geog.ucalgary.ca/

Full time status is expected. In some situations thesis programs may be completed on a part-time basis with approval from the Graduate Coordinator.

## 6. Additional Requirements

*For thesis programs:* participation in the graduate research seminar series and the annual Department Conference (oral presentation)

*For MGIS students:* Participation in the annual Department conference (oral presentation and/or display of an Academic poster of their project work)

Departures from regular departmental program/ course requirements may be recommended by the supervisor and must be approved by the Graduate Coordinator.

## 7. Credit for Undergraduate Courses

No more than one-half of a regular thesis graduate student's coursework can be at the undergraduate level. Programs requiring a larger ratio of undergraduate courses must receive approval of the Dean of Graduate Studies at the time of admission. MGIS students are allowed a maximum of one full-course credit at the 500-level.

## 8. Time Limit

Expected completion time is two years in MA/MSc programs and four years in the PhD program. Maximum completion time is four years for MA/MSc programs and six years for the PhD program. For the MGIS Program, minimum completion time is one year and maximum completion time is six years.

## 9. Supervisory Assignments

Each graduate student has a supervisor appointed within the first term in program. For PhD students, a supervisory committee should be appointed within three months of the appointment of supervisor.

## 10. Required Examinations

MGIS oral comprehensive examinations will be based on project and course work. MGIS students will be examined on their comprehensive understanding of course material and their integrated professional knowledge/conception of geographic information science. The examination committee will consist of at least three examiners, including the graduate student advisor, but with no requirement for an external examiner.

PhD candidacy examinations have a written and an oral component. Questions on the research proposal will not be included in the oral candidacy examination. Final thesis oral examinations are open.

## 11. Research Proposal Requirements

See Program/Course Requirements.

## 12. Special Registration Information

None

## 13. Financial Assistance

Department funding is available to highly ranked thesis students. Scholarships and external awards may be available to qualified thesis students. For information on awards, check the Graduate Awards Database: http://www.grad.ucalgary.ca//funding.

Unless otherwise stated, awards are made only to full-time students in thesis programs.

## 14. Other Information

None.

## 15. Faculty Members/Research Interests

Faculty members and their research interests can be found at http://www.geog.ucalgary.ca/

## Graduate Courses

**Geography 603** H(3-3)

*Remote Sensing: Basics and Beyond*
Introduction to the theory and practice of remote sensing. Topics include physics of remote sensing, sensor systems, resolutions, geometric and radiometric correction, image analysis (enhancements, filtering, texture analysis, principal components, classification approaches and algorithms and accuracy). May include specific image acquisition systems and their methodological requirements. Emphasis is on fundamental concepts. Laboratory provides experience with fundamental image processing techniques.
Prerequisite: Consent of the Department.

**Geography 605** H(3-3)

*Statistical Analysis: Basics and Beyond*
Introduction to applied statistics, particularly as they are used in geographical analysis. Topics include sampling design, summary statistics, probability theory, inferential statistics, and multivariate analysis. Laboratory exercises give students hands-on experience in computer-based statistical analysis.
Prerequisite: Consent of the Department.

**Geography 607** H(3-3)

***Geographic Information Systems: Basics and Beyond***
Introduction to the world of Geographic Information Systems (GIS). Includes: representing reality in the digital realm, georeferencing, data structures, software history and comparison, and the full spectrum of analytical approaches associated with advanced GIS software. A major part of the work will be hands on. Software is used as a vehicle for taking the theory and concepts into a working reality.
Prerequisite: Consent of the Department.

**Geography 619** H(3-2)

*Spatial Ecology*
Applies the principles of landscape ecology and conservation biology to the study of spatial effects on individual species and on the structure, dynamics, diversity and stability of multi-species communities. The use of GIS and remote sensing technologies is a central theme. Topics include habitat fragmentation, metapopulation analysis and viability, wildlife habitat modelling (static and dynamic), management of endangered species, and spatial decision support. Other aspects of this course include the importance and use of indicator, umbrella, keystone and flagship species in conservation.
Prerequisite: Consent of the Department.
Note: Not open to students with credit in Geography 695.11.

**Geography 633** H(3-3)

*Research and Applications in Remote Sensing*
Review of basic and advanced principles of image analysis; advanced laboratory techniques. Integration of remote sensing with GIS; current research in remote sensing. Project organization; data sources for remote sensing.
Prerequisite: Consent of the Department.

Geography 635 H(3-3)

***Active Microwave Remote Sensing***
Theoretical and applied aspects of active microwave remote sensing for geophysical parameter estimation. Discussion of sensor configuration, dielectric mixture modelling, microwave-surface interactions, microwave scattering (surface and volume) modelling and polarimetry. Laboratory work includes field scatterometer use, computer modelling, and polarimetric analysis.
Prerequisite: Consent of the Department.

Geography 639 H(3-3)

*Advanced Spatial Analysis and Modelling*
History of spatial modelling in geography; comprehensive coverages of techniques, spatial analysis and spatial modelling as currently used within GIS and remote sensing.
Prerequisite: Consent of the Department.

Geography 647 H(3-3)

*Advanced Research and Applications in Geographic Information Systems*
Focus on advanced GIS applications in core areas; methodological developments in GIS, and current research directions in GIS.
Prerequisite: Consent of the Department.

Geography 649 H(3-3)

*Enterprise GIS and Database Management Systems*
Advanced topics in GIS and database systems, including integration of enterprise database systems with a GIS, data modelling, database management, distributed GIS via the world wide web, and web-based GIS.
Prerequisite: Geography 647 or consent of the Department.

Geography 667 H(3-3)

*Advanced GIS Programming with ArcObjects*
Advanced programming techniques in ArcGIS using the ArcObjects framework. Topics include customizing the user interface, COM and interface-based programming techniques, and creating macros to perform advanced tasks in ArcGIS. A significant portion of evaluation will be based on an independent term project. Completion of a pre-study package is required.
Prerequisite: Consent of the Department.

Geography 681 H(3-0)

*Geographic Information Systems Project: Theoretical Issues*
A critical and comprehensive review of information and literature on a GIS research topic This course provides the conceptual basis for Geography 683.
Prerequisites: Geography 633, 639 and 647; and consent of the Department.

Geography 683 H(3-0)

*Geographic Information Systems Project: Application*
Implementation of a project on a GIS topic which will involve demonstrating mastery of GIS project design and the implementation and presentation of results commensurate with graduate level work. This topic will relate to material covered by the student in Geography 681.
Prerequisite: Geography 681 and consent of the Department.

Geography 685 H(3-0)

*Arctic System Science*
This course investigates the process linkages at various spatiotemporal scales between the atmosphere, lithosphere and hydrosphere operating within high latitude environments of the Northern Hemisphere. Of particular interest is the response of the terrestrial and marine cryosphere to climate variability and change, including methods for its detection and quantification.
Prerequisite: Consent of the Department.

Geography 687 H(3-3)

*Advanced Glacial Geomorphic Systems*
Contemporary topics in glacial geomorphology and sedimentology. Course consists of lecture, seminar and field trip components.
Prerequisite: Consent of the Department.
Note: Co-scheduled with Geog 507.

Geography 689 H(3-3)

*Advanced Topics in Geocryology*
Contemporary topics in the science and engineering of seasonally and perennially frozen ground. Course consists of lectures and seminars.
Prerequisite: Consent of the Department.
Note: Co-scheduled with Geog 509.

Geography 691 H(3S-3)

*Advanced Fluvial Geomorphology*
Advanced theory and research issues in fluvial geomorphology. Topics may include flow hydraulics, sediment transport, river morphology, channel networks, sediment routing, drainage basin evolution, and channel response to environmental change.
Prerequisite: Consent of the Department.
Note: Co-scheduled with Geography 411.

Geography 695 H(3-0)

*Seminar in Geographic Research Methods*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Geography 697 H(3-0)

*Seminar in the Philosophy and Nature of Human Geography*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Geography 699 H(3-0)

*Seminar in the Philosophy and Nature of Physical Geography*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT
A list of specific subtitles for the 700-level courses listed below is available in the Department.

Geography 795 H(3-0)

*Selected Topics in Geographic Research Methods*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Geography 797 H(3-0)

*Selected Topics in Human Geography*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Geography 799 H(3-0)

*Selected Topics in Physical Geography*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

## GEOSCIENCE GLGP

### Contact Info

Location: Earth Sciences Building, Room 118
Department number: (403) 220-3254
Fax: (403) 284-0074
E-mail address: geosciencegrad@ucalgary.ca
Web page URL: http://www.ucalgary.ca/geoscience

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based or course-based

The course-based Master of Science degree may be taken on a full-time or a part-time basis.

The Master of Science degree is also offered with specialization in Reservoir Characterization (Interdisciplinary). For further information on this specialization, see the separate listing in this Calendar.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Science requirements, the Department requires:

#### Master of Science

a) Normally, a four-year Bachelor of Science degree or equivalent. An Honours degree in geology or geophysics, or a field related to geophysics, such as physics or mathematics, is preferred.
b) A concise statement outlining the applicant's research interests and reasons for wishing to attend the University of Calgary
c) For those students required to provide proof of proficiency in English, a minimum TOEFL score of 580 (written test), 92 (internet-based test), a MELAB score of 82, an IELTS score of 7.5, or a PTE score of 64
d) Two Reference Letters

#### Doctor of Philosophy

a) Normally, a Master of Science degree or equivalent in geology or geophysics or a field related to geophysics, such as physics or mathematics
b) A concise statement outlining the applicant's research interests and reasons for wishing to attend the University of Calgary
c) For those students required to provide proof of proficiency in English, a minimum TOEFL score of 580 (written test), 92 (internet-based test), a MELAB score of 82, an IELTS score of 7.5, or a PTE score of 64
d) Two Reference Letters

### 3. Application Deadline

Deadlines for complete applications:
1 February for September admission
January admission is considered on a case-by-case basis and applications must be received by 1 September.

### 4. Advanced Credit

Students must apply for advanced credit at the time of admission. Some graduate level courses taken as an unclassified student or as a student transferring from another university may be counted for credit, subject to departmental approval.

Credit for relevant courses taken during the Master of Science program may result in the reduction of the required four-course minimum for doctoral students. Credit may be granted for a maximum of three half-courses for students with Master of Science degrees from the Department of Geoscience at the University

of Calgary, and two for students with Master of Science degrees from elsewhere. Advanced credit is not guaranteed and will be determined by the Graduate Coordinator or Department Head with consideration of the recommendation of the Interim Advisor/Supervisor.

Courses taken in order to gain entry into the program or to make up for deficiencies in background or GPA will not be considered for advanced credit.

## 5. Program/Course Requirements

In addition to the Faculties of Graduate Studies and Science requirements, the Department requires:

### Master of Science (course-based)

a) Nine half-courses, five of which must be at the 600 level or higher (includes GLGY 701 or GOPH 701 research project)
b) Completion of a Research Project (GLGY 701 or GOPH 701). The student is required to present and defend the project in a one-hour defense once the written research report is in near-final form. The supervisor and two other members of the department assess the project. If a company is involved the company supervisor may also assess the project.
c) Completion of at least six half-courses in the first year of study by full-time students, and at least one half-course in the first academic session by part-time students. Following is a list of required courses for the two concentration areas that are offered.

### Geology Course-based Concentration

a) Geology 707
b) At least seven additional geology or geophysics courses at the 500 or 600 level. At a minimum, three must be at 600-level. Up to four appropriate courses from another department may be substituted for a 500-level geology or geophysics course subject to program approval. Course-based students may receive credit for both GLGY 703 and GLGY 701. Courses are selected in consultation with the supervisor and with the approval of the graduate coordinator.
c) Geology 701. This course constitutes the research component of the degree and cannot be submitted and defended until after all other courses are completed.
d) Students with deficiencies may be required to take more than nine half-courses upon the advice of their supervisor.

### Geophysics Course-based Concentration

*a)* Four of the following: Geology 707, Geophysics 547, Geophysics 551, Geophysics 557, Geophysics 657, Geophysics 659.
*b)* At least four other GOPH courses at the 500, 600 or 700 level. At least 4 of the eight required courses must be at the 600 or 700 level. One or two appropriate courses from another department may be substituted for a 500-level geology or geophysics course subject to program approval. Course-based students may receive credit for both GOPH 703 and GOPH 701. Courses are selected in consultation with the supervisor and with the approval of the graduate coordinator.
c) Geophysics 701. This course constitutes the research component of the degree and cannot be submitted and defended until after all other courses are completed.
d) Students with deficiencies may be required to take more than nine half-courses upon advice of their supervisor.

### Master of Science (thesis-based)

a) Completion of a minimum of four half-courses in the first year of program
b) Students with deficiencies may be required to take more than four half-courses upon advice of their supervisor
c) An oral public presentation of thesis results

### Doctor of Philosophy

a) Completion of four half-courses in the first year of program
b) Subject to supervisor and graduate coordinator approval, some credit may be granted for courses taken during a Master's program, to reduce the course requirement
c) Students with deficiencies may be required to take more than four half-courses upon advice of their supervisor
d) Students with a Bachelor of Science degree, but no Master's degree, to complete a minimum of five half-courses, with four in the first year of program
e) Students in Geology to take Geology 707 during the first academic year in program
f) That all students take either Geology or Geophysics 701 or 703
g) An oral public presentation of thesis results.

## 6. Additional Requirements

### Master of Science (course-based)

Full-time students are normally expected to provide their own financial support and pay tuition and fees as outlined in the graduate student calendar since the department does not offer financial support to course-based Master of Science students.

Normally, part-time students will be working in the field of Geology and/or Geophysics, and the company supervisor can agree to work with the supervisor in the Department to supervise the student's research project, and to evaluate the research project.

## 7. Credit for Undergraduate Courses

The Department does not give graduate credit for courses taken below the 500-level.

## 8. Time Limit

Expected completion time is two years for students in thesis-based Master's degree programs, two years for full-time students in a course-based Master's program, and three or four years for doctoral students. Maximum completion time is four years for students in a thesis-based Master's program, and six years for students in a course-based Master's program and doctoral students.

## 9. Supervisory Assignments

Upon admission, a student is assigned an interim supervisor by the Graduate Coordinator. The interim supervisor is chosen from the research field the student has specified. Usually the interim supervisor becomes the permanent supervisor, but the Graduate Coordinator must approve the final selection before the thesis proposal is submitted. Supervisory committees for doctoral students are selected by consultation between the permanent supervisor and the student.

## 10. Required Examinations

Final thesis oral examinations are open with a public presentation on the same day.

Questions on the research proposal may be included in the oral candidacy examination. Students should contact their department for further details.

## 11. Research Proposal Requirements

Master of Science thesis-based students must file a thesis proposal by 15 March of the second session of study for September registrants and 1 July for January registrants. The thesis proposal must not be more than five pages of text long and include an abstract and a list of references cited in the text. The supervisor will assess the proposal in detail.

Ph.D. thesis students will submit a more substantial thesis proprosal within 18 months of registration.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this calendar. Students applying for scholarships must submit their applications to the Department by 1 February.
No financial support will be given to students enrolled in the course-based Master's program.

## 14. Other Information

The department requires all graduate students to file a comprehensive Annual Report. The report is due by December 15 and covers activities for the current calendar year. Recent September registrants are required to report activities for their first term of study only.

No office space will be provided to students enrolled in the course-based Master's program.

Detailed information about the graduate program can be found at departmental web site.

## 15. Faculty Members/Research Interests

The current faculty research interests can be found at http://www.geoscience.ucalgary.ca/faculty_directory2

## Geology (GLGY)

### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

**Geology 503** H(3-3)

*Aqueous Geochemistry*
Theoretical and applied aspects of aqueous solution chemistry. Topics include: methods for collection and preservation of water samples in the field, laboratory analysis of waters, theory and application of aqueous thermochemical models.
Prerequisite: Geology 323 or 329 or 429.
Note: A weekend field excursion will be run in September.

**Geology 505** H(3-3)

*Contaminant Hydrogeology*
Chemical and biological processes in surface water and groundwater systems. Topics include: water quality, contaminant transport and dispersal, fluid-sediment interactions, remediation of contamination. Techniques will include the use of thermochemical models, numerical modelling of contaminant migration, and examination of case studies.
Prerequisites: Geology 403 or 503, Geology 401 or 501 or 601.

**Geology 523** H(3-3)

*Advanced Mineralogy*
Crystal chemistry of important mineral groups. Relations between structure, property, and

composition. Common structure types and their use in understanding complex minerals. Elements of symmetry, space groups, X-ray diffraction techniques, and introduction to crystal structure determination and refinement using experimental data sets and extensive use of computers. Emphasis is on the interpretation and application of results to solving problems in Earth Sciences.
Prerequisites: Geology 423.

Geology 527 H(3-1T-3)

*Ore Deposits*
Processes of formation of metallic ore and diamond ore deposits. Classification of ores based on petrologic association. Introduction to ore microscopy.
Prerequisite: Geology 433 or 443.
Note: Normally offered in even-odd dated academic years. However, this course may be offered in any year in which sufficient interest is indicated to the Department prior to November 1 of the preceding academic year.
Note: A weekend field trip will be run in September.

Geology 531 H(3-1T-3)

*Advanced Igneous Petrology*
Mineralogical and chemical classifications of igneous rocks. Physics and chemistry of igneous rock formation. Laboratory includes hand specimen and microscopic petrology.
Prerequisites: Geology 341, 323 or 329 or 429, 433 or 443.

Geology 533 H(3-1T-3)

*Metamorphism and Lithosphere Evolution*
Application of metamorphic petrology to pure and applied problems in Earth science, especially lithosphere evolution. Integration of metamorphic petrology with structure, geochronology and tectonics. Interpretation of mineral assemblages; pressures and temperatures of formation of metamorphic rocks; rates and controls of metamorphic processes. Laboratory will consist of petrographic studies of rock suites, instrumental analysis (electron probe, XRD), and elementary use of phase equilibrium software packages.
Prerequisites: Geology 323 or 329 or 429, 433 or 443.
Note: Normally offered in odd-even dated academic years. However, this course may be offered in any year in which sufficient interest is indicated to the Department prior to November 1 of the preceding academic year.

Geology 537 H(160 hours)

*Field Methods III*
Field study of geological problems using advanced methods. Field exercises will normally be conducted away from Calgary for about 10-12 days preceding the Fall Session or following the Winter Session.
Prerequisites: Geology 435 or 439, 433 or 443, 461. A minimum grade of B is required in Geology 435 or 439.
Note: This course occurs in rugged field conditions and varying weather, for which participants must be prepared and equipped. It may occur outside Canada. Students will be required to cover food and accommodation costs and to pay a surcharge to cover the costs of equipment and other resources.

Geology 541 H(3-1T-3)

*Advanced Structural Geology*
Structural features of complexly folded strata; simple statistical analysis of data; structural analysis in plutonic and metamorphic rocks; applications to exploration and exploitation.
Prerequisites: Geology 341 and completion of at least 15 full-course equivalents.
Note: Credit for both Geology 541 and 641 will not be allowed.
Note: There is a weekend field excursion during the session.

Geology 543 H(3-3)

*Advanced Igneous and Metamorphic Petrology*
Advanced study of igneous and metamorphic petrology, and application to problems in earth science. Includes use of microscopy and geochemistry, as well as possible application of instrumental methods.
Prerequisites: Geology 433 or 443.

Geology 555 H(3-3)

*Global Geology*
Global aspects of plate tectonics and regional geology through time. Application of fundamental stratigraphic and structural principles. Contributions of geophysics, geochemistry, experimental and theoretical petrology to the modern plate tectonic model. Analysis and interpretation of major structural provinces as they relate to plate boundary interactions.
Prerequisite: Geology 443 or Geophysics 457.

Geology 561 H(3-3)

*Sequence Stratigraphy*
Integrated approach to the study of genetic stratigraphic sequences and their bounding surfaces, linked to facies analysis of clastic and carbonate successions.Principles of sequence stratigraphy and applications to petroleum reservoirs.
Prerequisites: Geology 435 or 439 or 441, 461.

Geology 563 H(3-3)

*Geological History of the Western Canadian Sedimentary Basin*
Stratigraphic assembly, tectonic evolution and resources of the WCSB within the Precambrian crystalline basement to the Jurassic-Paleogene Foreland Basin succession in the subsurface and exposures in the Rocky Mountains.
Prerequisite: Geology 443 and 461; or Geophysics 457.

Geology 571 H(3-1T-3)

*Engineering Geology*
Application of geology to engineering problems with emphasis on the geologic aspects of site and environmental investigations. Characterization of rock masses and surficial deposits and examination of their behaviour; special mapping methods, air photo interpretation and the application of some geophysical techniques.
Prerequisites: Geology 341 and Geophysics 355.
Note: Completion of Geology 401 is highly recommended prior to taking this course. Students who have not completed Geology 401 are advised to attend the tutorial session of Geology 571, offered during January block week.

Geology 585 Q(3-3)

*Biostratigraphy*
Principles of applied biostratigraphy for siliceous and calcareous microfossils and conodonts with emphasis on their use in basin analysis, sequence stratigraphy, and economic resource exploration.
Prerequisite: Geology 391 or 491.
Note: Credit for both Geology 585 and 685 will not be allowed.

Geology 589 E(3-3)

*Selected Topics in Petroleum Geology I*
589.01. Aqueous Fluids
589.02. Petroleum Fluids
589.06. Professional Practice for Geoscientists
589.07. Analytical Techniques for Petroleum Geochemistry
589.08. Petroleum Generation and Migration
Prerequisites: Geology 449 or Geophysics 449, Geology 461 or Geophysics 457.
Note: Credit for both Geology 589 and 689 will not be allowed.

Geology 593 Q(3-3)

*Selected Topics in Petroleum Geology II*
593.02. Stratigraphy and Sedimentation of Clastic Rocks
593.03. Stratigraphy and Sedimentation of Carbonate Rocks
593.05. Ichnology
593.06. Professional Practice for Geoscientists.
Prerequisites: Geology 449 or Geophysics 449, Geology 461 or Geophysics 457.
Note: Credit for both Geology 593 and 693 will not be allowed.

Geology 595 H(3-3)

*Selected Topics in Petroleum Geology III*
595.01. Petroleum Geology III Core Examination
595.03. Reservoir Evaluation and Hydrocarbon Play Assessment
595.05. Basin Analysis
Prerequisites: Geology 449 or Geophysics 449, Geology 461 or Geophysics 457.
Note: students who have taken Geology 561 should take Geology 694.01, not 595.01.
Note: Credit for both Geology 595 and 694 will not be allowed.

Geology 596 F(3-3)

*Selected Topics in Petroleum Geology IV*
Courses are offered in specific topics related to Petroleum Geology. Topics may include subsurface mapping, play assessment, reservoir characterization, reservoir geology, reserves and resources, basin analysis, petroleum geochemistry.
Prerequisites: Geology 449 or Geophysics 449, Geology 461 or Geophysics 457.
Note: Credit for both Geology 596 and 696 will not be allowed.
MAY BE REPEATED FOR CREDIT

Geology 597 H(3-3)

*Geostatistics*
Statistical analysis of spatial data, multivariate data analysis, regression, variogram analysis, kriging, co-kriging and stochastic simulation.
Prerequisites: Mathematics 253 or 263 or 283 or Applied Mathematics 219; Mathematics 221 or 211; completion of at least 15 full-course equivalents or consent of the Department.
Note: Credit for both Geology 597 and 697 will not be allowed.

Geology 599 H(3-3)

*Contemporary Topics in Geology*
Courses are offered in contemporary topics in areas such as geochemistry, hydrogeology, mineralogy, paleontology, petroleum geology, petrology, quantitative geology, sedimentology, structural geology, and surficial geology.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

## Graduate Courses

Graduate students are urged to read the Geoscience Department section in the Graduate Studies calendar. Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599. Courses numbered 600 are available to fourth-year students who obtain Departmental approval and who have credit for the prerequisite courses.

Geology 601 H(3-3)

*Advanced Physical Hydrogeology*
An advanced treatment of topics covered in Geology 401.
Prerequisite: Consent of the Department.
Note: Credit for both Geology 601 and either 401 will not be allowed.

Geology 603 H(3-3)

*Advanced Aqueous Geochemistry*
Advanced discussion of theoretical and applied aspects of aqueous geochemistry of natural waters. Topics include: methods for collection and preservation of water samples in the field, laboratory analysis of waters, theory and application of aqueous geochemical models to complex formation, solubility, stability of low temperature mineral assemblages, oxidation and reduction processes in natural environments and reaction path modelling. Applications of stable isotopes to low temperature geochemical processes may also be covered.
Prerequisite: Geology 403 or 503, or Geophysics 457.

Geology 605 H(3-1T)

*Groundwater Flow and Transport Modeling*
Review of the partial differential equations and boundary conditions that describe groundwater flow and transport. Introduction to numerical methods. The course emphasizes the practical aspects of building groundwater and transport models using computer exercises and a groundwater modeling project.
Prerequisites: Geology 401 or 601 or consent of the Department.

Geology 607 H(3-3)

*Advanced Physical Hydrology*
Coverage of more advanced topics in the physical hydrology of surface and subsurface waters including land-atmosphere exchange, vadose zone processes, and watershed hydrology.
Prerequisites: Mathematics 253 or 263 or 283 or Applied Mathematics 219, Geography 415, Geology 401; or consent of the Department.

Geology 609 H(3-3)

*Advanced Contaminant Hydrogeology*
An advanced treatment of topics covered in Geology 505.
Prerequisites: Consent of the Department.
Note: Credit for both Geology 505 and Geology 609 will not be allowed.

Geology 611 H(3-1)

*Groundwater Resource Management*
Advanced topics related to groundwater resource development and management, including exploration methods, aquifer test analysis, aquifer-aquitard systems, groundwater recharge, and the role of models. Fundamental issues related to regional integrated management of water resources.
Prerequisites: Mathematics 253 or 263 or 283 or Applied Mathematics 219, Geology 401 or Geography 415.

Geology 613 H(3-1T-3)

*Flow in Porous Media*
Fundamentals of fluid flow in porous media: pore structure; capillarity; single phase flow; immiscible and miscible fluid flow; pore level modelling of porous media. Concepts applied to hydrocarbon reservoirs and fluid migration in soils including: characterization of pore space, single phase flow in porous media, capillarity, wettability, routine and advance core analysis, miscibility in porous media. Similarities and differences between hydrocarbon reservoirs and soils. Introduction to enhanced oil and gas processes.
Prerequisite: Chemical Engineering 331 or Geology 401 or 429 or 423.
Note: Credit for both Geology 613 and either 699.20 or Petroleum Engineering 513 will not be allowed.

Geology 623 H(3-3)

*Modern Diffraction and Scattering Techniques*
Space groups and principles of X-ray, neutron, and electron diffraction and their applications. Crystal structure determination and refinement using single crystal and Rietveld methods. X-ray and neutron scattering techniques (using the Pair Distribution Function, PDF) to examine local disorder in nano-materials and glasses. Phase transition and structural evolution with pressure, temperature, and composition. Analyses of experimental data sets and extensive use of computers.
Prerequisite: Geology 523 or equivalent.
Note: Offered every alternate Fall term.

Geology 627 H(3-3)

*Advanced Topics in Ore Deposits*
A detailed study of ore occurrences with special emphasis on Canadian deposits. Laboratory: the study of comprehensive suites from deposits.
Prerequisite: Geology 527.

Geology 633 H(3-3)

*Advanced Igneous and Metamorphic Petrology*
Theoretical and applied problems in petrology, including some or all of: numerical techniques in petrology, phase equilibria, geothermometry and geobarometry, kinetics in petrology, physics and chemistry of magmatic processes. Laboratory will consist of petrographic study of rock suites.
Prerequisite: Geology 433 or 443 or equivalent or consent of the Department.

Geology 639 H(160 hours)

*Field Laboratory in Groundwater Hydrogeology*
Entails a week at a hydrogeology field site in Alberta or British Columbia. Hydrogeology and geotechnical techniques will be demonstrated and will involve hands-on participation by students. After the field work, students will conduct extensive analysis and interpretation of data gathered during the field session, complete exercises and prepare a written report. Relative to Geology 441, Geology 639 requires more sophisticated analyses of data and additional exercises. Geology 639 normally runs for two to three weeks following Winter Session Final Examinations or prior to the Fall Term.
Prerequisites: Geology 401 or 601 and consent of the Department.
Note: Credit for both Geology 441 and 639 will not be allowed.
Note: This course has limited enrolment.

Geology 641 H(3-3)

*Advanced Structural Methods*
Analysis of mesoscopic and megascopic structural data; the construction and analytical use of cross-sections, subsurface maps and 3-dimensional models; structural analysis of the Canadian Cordillera.
Prerequisite: Consent of the Department.
Note: Credit for both Geology 541 and 641 will not be allowed.
Note: There is a weekend field excursion during the term.

Geology 649 H(3-3)
(Geophysics 649)

*Advanced Petrophysical Techniques*
Application of petrophysical well logs and their relation to cores, cuttings, fluids and seismograms. Case studies applied to petroleum exploration and exploitation.
Prerequisite: Consent of the Department.

Geology 663 H(2-1)
(Physics 663)

*Applications of Stable Isotopes*
Applications in archaeology, biology, chemistry, engineering, geography, geology, medicine, meteorology, paleontology, physics and space sciences. Topics include hydrology, paleoclimates, ore deposits, geothermometry, fossil fuels exploration and recovery, pollutant tracing, food webs forensic investigations.
Prerequisite: Consent of the Department.

Geology 675 H(3-0)

*Advanced Topics in Dinosaur Paleontology*
Topics related to the paleobiology, paleoecology, and paleoenvironments of the Dinosauria will be covered.
Prerequisite: Consent of instructor or enrolment in a paleontology-based graduate program.

Geology 677 H(3-3)

*Advanced Topics in Oil and Gas Production*
Advanced study of the problems related to production of conventional oil, heavy oil, and natural gas; analysis of interactions of oil, water and gas; the effects of fluid properties, rock structure and capillary, gravity and viscous forces acting on the reservoir system; application to the design of improved oil and gas recovery methods. New processes in oil and gas recovery.
Prerequisite: Petroleum Engineering 513 or Geology 613 or consent of the Department.
Note: Credit for both Geology 677 and either Chemical Engineering 619.26 or 677 will not be allowed.

Geology 679 H(3-1)

*Petroleum and Environmental Organic Geochemistry*
Origin of petroleum; sedimentation of organic matter and the carbon cycle; diagenesis of organic matter; hydrocarbon generation and migration; kinetic models; creosote contamination; methods; interpretation of geochemical data; applications of geochemical data to geological and environmental problems.
Prerequisite: Consent of the Department.

Geology 685 Q(3-3)

*Advanced Biostratigraphy*
Advanced studies of the principles of applied biostratigraphy for siliceous and calcareous microfossils and conodonts with emphasis on their use in basin analysis, sequence stratigraphy, and economic resource exploration.
Prerequisite: Consent of the department.
Note: Credit for both Geology 585 and 685 will not be allowed.

Geology 689 E(3-3)

*Advanced Petroleum Geology I*
689.01. Aqueous Fluids
689.02. Petroleum Fluids
689.06. Professional Practice for Geoscientists
689.07. Analytical Techniques for Petroleum Geochemistry
689.08. Petroleum Generation and Migration
Prerequisite: Consent of the Department.
Note: Credit for both Geology 589 and 689will not be allowed.

Geology 693 Q(3-3)

*Advanced Petroleum Geology II*
693.05. Ichnology
693.06 Professional Practice for Geoscientists
Prerequisite: Consent of the Department.
Note: Credit for both Geology 593 and 693 will not be allowed.

Geology 694 H(3-3)

*Advanced Petroleum Geology III*
694.01. Advanced Petroleum Geology III Core Examination
694.03. Reservoir Evaluation and Hydrocarbon Play Assessment
694.05 Basin Analysis
Prerequisite: Consent of the Department.
Note: Credit for both Geology 595 and 694 will not be allowed.

Geology 696 F(3-3)

*Advanced Petroleum Geology IV*
Courses are offered in specific topics related to Petroleum Geology and the application of techniques to case studies of petroleum systems.
Prerequisite: Consent of the Department.
Note: Credit for both Geology 596 and 696 will not be allowed.
MAY BE REPEATED FOR CREDIT

Geology 697 H(3-3)

*Advanced Geostatistics*
Advanced treatment of the topics covered in Geology 597 with special emphasis on reservoir characterization.
Prerequisites: Mathematics 253 or 263 or 283 or Applied Mathematics 219; Mathematics 221 or 211; or consent of the Department.
Note: Completion of Mathematics 331 and/or Statistics 357 or 327 is recommended prior to taking this course.
Note: Credit for both Geology 597 and 697 will not be allowed.

Geology 698 F(3-0)
(Chemical Engineering 698)

*Reservoir Characterization for Field Development*
A team-based, integrated reservoir description experience working with geophysical, geological, petrophysical, and engineering data to produce a field development plan.
Prerequisite: Chemical Engineering 621, Geology 697, Human Resources and Organizational Dynamics 789 or equivalent.
Note: This course is intended for graduate students in the Master of Engineering with Reservoir Characterization Specialization.

Geology 699 H(3-3)

*Selected Topics in Geology*
Courses are offered in specific topics in areas such as geochemistry, hydrogeology, mineralogy, paleontology, petroleum geology, petrology, quantitative geology, sedimentology, structural geology, and surficial geology.
MAY BE REPEATED FOR CREDIT

Geology 701 H(0-6)

*Advanced Independent Study*
A written research report based on laboratory and field studies is required.
Note: Open only to graduate students in the Department of Geoscience.

Geology 703 H(0-6)

*Readings in Geology*
Note: Open only to graduate students in the Department of Geoscience.

Geology 707 H(3-3)

*Geology and Geophysics of Western Canada*
Topics include stratigraphy, sedimentology, structure, petrology, geophysics and economic geology. Laboratories contain a field component.
Note: Open only to graduate students in the Department of Geoscience and compulsory for beginning doctoral students in Geology.

Geology 709 H(3S-3)

*Seminars on Applied Basin Studies*
A seminar-based course that will cover topics that consider the development, evolution, stratigraphic and sedimentologic architecture, and stratigraphic correlation of sedimentary basins. Topics may include biostratigraphy, tectonics and sedimentation, subsurface correlation including sequence stratigraphy, siliciclastic and carbonate sedimentology, geochronology and petroleum geology. Concepts will be developed from discussions, assigned reading, seminars and fieldtrips to local geological sites.
Prerequisite: Graduate student registration in the Department of Geoscience, or consent of the Department.

Geology 711 H(3S-3)

*Seminars on Applied Basin Field Studies*
A seminar-based course that will consider the entire geologic history of a particular basin or sub-basin as well as key sections or geological sites that will be visited at the end of the semester. Topics will range across the full discipline of sedimentary geology with emphasis on applications to Petroleum Geology.
Prerequisite: Graduate student registration in the Department of Geoscience, or consent of the Department..

Geology 729 H(3 -3)

*Sedimentary Geochemistry*
Application of chemical and isotopic data and techniques to the mineral assemblages observed to form during diagenesis. Water-rock interactions are examined using the thermodynamics of solution-mineral-gas equilibria. Topics may include kinetics, reaction path modelling, fluid flow in sedimentary basins and the relationships between fluid flow and diagenetic events.

Geology 733 H(3-3)

*Analytical Methods in Petrology*
Topics may include scanning electron microscope, electron probe, x-ray diffraction and x-ray fluorescence.

## Geophysics (GOPH)

### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

Geophysics 517 H(3-3)

*Time Series Analysis and 1D Data Processing*
Analysis of geophysical time series, especially real and synthetic seismic signals, is introduced using theoretical concepts and their practical application in a computational lab using commercial computational software.
Prerequisites: Geophysics 355 and Applied Mathematics 415.

Geophysics 547 H(3-3)

*Gravity and Magnetics*
The nature of the magnetic and gravitational fields of the earth. Theory and applications of the gravity and magnetic methods of geophysical exploration.
Prerequisites: Geophysics 355, 359, Mathematics 331, Applied Mathematics 415.

Geophysics 549 H(1T-96 hours)

*Field School*
Seismic, gravity, magnetic, electromagnetic, resistivity, induced polarization and topographic surveys will be conducted for about 10-12 days prior to the Fall Session. Data collected will be processed during Fall Session tutorials.
Prerequisites: Geophysics 355 and 453.
Note: This course occurs in rugged field conditions and varying weather, for which participants must be prepared and equipped. Students will be required to cover food and accommodation costs, and to pay a surcharge to cover the costs of equipment and other resources.

Geophysics 551 H(3-3)

*Seismic Theory and Methods*
Seismic wave propagation theory; various techniques of exploration seismology.
Prerequisites: Geophysics 355, Physics 321, 323, Applied Mathematics 415, and Mathematics 331.

Geophysics 557 H(3-3)

*Multidimensional Data Analysis and Processing*
Analysis and processing of 2D and 3D seismic data is explored using theoretical and practical concepts and applied in a computational lab using both commercial computational software and a commercial seismic data processing system.
Prerequisites: Geophysics 517.

Geophysics 559 H(3-3)

*Geophysical Interpretation*
Analysis and integration of geophysical and geological data. Qualitative and quantitative interpretation. Industrial case studies.
Prerequisite: Geophysics 355, Geophysics 457 or Geology 461 or 597.

Geophysics 565 H(3-3)

*Environmental Applications of Geophysics*
Application of geophysical methods such as resistivity, electromagnetics, and ground penetrating radar to investigations of geological, geotechnical, hydrological, and environmental problems. Small-scale high resolution applications of other geophysical methods (seismic, gravity, magnetics).
Prerequisite: Mathematics 249 or 251 or Applied Mathematics 217 and completion of 9 FCE in Science or Engineering.
Note: Credit for Geophysics 565 and either 365 or 465 will not be allowed.

Graduate Courses

Graduate students are urged to read the Geoscience Department section in the Graduate Studies calendar. Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

Courses numbered 600 are also available to fourth-year undergraduate students who obtain Departmental approval and who have credit for the prerequisite courses.

Geophysics 645 H(3-0)

*Seismic Wave Propagation*
Seismic body and surface waves, reflection, refraction, diffraction, anelasticity, anisotropy, ray methods, point and line source solutions to the equation of motion, finite-difference methods for seismic waves, additional topics depending on current research interests.
Prerequisite: Geophysics 551 or consent of the Department.

Geophysics 649 H(3-3)
(Geology 649)

*Advanced Petrophysical Techniques*
Application of petrophysical well logs and their relation to cores, cuttings, fluids and seismograms. Case studies applied to petroleum exploration and exploitation.
Prerequisite: Consent of the Department.

Geophysics 653 H(3-0)

*Electromagnetic and Induced Polarization Topics*
Topics in electromagnetic and induced polarization exploration as applied to the search for metallic minerals.

Geophysics 657 H(3-3)

*Seismic Signal Analysis*
Advanced methods of seismic data analysis in exploration and production geophysics. Topics include velocity analysis, polarization filtering, median filtering, migration, inversion and tomography.

Geophysics 659 H(3-3/2)

*Practical Seismic Modeling, Migration, and Inversion*
Concepts and techniques of seismic imaging (migration) are explored. Practical considerations such as algorithm characteristics and data geometry are emphasized; poststack and prestack migration and DMO methods are examined from the Kirchhoff, Fourier, and downward continuation perspectives.
Note: Some familiarity with seismic data and computer programming is assumed.

Geophysics 665 H(3-0)

*Theoretical Seismology*
Seismic ray theory, inverse theory, full-wave methods, matrix methods, numerical methods, additional topics depending on current research interests.
Prerequisite: Geophysics 551 or consent of the Department.

Geophysics 669 H(3-0)

*Global Seismology*
An introduction to theory and practice of global seismology. Topics include: seismograph systems, global wave propagation, moment tensors, shear-wave splitting, surface waves, receiver functions, seismic tomography and teleseismic receiver functions.
Prerequisite: Basic knowledge of seismic wave theory, Fourier analysis and vector calculus. Students should be enrolled in the graduate program in geophysics or receive consent of the instructor.

Geophysics 671 H(3-0)

*Inverse Theory and Applications I*
An introduction to the mathematical and numerical techniques of geophysical inversion. Topics include least squares, singular value decomposition, and Tikhonov regularization. Development of numerical codes to solve real inverse problems is stressed.
Prerequisites: Knowledge of linear algebra and vector calculus, and some familiarity with statistics. Also, students should be enrolled in the graduate program in geophysics or receive consent of the instructor.

Geophysics 673 H(3-0)

*Inverse Theory and Applications II*
Multidimensional real-world inverse problems, such as constrained seismic, gravity, or resistivity inversion. Fourier, maximum entropy, Bayesian approaches and iterative solution techniques such as Kaczmarz and conjugate gradient are covered.
Prerequisites: Geophysics 671 or consent of the instructor.

Geophysics 681 H(3-0)
(Geomatics Engineering 681)

*Advanced Global Geophysics and Geodynamics*
Elasticity, figure of the Earth, Earth structure and seismology, gravity and its temporal variations, isostasy, tides, Earth rotation and orientation, time, plate flexure, glacial rebound, continental drift, geodetic observation methods for geodynamics.

Geophysics 683 H(3-0)

*Dynamics of the Earth*
Fluid mechanics and Earth rheology, heat flow and mantle convection, magneto hydrodynamics and core dynamics, stresses, folding and diapirism, faulting and earthquake mechanism.

Geophysics 687 H(3-3)

*Theory of Seismic Imaging*
The theories of wave propagation in acoustic and elastic media are used to develop the major algorithms used in seismic imaging (migration). Green's theorem, Huygen's principle, Kirchhoff diffraction theory, raytracing, wavetracking, multidimensional Fourier analysis, and Radon transforms are explored.
Note: Elementary knowledge of vector calculus and partial differential equations is assumed.

Geophysics 699 H(3-3)

*Selected Topics in Geophysics*
Courses are offered in specific topics in areas such as seismology, environmental geophysics, potential methods, integrated geophysical studies, and geodynamics.
MAY BE REPEATED FOR CREDIT

Geophysics 701 H(0-6)

*Advanced Independent Study*
A written research report based on laboratory and field studies is required.
Note: Open only to graduate students in the Department of Geoscience.

Geophysics 703 H(0-6)

*Readings in Geophysics*
Note: Open only to graduate students in the Department of Geoscience.

## GERMANIC, SLAVIC AND EAST ASIAN STUDIES GSEA

### Contact Info

Location: Craigie Hall, C Block, Room 205
Faculty number: (403) 220-5293
Fax: (403) 284-3810
E-mail address: gsea@ucalgary.ca
Web page URL: http://gsea.ucalgary.ca/

### 1. Degrees and Specializations Offered

Master of Arts degree (thesis-based) in German

The Department particularly solicits applications from students interested in pursuing a cross-disciplinary degree involving another department at the University of Calgary (e.g., English; History; Linguistics; Philosophy; French, Italian and Spanish).

Applicants interested in an interdisciplinary doctoral program with a German Studies component on a special case basis should contact the Department.

The Department does not formally offer a part-time option – all students will be considered full-time.

### 2. Admission Requirements

In addition to the requirements of the Faculties of Graduate Studies and Arts , the department of Germanic, Slavic and East Asian Studies requires:

a) a letter of intent outlining background, research interests, and goals for the program

b) an academic writing sample (of approximately 8-15 pages) in English or German

c) Two Reference Letters

### 3. Application Deadline

Deadlines for the submission of complete applications:

1 February for September admission
1 September for January admission (discuss January admission with Department)

Late applications reduce the applicant's chances of receiving funding

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

### 5. Program/Course Requirements

In addition to the requirements of the Faculties of Graduate Studies and Arts, the Department requires:

a) Normally, three full-course equivalents for students who hold a baccalaureate degree
b) For some students, depending upon background preparation, a course in bibliography and methodology
c) Sufficient German language skills for the proposed program

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

No more than one-half of a regular graduate student's required program of course work can be at the undergraduate level. Programs requiring a larger ratio of undergraduate courses must receive the approval of the Dean of Graduate Studies at the time of admission.

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

### 8. Time Limit

Expected completion time is two years for the Master of Arts and four years for the Doctor of Philosophy. Maximum completion time is four years for the Master of Arts and six years for the Doctor of Philosophy.

### 9. Supervisory Assignments

The Graduate Program Graduate Program Director is normally the interim supervisor for students entering the program, and will assist them in finding a supervisor within the first year. In the case of cross-disciplinary degrees, the choice of supervisor must be established upon application to the program.

### 10. Required Examinations

Final thesis oral examinations are open.

Questions on the research proposal will not be included in the oral candidacy examination of special case doctoral degree students.

### 11. Research Proposal Requirements

The department requires all graduate students to submit a written thesis proposal by the sixteenth month of the program. The required form is available on the department website. The proposal should be drafted after consultation with the student's supervisor and have his/her preliminary approval.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to the Department by 1 February.

### 14. Other Information

None.

### 15. Faculty Members/Research Interests

Research faculty and the specific areas within which Master of Arts thesis supervision is offered may be found at http://gsea.ucalgary.ca/graduate/faculty-members-german

### Graduate Courses

German 627 H(3S-0)

*Seminar in German Literature and Culture*
Selected topics in literary history.
MAY BE REPEATED FOR CREDIT

German 629 H(3S-0)

*Seminar in German Language and Linguistics*
MAY BE REPEATED FOR CREDIT

German 631 H(3S-0)

*Seminar in German Language Pedagogy*
MAY BE REPEATED FOR CREDIT

German 696 F(1-0)

*Bibliography, Research Methods and Grant Proposal Writing*
Note: Required of all graduate students who have not had an equivalent course.
NOT INCLUDED IN GPA

German 699 H(3-0)

*Conference Course*
Meets the needs of individual students. It may include a general or specific linguistic topic; or the detailed study of an author, period, genre; or any literary problem not dealt with in the honours or graduate courses listed above.
MAY BE REPEATED FOR CREDIT

## GREEK AND ROMAN STUDIES GRST

### Contact Info

Location: Social Sciences Building, Room 506
Faculty number: (403) 220-5537
Fax: (403) 220-9581
Contact List:
See http://grst.ucalgary.ca/contact
Web page URL: http://grst.ucalgary.ca
http://grst.ucalgary.ca/graduate

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA) degree, thesis or course-based (full or part time)

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

a) Normally at least eleven full-course equivalents of relevant undergraduate course work are expected for admission to the MA program, with some concentration in the proposed research area;
b) All research areas require proficiency in reading Latin and/or Greek;
c) Competence in reading French, German or Italian must be acquired either before or during the program;
d) For the PhD, an MA is required;
e) Two Letters of Reference.

### 3. Application Deadline

Deadlines for submission of complete applications:

1 February for September admission (when accompanied by a graduate scholarship application)

1 April for September admission (with no scholarship application)

1 September for January admission

### 4. Advanced Credit

Contact department for information.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts (thesis-based, full or part-time)

a) Greek and Roman Studies 603, first-year half-course on research and professional training
b) Four other seminar half-courses, normally taken in the first year of the program; these may include up to two half-courses outside the department if appropriate to the area of specialization
c) Four quarter-courses of directed studies in Greek and Latin texts (GRST 607), normally taken in Fall and Winter terms of the first and second year
d) An examination in translation, with dictionary, from French or German or Italian into English (normally to be attempted within the first twelve months of registration)
e) A thesis of approximately 20,000 words, with oral examination

Master of Arts (course-based, full or part-time)

a) Greek and Roman Studies 603 , first-year half-course on research and professional training
b) Eight other seminar half-courses; these may include up to two half-courses outside the department if relevant to the student's particular interests in the field
c) Four quarter-courses of directed studies in Greek and Latin texts (GRST 607), normally taken in Fall and Winter terms of the first and second year
d) An examination in translation, with dictionary, from French or German or Italian into English (normally to be attempted within the first twelve months of registration)

Doctor of Philosophy

a) Greek and Roman Studies 603, first year half-course on research and professional training;
b) A minimum of four other graduate seminar half-course; these may include up to two half courses outside the department if appropriate to the area of specialization;
c) Four quarter-courses of directed studies in Greek and Latin texts (GRST 607);
d) A translation examination from two of the three following modern languages into English, French, German or Italian;
e) Examination of the Core Reading and Dissertation Reading List (contact the department for further information);
f) A twenty-page dissertation proposal;
g) A Candidacy Exam, which must be passed before 28 months of tenure;
h) A thesis of about 75,000 words, followed by an oral examination.

## 6. Additional Requirements

The department may require up to two half-courses of additional directed studies in order to ensure sufficient preparation in relevant areas for the MA or PhD. Students are advised of any such requirements upon entry into the program.

## 7. Credit for Undergraduate Courses

Not more than two of the half-courses required in the thesis-based MA program, and not more than four half-courses in the course-based program, may be taken at the 500-level.

## 8. Time Limit

Students studying on a full-time basis are expected to complete the program in two years. Students in thesis-based Master's programs must complete their degrees within four years. Students in course-based Master's programs must complete their degrees within six years. For the PhD program, students are expected to complete their degrees within 6 years.

## 9. Supervisory Assignments

The Graduate Program Graduate Program Director is normally the interim supervisor for a Master's student entering the program, and will assist the student to find a supervisor within eight months of entering the program. Doctoral students are expected to have a supervisor upon entry. The appointment of a supervisor is subject to approval by the Department Head.

## 10. Required Examinations

Final oral examinations are open.

Questions on the research proposal will not be included in the oral candidacy examination.

## 11. Research Proposal Requirements

A formal proposal is not required for the MA thesis. The student's thesis topic is defined in consultation with the supervisor, normally within 12 months of entry into the program. It should be referred to the Program Graduate Program Director for approval. The PhD proposal is to be submitted in accordance with the Faculty of Graduate Studies requirements.

## 12. Special Registration Information

None.

## 13. Financial Assistance

The department offers full or partial support through teaching assistantships and Faculty of Graduate Studies Support to selected applicants.
The Faculty of Graduate Studies offers numerous awards listed in the Graduate Calendar (e.g. Open Scholarships) in a university-wide competition.

Application forms are included in the admission application package and linked to the online admission application.

Various awards are available from other agencies (federal and provincial governments, private foundations, etc.).

Applicants are encouraged to seek funding vigorously. The department can offer advice on identifying sources.

Note: Faculty of Graduate Studies Support and university scholarships are normally awarded only to students in the thesis-based program.

## 14. Other Information

Enquiries should be addressed to: Graduate Program Graduate Program Director, Department of Greek and Roman Studies, University of Calgary, 2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4 (See http://grst.ucalgary.ca/contact).

## 15. Faculty Members/Research Interests

Details concerning the research areas of individual professors may be obtained from the department website at http://grst.ucalgary.ca/contact-us/directory

### Greek (GREK)

#### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

**Greek 525** H(3S-0)

*Topics in Greek Literature and Language*
Prerequisite: Greek 401 or 413.
MAY BE REPEATED FOR CREDIT

**Greek 551** H(0-2T)

*Directed Studies in Greek Literature and Language*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

#### Graduate Course

**Greek 601** H(3S-0)

*Graduate Seminar*
MAY BE REPEATED FOR CREDIT

### Greek and Roman Studies (GRST)

#### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

**Greek and Roman Studies 525** H(3S-0)

*Research Seminar*
Research topics in Greek and Roman history, literature, art, and archaeology. Seminar discussions will require a high level of student participation.
MAY BE REPEATED FOR CREDIT

**Greek and Roman Studies 551** H(0-2T)

*Directed Research*
Qualified students will undertake supervised research projects individually or in small groups.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

#### Graduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 601-607.

**Greek and Roman Studies 601** H(3S-0)

*Graduate Seminar*
MAY BE REPEATED FOR CREDIT

**Greek and Roman Studies 603** H(2S-0)

*Research and Professional Training*

**Greek and Roman Studies 607** Q(0-1T)

*Directed Studies*
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

### Latin (LATI)

#### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

**Latin 525** H(3S-0)

*Topics in Latin Literature and Language*
Prerequisite: Latin 401 or 413.
MAY BE REPEATED FOR CREDIT

#### Graduate Course

**Latin 601** H(3S-0)

*Graduate Seminar*
MAY BE REPEATED FOR CREDIT

# HASKAYNE SCHOOL OF BUSINESS: MANAGEMENT MGMT

#### Contact Info

Location:
MBA Program: Scurfield Hall, Room 350
PhD Program: Scurfield Hall, Room 332
Phone:
MBA Program: (403) 220-3808
PhD Program: (403) 220-3803
Fax: (403) 282-0095
E-mail address:
mbarequest@haskayne.ucalgary.ca
phdrequest@haskayne.ucalgary.ca
Web page URL: http://www.haskayne.ucalgary.ca

## 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Business Administration (MBA), course-based and thesis-based

Joint programs, offered with other Faculties:
UPDATED

Juris Doctor/Master of Business Administration (JD/MBA)
Master of Social Work/Master of Business Administration (MSW/MBA)
Master of Biotechnology/Master of Business Administration (MBT/MBA)
Doctor of Medicine/Master of Business Administration (MD/MBA) ("Leaders in Medicine" Program)

Combined programs, offered with professional societies:

MBA-CMA Program

This is a combined initiative between the Haskayne School of Business and the Certified Management Accountants of Alberta. This program is intended for those with a strong undergraduate background and several years of relevant work experience. Students must complete the CMA pre-requisites and the CMA national entrance exam before being admitted to the MBA-CMA program. Students can complete the requirements for the Haskayne MBA and the CMA designation in three years of part-time study. For information and application materials for this program, please visit http://www.cma-alberta.com.

MBA-CGA Program

This is a combined initiative between the Haskayne School of Business and the Certified General Accountants of Alberta. Students accepted to the MBA program may complete several requirements of the CGA designation as part of their MBA program. For information check with the Haskayne MBA office or with https://www.cga-alberta.org/.

Master of Business Administration (course-based)

The course-based MBA program is designed for students who wish to pursue a career in management and is offered to students who possess a four-year degree or equivalent in any discipline. The program consists of required courses designed to create integrative business skills and elective courses where students have the opportunity to pursue areas of specialization. Students can complete the Haskayne MBA through full-time study that normally requires 16 to 20 months, or through evening study with completion in two to six years. Normally, combined programs (JD/MBA, MSW/MBA, MBT/MBA, MD/MBA) must be completed on a full time basis. Students in the Haskayne MBA program may choose a specialization in Finance, Entrepreneurship and Innovation, Marketing, Global Energy Management and Sustainable Development or Project Management. They may also elect not to have an area of specialization.

The Executive MBA is offered jointly by the University of Calgary and the University of Alberta on alternate weekends and periodic intensive weeks. It is designed for those who wish to participate in an intensive MBA study program while still continuing actively in their careers.

Master of Business Administration (thesis- based)

This program of studies is designed for students wishing to pursue a special research interest in the Haskayne School of Business. It is normally offered to students who possess a Bachelor of Commerce degree or its equivalent. The thesis program will admit only those students who can demonstrate a serious commitment to research, the ability to work independently in the production of a thesis, and a qualified supervisor who is interested in overseeing their research program.

Doctor of Philosophy

The Doctor of Philosophy program offers talented research-oriented students the opportunity to pursue an academic career in business-related subjects.

## 2. Admission Requirements

Master of Business Administration

In addition to the Faculty of Graduate Studies requirements, the MBA program requires:

a) A current résumé.
b) A personal statement outlining the applicant's career goals and how the MBA program would help achieve those goals.
c) For students required to prove proficiency in English, a minimum TOEFL score of 600 (written test), or 100 (internet-based test), or an IELTS score of 7.0,or a MELAB score of 84, or a PTE score of 70.
d) Completion of the Graduate Management Admission Test (GMAT*) with a recommended minimum score of 550 for the Haskayne MBA with high scores on both verbal and quantitative subcomponents. Where GMAT is unavailable, the program will accept equivalent results on the Graduate Record Exam (GRE). It is recommended that students should place above the 70th percentile on overall test scores. A minimum GMAT score of 600 or an equivalent GRE is required for the thesis program.
e) Two Reference Letters.
f) For course-based programs only, the equivalent of at least 3 years of appropriate work experience
g) For applicants to the thesis-based program, normally a Bachelor of Commerce with a minimum grade point average of 3.3 on a four point scale.
h) For applicants to the Executive MBA program, the equivalent of at least seven years of work experience, a number of years of which must have carried management or professional responsibility.
i) An applicant to a combined MBA program (JD/MBA, MSW/MBA, MBT/MBA, MD/MBA) must be admitted to the MBA program, and make separate application for admission to the other program. The respective Combined Program Committee will review each application. Normally, only a full-time student in the Haskayne MBA Program may take a combined program.

Please note that receiving admission to both individual programs does not guarantee admission to the combined program.

An applicant who has completed a Bachelor's degree with an admission grade point average (GPA) from 2.50 to 2.99 may be admitted to an MBA course-based program as a regular student on the basis of the following equivalent achievement score: [(GPA x 200) + GMAT] 1150.*

** Consult the Haskayne School of Business about the Graduate Management Admission Test.*

Doctor of Philosophy

In addition to the Faculty of Graduate Studies requirements, the Haskayne School of Business requires:

a) Normally, an MBA degree or equivalent from a recognized institution with a recommended minimum admission grade point average of 3.5 on a four-point scale.

Students with an undergraduate or Master's degree in an area other than business may be required to complete a qualifying period to gain a general business background before beginning the normal doctoral course requirements.

It is possible to enter the PhD program without an MBA or other Master's degree. Consult the Director of the PhD Program for further information.

b) A score of at least 600 on the Graduate Management Admission Test (GMAT) with high scores on both verbal and quantitative subcomponents; or equivalent results on the Graduate Record Exam (GRE). It is recommended that students should place above the 85th percentile on overall test scores. Most PhD applicants in the recent past have obtained above 650 on the GMAT, with many successful applicants having earned scores of 700 and above.
c) For those students required to prove proficiency in English, a minimum TOEFL score of 600 (written test), or 100 (internet-based test), or an IELTS score of 7.0, or a MELAB score of 84, or a PTE score of 70.
d) Two Reference Letters.
e) A personal statement outlining objectives, intent and commitment to a research program.
f) Availability of a research-active supervisor and resources for the area in which the student wishes to study.

Work experience in business or public organizations will be considered.

See the PhD program website http://haskayne.ucalgary.ca/haskaynegrad/phd for more information. Approved changes to the program standards and requirements will be posted on the website.

## 3. Application Deadline

Deadlines for the submission of complete applications to the Haskayne School of Business:

| | Deadline | Decision made by* |
|---|---|---|
| Decision Round 1 | 15 Nov | 15 Jan |
| Decision Round 2 | 15 Jan | 1 March |
| Decision Round 3 | 1 March | 1 May |
| Decision Round 4** | 1 May | 15 June |

**Applications that are not accepted for admission or rejected may be held over for consideration in following decision rounds.*

*** Not open to international applicants.*

PhD and MBA (thesis-based) programs

15 January for September admission - year-round admission assessment and decision possible for exceptional students with complete applications.

Combined programs

A separate application to applicable program is required, please see relevant program for deadlines.

## 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process to the MBA program. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

Course requirements for doctoral students will be based on the student's background and program needs. Credit for previous courses will be provided as appropriate.

## 5. Program/Course Requirements

In addition to the requirements of the Faculty of Graduate Studies, the Haskayne School of Business requires:

### MBA (course-based)

The MBA degree normally consists of twenty half-courses (nineteen half-courses and two quarter courses effective July 1, 2010). Students may be granted exemption from first-year courses based upon prior academic preparation and with the approval of the Associate Dean (MBA Program). Students must complete a minimum of fifteen half-courses (or equivalent), of which a maximum of five half-courses may be transfer credit from another recognized graduate program, for the MBA degree.

#### First Year Courses UPDATED

ACCT 601 Financial Accounting
ACCT 603 Management Accounting
FNCE 601 Managerial Finance
HROD 601 Managing Human Resources
MGIS 601 Management Information Systems
MGST 611 Managerial Economics
MGST 613 Managerial Decision Modelling
MKTG 601 Marketing Management
OPMA 601 Operations Management
SGMA 601 Strategic Management
MGST 790.01 MBA Skills

#### Second Year Courses UPDATED

The MBA degree requires the following integrative courses:
MGST 715 Strategic Business Analysis
BSEN 777 Global Environment of Business
MGST 790.02 Leadership Capstone

#### Areas of Specialization UPDATED

Students must complete seven elective half-courses beyond the first year and integrative courses. Students may select an area of specialization normally consisting of four half-courses. Students wishing to specialize may choose from the following areas:

- Finance
- Entrepreneurship and Innovation
- Marketing
- Global Energy Management and Sustainable Development
- Project Management

Students who elect not to choose an area of specialization may choose instead from various graduate courses offered by the Haskayne School of Business. Subject to the approval of the Associate Dean (MBA Program) and the Faculty of Graduate Studies, graduate courses offered at the University of Calgary outside the Haskayne School of Business may also be taken.

### Combined JD/MBA

A student admitted to the combined JD/MBA program spends the first year doing core studies in one program and the second year doing core studies in the other program. The remaining years in the program combine Law and Business courses in a way that will allow the achievement of both degrees in four rather than five years (please consult the MBA office).

### Combined MSW/MBA

A student admitted to the combined MSW/MBA program will require an undergraduate degree in Social Work (BSW) or equivalent. The MSW/MBA degree can be completed in two years of study (24 months) including fall/winter and spring/summer sessions (please consult the MBA office).

### Combined MBT/MBA

A student admitted to the combined MBT/MBA program will require an undergraduate degree in Biological Sciences or equivalent.

### Combined MD/MBA

A student admitted to the MD/MBA program will be required to hold an undergraduate degree and be admitted to both the MD and MBA programs. A program will be developed for each student under the guidelines of the Leaders in Medicine program (please consult the MBA office).

### Executive MBA

The delivery format of the program is different from the Haskayne MBA program and requires more integrative types of sessions and activities. However, the program requires many of the same courses as are required in the Haskayne MBA program. In general, students in this program are expected to follow a general curriculum rather than electing an area-specific specialization. Only in rare cases will it be possible for students to do the latter. It is expected that all participants entering the program in a given year will complete the program requirements at the same pace, completing all of them over the same 21-month time frame.

### MBA with a Specialization in Global Energy Management (GEEMBA) (Distance Delivery) UPDATED

The delivery format differs from our other Haskayne MBA and Executive MBA programs. Course delivery will include more integrative types of sessions and activities, offered in modules in a variety of locations. Many of the same courses as are required in the Haskayne MBA program, including courses that are required for the Global Energy Management and Sustainable Development (GEMS) specialization. It is expected that all participants entering the program format in a given year will complete the program requirements at the same pace, completing all of them over the same 19-month time frame.

### MBA (thesis-based)

a) A minimum of eight half-course equivalents selected by the student in consultation with his or her supervisor. Among these eight half-courses, a course in research methods (MGST 773, Multivariate Analysis in Management) and one Strategy and Global Management course BSEN 777, SGMA 601, or SGMA 795 are required. MBA Thesis students are also invited and encouraged to take one or more doctoral-level courses as part of their programs.
b) Approval of each individual's program by the Director, MBA (thesis-based) Program.

Students who lack courses in one or more of the functional disciplines in management (i.e., accounting, finance, human resources and organizational dynamics, management information systems, operations management, marketing) may be required to take courses in those areas in partial fulfillment of their program either as part of, or in addition to, the normal eight half-course requirement.

### Doctor of Philosophy

Each student will have four areas of study. The first area (Management Studies – MGST) will be an overview of management education, theory, and research methods. The second will be designated as the major area; the third as the minor; and the remaining area is analytical methods.

a) Management Studies Area – A number of half-courses, such as MGST 781, MGST 783, MGST 791, MGST 792, and MGST 793. Students who have not completed a research-based Master's degree should take MGST 792 during the Spring/Summer Sessions between their first and second years.
b) Major area: The major area must be chosen from those offered within the Haskayne School of Business:
   - Accounting
   - Entrepreneurship and Family Business Management
   - Environmental Management/Sustainable Development
   - Finance
   - Human Resources and Organizational Dynamics
   - Management Information Systems
   - Marketing
   - Operations Management
   - Risk Management and Insurance
   - Strategy and Global Management
   - Tourism Management

Students will be required to take three or four half-courses from the major area.

c) Minor Area – The minor area of study must complement the major area. It may be chosen from those areas offered within the Haskayne School of Business or from those offered from other faculties. Students will be required to take one or two half-courses in their minor area.
d) Analytical Methods – Research and Statistics/Methods: at least three half-courses offered within the Haskayne School of Business or by other Faculties.

The typical student will take six full-course equivalents over the first 20 months of the program. The number of courses may vary according to the student's particular program and background. Students work closely with their research-active supervisors who help guide them to the appropriate courses within and outside the School.

## 6. Additional Requirements

Attendance at an orientation session is mandatory for all incoming students in all MBA program options and for all incoming doctoral students.

## 7. Credit for Undergraduate Courses

Credit for undergraduate courses taken prior to admission may be granted based on the approval of the Associate Dean (MBA Program).

## 8. Time Limit

Thesis-based Master: five years
Course-based Master: six years
Doctor of Philosophy: six years
MSW/MBA: seven years

## 9. Supervisory Assignments

Doctoral and MBA (thesis-based) students are required to select a permanent supervisor within the first twelve months of their program. For doctoral students, a supervisory committee reflective of the student's research interests is required within three

months after the permanent supervisor has been approved.

### 10. Required Examinations

Doctoral students are required to complete written candidacy examinations developed by the supervisory committee within twenty-eight months of commencing the program. These often combine take-home examinations and an oral examination completed within a period of one month. Questions on the research proposal may be included in the candidacy exam. The written candidacy examination format may differ depending on the major area and the supervisory committee. Students are advised to consult with their supervisors at least six months in advance of the candidacy examination dates.

MBA thesis and doctoral students will complete an oral thesis examination at the end of their programs.

Oral thesis examinations are open.

### 11. Research Proposal Requirements

Students whose research involves human subjects must receive approval from the Haskayne School of Business and from the University of Calgary Conjoint Faculties Research Ethics Board before beginning data collection. Doctoral students are required to have an acceptable research proposal before the doctoral candidacy examination. MBA (Thesis) students must secure approval from the supervisor before beginning thesis research.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, please see the Awards and Financial Assistance section of this Calendar.

MBA Thesis and doctoral students applying for scholarships must submit their applications to the Program Director by 15 January.

The Haskayne School of Business provides assistance for doctoral students in the form of Graduate Assistantships, Faculty of Graduate Studies Scholarships, the Robert Willson Scholarship, and the Marion Janet and Ian Stormont Forbes Graduate Scholarship. Students should also enquire about scholarships available from the Faculty of Graduate Studies. All admitted full-time MBA students will be automatically considered for Business scholarships.

### 14. Other Information

Successful applicants will be required to confirm their acceptance of an offer of admission into the MBA program by sending a non-refundable $500 deposit to the Haskayne School of Business. The $500 will be credited toward fees upon registration.

### 15. Faculty /Research Interests

The active research interests of the faculty can be found at
http://www.haskayne.ucalgary.ca/faculty/dir/faculty/

## Graduate Courses

### Accounting (ACCT)

**Accounting 601** H(3-0)

*Introductory Financial Accounting*
Introduction to accounting for business organizations. Reporting of financial results of operations and financial position to investors, managers, and others. Emphasis on the use of accounting information for decision-making.

**Accounting 603** H(3-0)

*Management Accounting*
Breakeven analysis, activity-based costing and management, budgeting, productivity measures, and other tools and techniques that are part of a planning and control system that will help the manager make better economic decisions.
Prerequisite: Accounting 601.

**Accounting 641** H(3-0)

*Intermediate Financial Accounting I*
Provides detailed coverage of the Generally Accepted Accounting Principles (GAAP) primarily related to assets. Emphasizes the theory behind the methods, the strengths and weaknesses of such methods and the need for sound professional judgment.
Prerequisite: Accounting 603 or consent of the Haskayne School of Business.

**Accounting 643** H(3-0)

*Intermediate Financial Accounting II*
Builds on Intermediate Financial Accounting I with coverage of the Generally Accepted Accounting Principles (GAAP) primarily related to liabilities and owners' equity. Emphasizes the theory behind the methods, the strengths and weaknesses of methods and the need for sound professional judgment.
Prerequisite: Accounting 641.

**Accounting 661** H(3-0)

*Cost Accounting*
Provides intermediate level discussions to the production and analysis of costs used for pricing, production, and investment decisions, revenue analysis, performance evaluation, management incentive systems, and strategy analysis. Topics covered include cost classifications and methods of cost establishment; cost data appropriate for decision models, standards and controls.
Prerequisite: Accounting 603.

**Accounting 721** H(3-0)

*Taxation*
Discusses the core concepts, regulations, and interpretations underlying the Canadian individual and corporate income taxation. Emphasis is on WHO is taxable, on WHAT income, WHEN and HOW tax is calculated? Tax planning opportunities will be identified by using long-term and clientele-based techniques.
Prerequisite: Accounting 601.

**Accounting 723** H(3-0)

*Advanced Taxation*
The focus of this course is on tax planning. It extends the material covered in the introductory tax course with an examination of specialized topics in personal and corporate income tax.
Prerequisite: Accounting 721.

**Accounting 725** H(3-0)

*Auditing*
Discusses the techniques and theory behind the external auditor's provision of assurance services on financial information. Topics include the demand for assurance, the role of auditors in providing assurance, auditor independence, audit reports, and audit liability.
Prerequisite: Accounting 643.

**Accounting 741** H(3-0)

*Financial Statement Analysis*
Covers the theories, concepts and practices of financial statement analysis with an emphasis placed on applications.
Prerequisite: Accounting 603.

**Accounting 743** H(3-0)

*Advanced Financial Accounting*
Focuses on advanced accounting methods related to inter-corporate investments and financial reporting. Topics include accounting for business combinations and inter-corporate investments, foreign currency transactions and translation, bankruptcy, partnerships, and not-for-profit organizations.
Prerequisite: Accounting 643.

**Accounting 745** H(3-0)

*Accounting Theory*
Examines the conceptual framework underlying the preparation of financial accounting information, and the theories and propositions on the use of such information by investors, regulators, standard setters, and other corporate stakeholders.
Prerequisite: Accounting 643.

**Accounting 765** H(3-0)

*Managerial Control Systems*
Emphasis is placed on how managers use planning and control to accomplish a firm's strategies. Uses a case approach to management control systems explaining the usefulness of accounting data from a managerial perspective.
Prerequisite: Accounting 661

**Accounting 789** H(3S-0)

*Seminar in Accounting*
Development of and solutions to current issues and problems in accounting.
Prerequisite: Accounting 603 or consent of the business school.
MAY BE REPEATED FOR CREDIT

**Accounting 797** H(3S-0)

*Advanced Seminar in Accounting*
Advanced accounting research topics.
Prerequisite: Consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

PhD Course

**Accounting 799** H(3S-0)

*Doctoral Seminars in Accounting*
799.01. Seminar in Financial Accounting
799.02. Seminar in Managerial Accounting
799.04. Seminar in Taxation

## Business and Environment (BSEN)

**Business and Environment 691** H(3-0)
(Civil Engineering 691)

*Fundamentals of Project Management*
Application of management principles to the project environment; planning, control, scope, time and cost processes; project organization and human resource issues. Students review a current major capital project and submit and defend a project report.
Prerequisite: Consent of Program Director.

**Business and Environment 719** H(3-0)

*Project External Issues*
Projects will focus on the effects of external factors on business. External factors may include corporate influences; financial interfaces; sources of funds; lending environment, owner's and lender's risks; government involvement; regulatory requirements; public interfaces; public information; compensation; project commissioning.
Prerequisite: Business and Environment 691.

**Business and Environment 749** H(3-0)

*Rediscovering Leadership: The Haskayne Wilderness Retreat*
One-week intensive wilderness retreat combines experiential outdoor activities and personal growth challenges with cross-cultural first nations teachings and ceremonies to deliver core leadership skills for social responsibility and sustainable development.

**Business and Environment 751** H(3-0)
(formerly Strategy and General Management 789.12)

*Strategies for Sustainable Development*
The strategic context for making business decisions with respect to sustainable development issues. The role of sustainability in economic development, international trade relations and emerging technologies. Stakeholder perspectives and the effect of environmental and social issues on industrial performance.

**Business and Environment 753** H(3-0)
(formerly Strategy and General Management 797.04)

*Managing Social and Environmental Issues in the Global Market Place*
Canadian companies operating in the international arena find themselves faced with an increasingly complex array of social and environmental risks that threaten their strategic objectives. This course examines this new class of strategic corporate risks through a review of changes in international sustainable development policy initiatives, changes in communications, the emergence of an environmental and social activist sector, and the interaction of these factors resulting in new international business risk challenges. The course uses lectures, cases, simulations and class discussion of theories and concepts.

**Business and Environment 761** H(3-0)

*Ethics and the Professional Manager*
The role of values in business decision making; alternative moral codes and their principles; moral principles as decision tools, and reasoning through moral dilemmas; role of business in society; specific issues in business ethics; application through cases and exercises.

**Business and Environment 777** H(3-0)

*Global Environment of Canadian Business*
Economic, political, social and legal factors affecting management decisions. Topics may include Canada in the world economy, business and government relations, business ethics, and legal environment for business. Develops knowledge and ability to analyze and deal with complexities of the business environment.
Corequisite: Strategy and Global Management 701 or consent of the Haskayne School of Business.

**Business and Environment 789** H(3S-0)

*Seminar in Business and Environment*
Study and discussion of current research literature and contemporary issues on topics related to Business and Environment.
MAY BE REPEATED FOR CREDIT

**Business and Environment 793** H(3-0)

*Legal Environment of Business*
The study of the various areas of business law. Topics may include contracts, patents and copyrights, product liability, incorporation, and other relevant legal issues.
Prerequisites: Human Resources and Organizational Dynamics 601, Operations Management 601, Management Information Systems 601, Accounting 601 or equivalent.

**Business and Environment 797** H(3S-0)

*Advanced Seminar in Business and Environment*
Prerequisite: Consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

## Entrepreneurship and Innovation (ENTI)

**Entrepreneurship and Innovation 781** H(3-0)

*Introduction to Entrepreneurship*
An experience based course covering the prestart-up stage of business development through group projects and case studies designed to provide experience based skill development in creativity, idea generation, and feasibility analysis.

**Entrepreneurship and Innovation 783** H(3-1)

*Opportunity Development*
A project and case based course designed to explore concepts of opportunity development.

**Entrepreneurship and Innovation 785** H(3-0)

*Venture Development*
A project based course designed around the formation of business concepts in the formalization of a business plan.
Note: Credit for both Entrepreneurship and Innovation 785 and Management Studies 797.81 will not be allowed.

**Entrepreneurship and Innovation 787** H(3-0)

*Applied Business Analysis*
Approaches to advising new and existing ventures on effective venture development. Projects will involve the student conducting analysis of several ventures and providing advice to them.
Prerequisite: Marketing 601 or consent of the Haskayne School of Business.

**Entrepreneurship and Innovation 791** H(3-0)
(formerly Entrepreneurship and Innovation 797.01)

*Technology Commercialization*
The process of taking a technology product or service from development to the market, including market strategies, finding investors and potential early customers, the role of advisors, legal issues and the importance of the exit strategy for founders and early stage investors. Students will be required to complete a major project to write a feasibility study for a new technology or a case study of a successful technology venture.

**Entrepreneurship and Innovation 793** H(3-0)
(formerly Entrepreneurship and Innovation 797.03)

*Technology and Innovation Management*
The dynamics of innovation as the primary driving force within firms and modern industrialized economies. Potential concepts are: incremental versus radical innovations, market-pull versus technology-push theories, dominant designs, technological trajectories, key factors for successful innovation. The emergence of new technologies; the importance of national and regional innovation systems; the role of science, regulations and social pressure in innovations dynamics; knowledge management; and implications for firms in rapidly changing industrial settings may be discussed.

**Entrepreneurship and Innovation 797** H(3S-0)

*Advanced Seminar in Venture Development*
797.02. Strategic Legal Planning for New Ventures
Prerequisite: Consent of the Haskayne School of Business.

**Entrepreneurship and Innovation 799** H(3S-0)

*Doctoral Seminars in Venture Development*
799.01. Entrepreneurship: The State of the Art
799.02. Conceptual Models and Theories of New Venture Development
799.03. Special Topics in Entrepreneurship and Innovation
799.04. Advanced Topics in Entrepreneurship

## Finance (FNCE)

**Finance 601** H(3-1)

*Managerial Finance*
The major decision-making areas confronting modern financial managers today. Provides a general understanding of financial markets and how they can be used for personal finance. Covers traditional subjects such as capital budgeting, net present value, risk/return, capital structure and dividend policy. Topical areas covered are IPOs, mergers and acquisitions, derivatives and options. The course is integrated with current events from the financial world.
Prerequisite: Management Studies 609 or Accounting 601.

**Finance 745** H(3-0)

*Futures and Options*
After presenting basic definitions, institutional details, and strategies, a general theory of derivative pricing based on the principle of No Arbitrage will be developed. This theory will then be applied to the basic derivative contracts (futures, forwards, put options and call option) as well as exotic options. Using the binomial model, as well as the continuous time model of Black Scholes, hedging and replication will also be examined.
Prerequisite: Finance 601.

Finance 751 H(3-0)

*Advanced Topics in Financial Administration*
Classical and contemporary topics in the theory and practice of financial management including capital structure, cost of capital, real options valuation, bankruptcy costs and debt holder-equity holder conflicts, corporate financial strategy, managerial incentives and financial decisions, information conveyed by financial decisions, and mergers and acquisitions.
Prerequisite: Finance 601.

Finance 753 H(3-1)

*Problems in Financial Management*
The application of financial management principles to actual problems mainly in the corporate sector, including such areas as working capital, management, short, intermediate and long-term financing problems, dividend policy and reorganization.
Prerequisite: Finance 601.

Finance 755 H(3-1)

*Capital Budgeting*
Capital investment policies, real options, required rate of return calculation, tax factors, risk analysis, buy versus lease, abandonment considerations.
Prerequisite: Finance 601.

Finance 757 H(3-0)

*Management of Financial Institutions*
Financial intermediaries such as banking and brokerage. Explains the risks faced by institutions and the integration through modern financial markets. Covers issues such as lending, trading, securitization, deposit insurance and the regulatory environment. Concludes with modern bank management from the shareholder value point of view.
Prerequisite: Finance 601.

Finance 759 H(3-1)

*Investment and Portfolio Management*
Theory and analysis of investment and portfolio management decisions. Evaluation of performance of individual and professional investors and portfolio managers.
Prerequisite: Finance 601.

Finance 765 H(3-0)

*Mergers and Acquisitions*
A study of economic theory and practical issues around takeover strategies, and takeover defence strategies. Valuation issues, corporate restructuring, corporate governance, and methods of ensuring congruence between management and shareholder goals are also discussed.
Prerequisite: Finance 751 or consent of the Haskayne School of Business.

Finance 767 H(3-0)

*Financial Risk Management*
A framework for evaluating financial risks and managing them with the use of financial securities including derivatives. Includes firm valuation with risk management, value-at-risk, testing financial models, optimal hedging strategies, energy risk management, market risk, static versus dynamic strategies, interest rate risk, credit risk and liquidity risk. Case analysis of financial disasters due to risk management failures.
Prerequisite: Finance 601.

Finance 785 H(3-0)

*New Venture Finance*
Problems of valuing and financing new ventures. Emphasis on financial theory, best practices and modeling of new ventures. Case studies and opportunities to develop detailed financial plan for live new venture.
Prerequisite: Finance 601 or consent of the Haskayne School of Business.

Finance 789 H(3S-1)

*Seminar in Financial Management*
Intensive study and discussion of current literature and research with respect to selected, advanced topics in Finance.
MAY BE REPEATED FOR CREDIT

Finance 795 H(3-0)

*International Finance*
A study of the international financial environment and the issues firms face when operating in this environment. Currency regimes, currency crises, balance of payments, exchange rate and interest rate parity conditions, supernational agencies, political risks, management of foreign exchange exposure are some of the major topics studied.
Prerequisite: Finance 601.

Finance 797 H(3S-0)

*Advanced Seminar in Finance*
Prerequisite: Consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

PhD Course

Finance 799 H(3S-0)

*Doctoral Seminars in Finance*
799.01. Theory of Finance
799.02. Empirical Methods in Finance
799.03. Topics in Finance
799.04. Financial Engineering

## Human Resources and Organizational Dynamics (HROD)

Human Resources and Organizational Dynamics 601 H(3-0)

*Managing Human Resources*
Survey course on managing the human side of business. Development of leadership and team skills.

Human Resources and Organizational Dynamics 631 H(3-0)

*Managing Human Resources from a Strategic Perspective*
Integrated coverage of human resource management theory, practice and research as it applies to the strategic management of organizations.
Prerequisite: Human Resources and Organizational Dynamics 601.

Human Resources and Organizational Dynamics 691 H(3-0)

*Project Team Building and Interpersonal Skills*
Leadership style and behaviour; interpersonal effectiveness and self-awareness; project teams; group dynamics; organizational change; application to the project environment.
Note: Available only to students in the MEng Program (Project Management). Not open to students in the MBA Program.

Human Resources and Organizational Dynamics 721 H(3-1)

*Advanced Leadership and Technical Skills*
Covers increasing self-awareness, self-understanding and presentation of self. The interpersonal skills necessary for group effectiveness, team management and performance leadership will be analyzed and developed through small group exercises.
Prerequisite: Human Resources and Organizational Dynamics 601.

Human Resources and Organizational Dynamics 723 H(3-1)

*Organizational Change and Development*
Diagnosing organizational situations where the need for change exists and facilitating such changes. Utilization of behavioural science knowledge for organizational problem-solving.
Prerequisite: Human Resources and Organizational Dynamics 601.

Human Resources and Organizational Dynamics 725 H(3-0)

*Organizational Analysis and Design*
Application of knowledge of organizational theory and behaviour to organizational analysis and design. Emphasis will be placed on the acquisition of the required analysis and design skills based on an understanding of how organizations are structured, how they function and their relationships with their environment.
Prerequisite: Human Resources and Organizational Dynamics 601.

Human Resources and Organizational Dynamics 727 H(3-0)

*Competitive Advantage Through People*
Analysis of the interdependencies and theoretical foundations of staffing and development programs, design and administration of reward compensation systems and performance management programs from the orientation of professional human resources management.
Prerequisite: Human Resources and Organizational Dynamics 601.

Human Resources and Organizational Dynamics 729 H(3-0)

*Workplace Issues*
Examination of the employment relationship, with a focus on controversial and significant topics in the workplace. Coverage may include: unjust dismissal; drug and alcohol testing; computer and internet policies; privacy and surveillance; impact of unions; disability and accommodation; and workplace violence. Modular format with modules customized to meet student interests.
Prerequisite: Human Resources and Organizational Dynamics 601.

Human Resources and Organizational Dynamics 731 H(3-0)

*Lifework Planning and Career Assessment*
Persons demonstrate competency in personal and career development by their ability to take personal responsibility for the quality of their lives. Students will clarify their competencies and values and plan for dealing with the challenges faced by mature adults.
Prerequisite: Human Resources and Organizational Dynamics 601.

Human Resources and Organizational Dynamics 741 H(3-0)

*Managerial Decision Making*
Examines how decisions are made in organizations and how these decisions can be made more effectively, particularly at the top management and Board levels. Decision making in current business contexts are explored by way of simulations, case analyses, discussions, debates and written assignments.

Human Resources and Organizational Dynamics 745 H(3-0)

*Cross Cultural Leadership and Human Resources Management*
Leadership of human resources in a cross-cultural and international context; the nature of cultural differences; influence on organizational processes and practices such as communication, leadership, decision-making, team dynamics, staffing, performance management and organizational design, and implications for those holding international managerial roles.

Human Resources and Organizational Dynamics 789 H(3S-0)

*Seminar in the Management of Human Resources*
Intensive study and discussion of current literature, research and issues with respect to selected topics in the management of human resources.
Prerequisite: Human Resources and Organizational Dynamics 601 or consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

Human Resources and Organizational Dynamics 793 H(3-0)

*Business Negotiations*
The major concepts and theories of negotiation; the dynamics of interpersonal and intergroup conflict; analysis of negotiation strategies and individuals styles. Application to a broad range of business negotiations. Use of simulations and written assignments.
Prerequisite: Human Resources and Organizational Dynamics 601.

Human Resources and Organizational Dynamics 797 H(3S-0)

*Advanced Seminar in Human Resources and Organizational Dynamics*
Prerequisite: Consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

PhD Course

Human Resources and Organizational Dynamics 799 H(3S-0)

*Doctoral Seminars in Human Resources and Organizational Dynamics*
799.01. Organizational Behaviour
799.02. Organization Theory
799.03. Industrial Relations
799.05. Interorganizational Relationships: Creating and Managing Strategic Alliances

## Management Information Systems (MGIS)

Management Information Systems 601 H(3-1)

*Management Information Systems*
The fundamental role of information systems (IS) and Information Technologies in leading and managing effective organizations. Strategic, tactical and operational aspects of IS are covered, focusing on their impact on managerial decision processes across a range of business contexts. Topics highlight the development, control, impact and evaluation of IS activities from the individual to the societal level of analysis.

Management Information Systems 725 H(3-0)

*e-Technology*
Technical and managerial issues related to buying, building, and implementing e-technology to enable various organizational and business strategies and relationships including business-to-business, business-to-customer, business-to-employee and employee-to-employee strategies. Topics include: systems internetworking, information management, systems integration, wireless technologies, transmission security and authentication, project management, software design, technology diffusion and evaluation, technology-enabled business process design, and legal and ethical issues.
Prerequisite: Management Information Systems 601.

Management Information Systems 735 H(3-0)

*Systems Analysis and Design*
Planning and implementation of network-enabled (i.e. Intranet and Internet) solutions to facilitate information and knowledge transfer across business environments. Reflects the information explosion of recent years, the new technological advances in information systems, and the exponential growth in electronic business processes. Course emphasis is placed on the management of technology-enabled business processes.
Prerequisite: Management Information Systems 601.

Management Information Systems 737 H(3-0)

*Enterprise Data Management*
Data systems, technologies and management issues associated with information design, capture, storage, search, and dissemination to various stakeholders of an organization. Includes database management technologies, data modelling tools, interface design, structured query language, document and knowledge management systems, and information backup, security and disaster recovery. Brief aspects of the course explore linkages with Internet-based technologies, design issues, web services, search strategies and telecommunication systems for information delivery (wireless and wired; intranet, extranet, and internet).
Prerequisite: Management Information Systems 601.

Management Information Systems 743 H(3-0)

*Telecommunications*
Basic telecommunications and data communications concepts relevant to organizations. Fundamentals of analog and digital signalling and transmission. Wide and local area networking. Protocols and standards; telecommunication applications. The role of the Internet in organizations.
Prerequisite: Management Information Systems 601.

Management Information Systems 797 H(3S-0)

*Advanced Seminar in Management Information Systems*
Prerequisite: Consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

PhD Course

Management Information Systems 799 H(3S-0)

*Doctoral Seminars in Management Information Systems*
799.01. PhD Seminar I in Management Information Systems
799.02. PhD Seminar II in Management Information Systems
799.03. PhD Seminar III in Management Information Systems
799.04. PhD Seminar IV in Management Information Systems

## Management Studies (MGMT)

Management Studies 611 H(3-0)

*Managerial Economics*
Introduction to economic models for business decision making. Models from microeconomics are applied to provide insight in understanding costs, pricing, industry structure, and competitive interaction. Information economics is used to illustrate principal-agent problems that commonly arise in a business context. Macroeconomic models of supply and demand are applied to illustrate how government policy affects inflation and exchange rates.

Management Studies 613 H(3-0)

*Managerial Decision Modelling*
The transformation of raw data into useful information for decision-making. Quantitative models are implemented with spreadsheets to develop skills in generating managerial insight from data and in dealing with uncertainty. Topics covered include basic probability and statistics, decision trees, regression analysis, optimization, and simulation.

Management Studies 715 H(3-0)
(formerly Management Studies 615)

*Strategic Business Analysis*
Introduction to strategic analysis. Integration of learning from various management disciplines through a "field experience" study of a business firm.
Prerequisite: Strategy and Global Management 601.
Note: Credit for both Management Studies 715 and Management Studies 615 will not be allowed.

Management Studies 741 H(3-0)

*Business Process Improvement and Creative Problem Solving*
Business process improvement and creative problem solving as critical components of competitiveness. The adjective "business' is used to indicate that the course emphasizes improvements in non-manufacturing processes (of relevance to all organizations) in such areas as development, distribution, financial accounting/planning, order entry, personnel, and purchasing. Topics covered include the relationship to Total Quality Management and Time-Based Competition, incremental versus radical improvement, selection of key processes for study (including bench-marking and the role of capacity constraints), process flow diagramming, Pareto analysis, cause-and-effect analysis, statistical control charts, affinity diagrams, and steps in creative problem solving. Team exercises and projects make up a substantial portion of the course.
Prerequisite: Operations Management 601 or equivalent.

Management Studies 743 H(3-0)

*International Logistics*
The management functions of physical distribution, procurement and production are examined in a global context. Management of these activities must reflect the major structural changes taking place in the world. Increasing growth in international trade heightens the level of international purchasing and logistics activities, demanding that the future manager exploit global sourcing and production opportunities and configure a supply chain management system that provides excellent, cost-effective service on a world-wide basis. Both theoretical and practical approaches are applied to the wide array of topics in global manufacturing, sourcing and distribution.
Prerequisite: Operations Management 601 or equivalent.

Management Studies 751 H(3-0)

*Global Energy Finance and Accounting*
Problems related to evaluating and financing energy enterprises. Financial and accounting principles applied to valuing and financing energy projects. Financial reporting, managerial control systems, theory of financing, valuation, and deal structuring. Focus on private sector energy enterprises.
Prerequisites: Accounting 603 and Finance 601.

Management Studies 761 H(3-3T)
(formerly Finance 789.02)

*Personal Financial Management in Canada*
Introduction to personal financial management in Canada. Goal setting, personal financial statements analysis, the time value of money, the Canadian personal income tax system, taxation issues for small businesses, risk management, an overview of investments, retirement planning and estate planning. Completion of a personal financial plan by the end of the course.
Prerequisite: Finance 601 or equivalent.
Note: May not be used as part of a student's major in Finance.

Management Studies 790 UPDATED Q(3-0)

*Seminar in Management Studies*
Intensive study and discussion of current literature and research with respect to selected topics in Management Studies.
Prerequisite: Consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

Management Studies 797 UPDATED H(3-0)

*Directed Graduate Study in Management*
Coverage of various topics on the basis of student and faculty interest.
Prerequisite: Consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

PhD Courses

Management Studies 701 UPDATED H(3-0)

*Research Methods in Management*
Research design and techniques in management that will prepare students to conduct their research projects.

Management Studies 773 H(3-0)

*Multivariate Analysis in Management*
Multivariate Analysis in Management is concerned with the study of association among sets of measurements. This multivariate statistics course is intended primarily for PhD students in Management although MBA (Thesis) students pursuing an empirical-based thesis can also benefit. The objective of this course is to introduce graduate students to a variety of multivariate statistical techniques and methods to enable them to effectively carry out an empirical research study in management including the business, public, and not-for-profit sectors. Topics include: introduction to research design and multivariate methods, linear regression, logistic regression, analysis of variance and convariance, multivariate analysis of variance, discriminant analysis, principal components analysis, common factor analysis, and additional multivariate topics if time permits. The technical level of treatment would require basic understanding of matrix and linear algebra and at least one first level course in statistics. Such preliminary technical understanding will be helpful to appreciate the theory and intuition behind the multivariate techniques. A good blend of technical, conceptual, and practical aspects (using SPSS software) of the course will be maintained.
Prerequisite: Consent of the Haskayne School of Business.

Management Studies 781 H(3-0)

*Philosophy of Science in Management Studies*
Historical and critical perspectives of classical issues in philosophy of science, nature of scientific explanation, confirmation of scientific theories, theories of truth, distinctions between science and non-science.
Prerequisite: Consent of the Haskayne School of Business.

Management Studies 783 H(3-0)

*Advanced Research Methodology and Methods*
Research methodology relevant to examination and testing of theoretical and applied issues in management. The development and testing of research concepts; research operations, designs and analysis.
Prerequisite: Consent of the Haskayne School of Business.

Management Studies 789 H(3S-0)

*Seminar in Management Studies*
Intensive study and discussion of current literature and research with respect to selected topics in Management Studies.
Prerequisite: Consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

Management Studies 791 H(3-0)

*Management Education Seminar*
Curricular and course design, instructional techniques, instructional tools, teaching styles, career Q3planning and professional ethics. Nature, role and function of universities, and business schools, business school relations.
Prerequisite: Consent of the Haskayne School of Business.
Note: Doctoral students whose supervisors are members of the Haskayne School of Business are required to register in this seminar in the second year of doctoral studies.
NOT INCLUDED IN GPA

Management Studies 792 F(1-2)

*Research Development*
Development of research skills through participation in a well defined project under the direct supervision of an experienced researcher.
Prerequisite: Management Studies 781 or 783 or equivalent.

Management Studies 793 H(3S-0)

*Conceptual Frameworks of the Enterprise*
Advanced, comparative institutional analysis to explain the choice of the firm's boundaries, the governance mechanisms to manage the interface with the external environment and the internal organizational design, so as to reduce transaction costs and facilitate value creation.
Prerequisite: Consent of the Haskayne School of Business.

Management Studies 799 H(3-0)

Topics in Management Studies
Coverage of various topics on the basis of student and faculty interests.
Prerequisite: Consent of the Haskayne School of Business
MAY BE REPEATED FOR CREDIT

Marketing (MKTG)

Marketing 601 H(3-0)

*Marketing Management*
An introductory course on marketing management with an emphasis on marketing concept as the focus of business strategy. The decision variables as well as functional frameworks used by marketing managers are emphasized by concentrating on the relationship between business and consumers.

Marketing 735 H(3-0)

*Marketing Communications*
Evaluation of strategic roles of a variety of communication disciplines - such as advertising, direct response advertising, sales promotion and public relations - and how companies combine those disciplines to provide clarity, consistency, and maximum impact.
Prerequisite: Marketing 601.

Marketing 741 H(3-0)

*Business-To-Business Marketing*
Management issues in the marketing of products and services to business, government and industrial customers. Topics include organizational buying behaviour, industrial market segmentation, demand

analysis and sales forecasting, development and implementation of an industrial marketing mix.
Prerequisite: Marketing 601.

Marketing 761 H(3-0)

*Buyer Behaviour*
Study of factors influencing buyer decision-making processes and purchase behaviours, with implications for marketing practice.
Prerequisite: Marketing 601.

Marketing 763 H(3-0)

*Marketing Research*
Study of research as a process for gathering market information to aid problem solving. Steps in the research process reviewed include problem definition, research design, data collection, data analysis and report preparation.
Prerequisite: Marketing 601.

Marketing 783 H(3-0)

*Services Marketing and Management*
Study of processes and practices relevant to strategic firms using service for competitive advantage. Focuses on the integration of marketing, operations, and human resources from the consumer's perspective.
Prerequisite: Marketing 601.

Marketing 785 H(3-0)

*New Venture Marketing*
Within the context of high-potential, high growth ventures, examines four pillars of new product/new business opportunity. How to create value for the customer, solve significant problems through product and service design, measure sustainable financial value, and assess fit of new ideas with entrepreneur / organization. Emphasis on discovering market opportunities and exploring product or service feasibility.
Prerequisite: Marketing 601.

Marketing 789 H(3S-0)

*Seminar in Marketing Management*
Intensive study and discussion of current literature and research with respect to selected, advanced topics in marketing.
Prerequisite: Marketing 601 or consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

Marketing 793 H(3-0)

*Strategic Market Planning*
Strategic market planning in a corporate context. Developing marketing plans and understanding implementation. Examining the market management process.
Prerequisite: Marketing 601.

Marketing 795 H(3-0)

*International Marketing*
Design and implementation of marketing strategies across countries. Focuses on the global marketing environment and decision issues on foreign market entry, local marketing and global management of marketing activities.
Prerequisite: Marketing 601.

Marketing 797 H(3S-0)

*Advanced Seminar in Marketing*
Prerequisite: Consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

PhD Course

Marketing 799 H(3S-0)

*Doctoral Seminars in Marketing*
MAY BE REPEATED FOR CREDIT

## Operations Management (OPMA)

Operations Management 601 H(3-0)

*Operations Management*
Management of the production and/or service delivery system of the organization in concert with marketing, human resources, finance, and information systems. Management decision making on a continuum from day-to-day operating decisions such as inventory and quality control to long-term strategic decisions like capacity and location planning. Topics covered in the course may include operations strategy, product/service design and inventory and supply chain management.

Operations Management 715 H(3-0)

*Management Science Using Spreadsheets*
The modeling and analysis of quantitative problems from a variety of fields within business, with emphasis on insight for decision making. Use of optimization, simulation, decision analysis, and other techniques in spreadsheets. Spreadsheet engineering as an approach to reducing spreadsheet errors. Case studies are used to develop skill in dealing with incomplete and ambiguous information.
Prerequisite: Management Studies 613.

Operations Management 719 H(3-0)

*Project Procurement and Logistics*
Procurement planning activities; commercial practice; tendering; bid evaluation; negotiation and award; contract administration; logistics management; transportation; warehousing and inventory management; modularization; regulatory requirements; customs; claims.
Prerequisite: Strategy and Global Management 691.

Operations Management 743 H(3-0)

*Simulation of Operational Systems*
Computer simulation as a decision-making methodology for all areas of organizations. Topics include model development and validation, design of simulation experiments, generation of appropriate values of random variables, interactive procedures and interpretation of results. A user-oriented language is utilized and an applied project is carried out.
Prerequisites: Operations Management 601 and Management Studies 613.

Operations Management 745 H(3-0)

*Operations Planning and Supply Chain Management*
An in-depth treatment of inventory management and operations planning as related to supply chain management. Topics treated include commonly used inventory control systems, various extensions of the basic economic order quantity model, aggregate planning, materials requirement planning, production scheduling, just-in-time manufacturing, and managing materials along the supply chain. Case studies will be used as well as illustrations of spreadsheet modelling.
Prerequisites: Operations Management 601 and Management Studies 613.

Operations Management 797 H(3S-0)

*Advanced Seminar in Operations Management*
Prerequisite: Consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

PhD Course

Operations Management 799 H(3S-0)

*Doctoral Seminars in Operations Management*
799.02. Tactical Research Issues
799.03. Operational Research Issues

## Risk Management and Insurance (RMIN)

Risk Management and Insurance 763 H(3-0)
(formerly Finance 763)

*Managing Risks and Disasters*
Risk management strategies with emphasis on the management of operational and hazard risks. Topics include risk identification and assessment; organizational responsibility for risk management; risk mitigation; risk financing; crisis management; and business continuity planning.
Prerequisite: Consent of the Haskayne School of Business.

## Strategy and Global Management (SGMA)

Strategy and Global Management 601 H(3-0)
(formerly Strategy and Global Management 701)

*Strategic Management I*
The role of the CEO and other senior executives in formulating and implementing corporate strategies, and provides an overview of key strategic issues and topics. Covers such areas as industry analysis executive leadership, corporate strategy, corporate diversification, strategic change, global strategy, mergers and acquisitions, and strategic implications of new technologies.
Note: Credit for both Strategy and Global Management 601 and 701 will not be allowed.

Strategy and Global Management 725 H(3-0)

*e-Strategy*
The impact of internet technology on strategic management of large corporations. How the technology influences industry structure and how it drives companies' competitive strategies and their organizational structures and systems. Explores the implications for strategic leadership in organizations.
Corequisite: Management Information Systems 725.

Strategy and Global Management 751 H(3-0)

*Strategic Management in the Global Energy Industry*
Characteristics of the energy industry. Major strategic issues facing top management teams in corporations involved in oil and gas and power businesses and relevant strategic tools for addressing them. Industry structure, energy value chain, key players and their strategies, industry dynamics and trends, supply and demand, expansion, M&As, roles of governments, major technological drivers, organization and top management leadership.
Corequisite: Strategy and Global Management 701.

Strategy and Global Management 775 H(3-0)

*International Business Environment*
The environment which influences international business activities including economic, legal, political and socio-cultural factors. Foreign direct investment in Canada will also be considered.

Strategy and Global Management 789 H(3S-0)

*Seminar in Strategy and Global Management*
Study and discussion of current research literature and contemporary issues on topics related to Strategy and Global Management in the private and/or the public sectors.
MAY BE REPEATED FOR CREDIT

Strategy and Global Management 795 H(3-0)

*Strategic Management II*
Application of strategic concepts and frameworks of analysis. Decisions and the processes to mobilize resources for the attainment of objectives. Measurement of performance through industry and competitive analysis.
Prerequisite: Strategy and Global Management 701 or consent of the Haskayne School of Business.

Strategy and Global Management 797 H(3S-0)

*Advanced Seminar in Strategy and Global Management*
Prerequisite: Consent of the Haskayne School of Business.
MAY BE REPEATED FOR CREDIT

PhD Course

Strategy and Global Management 799 H(3S-0)

*Doctoral Seminars in Strategy and Global Management*
799.01. Survey of the Field
799.02. Corporate and Competitive Strategy
799.03. Current Topics in Strategic Management
799.04. Business Environment
799.05. Interorganizational Relationships: Creating and Managing Strategic Alliances

Tourism and Hospitality Management (TOUR)

Tourism Management 741 H(3-0)
(formerly Tourism and Hospitality Management 741)

*Policy Planning and Development in Tourism*
The planning process. The nature of tourism, and its role in national and regional development. Economic, social, psychological, environmental and technological impacts of tourism on the host community. Trade-offs. Strategies in development. Planning and public policy. National, provincial and local tourism programs. The Alberta example.
Prerequisite: Consent of the Haskayne School of Business.

Tourism Management 745 H(3-0)
(formerly Tourism and Hospitality Management 745)

*International Tourism*
The structure, environment and special characteristics of international tourism. Nature, importance and measurement of country/destination image. Host-visitor interaction. Factors motivating, facilitating and constraining international travel. Types of international tourists and their needs. Measurement, forecasting and promotion of international travel. Major issues and elements of planning for international visitors.
Prerequisite: Consent of the Haskayne School of Business.

PhD Course

Tourism Management 799 H(3S-0)
(formerly Tourism and Hospitality Management 799)

*Doctoral Seminars in Tourism*
799.01. General Fields in Tourism Management
799.02. Special Fields in Tourism Management
799.03. Tourism Policy and Strategy
799.04. Theory in Tourism

## HISTORY HIST

### Contact Info

Location: Social Sciences Building, Room 656
Faculty Number: (403) 220-3839
Fax: (403) 289-8566
E-mail address: histgrad@ucalgary.ca
Web page URL: http://hist.ucalgary.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), course-based and thesis-based

Candidates should apply to the program of their choice, indicating the area of specialization (see section 5 below).

### 2. Admission Requirements

In addition to the requirements of the Faculties of Graduate Studies and Arts, the Department requires:

#### Master of Arts

a) Normally, a four-year undergraduate program with honours or a major in history. Usually this entails at least seven full-year History courses (or fourteen half-courses). Credit may be given for up to two half-courses in other disciplines, if appropriate for the proposed area of study.
b) A minimum admission grade point average of 3.40 on a four-point scale over the final 10 FCE of the undergraduate degree
c) A copy of a historical research paper, preferably graded, normally at the senior undergraduate level
d) A 250-word (minimum) statement of research interest including research topics in the major field and the reasons for pursuing a post-graduate degree in history
e) Two Reference Letters

#### Doctor of Philosophy

a) Normally, a completed four-year undergraduate program with honours or a major in history and a completed Master's degree or the equivalent in history or in a related discipline
b) A grade point average of 3.70 on a four point scale in history at the graduate level
c) A detailed statement of research interests, career goals, and ideas for the thesis topic
d) A sample of written work, normally a Master's thesis chapter or a major research paper completed at the Master's level
e) Two Reference Letters

### 3. Application Deadline

Deadlines for the submission of complete applications:
15 January for September admission and funding
15 April for September admission only

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

### 5. Program/Course Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the Department requires:

#### Master of Arts (thesis-based)

a) A minimum of one year of full-time study at the University of Calgary
b) Three full-course equivalents (including History 690) in two semesters of course work. Masters students will complete their coursework through regularly offered History seminars.

Areas of specialization are: Canada, Europe, Latin America, United States, Britain, Imperial India, China, Atlantic History, History of Science, Intellectual History, Military-Diplomatic History, Political History, Popular Culture, Religious History, History of Gender and Sexuality, Social History, and Western Canada/Borderlands/Frontier.

Students in the Departments of History, Political Science, Religious Studies and the Centre for Military and Strategic Studies may choose an interdisciplinary specialization in Israel Studies. For further information on the Israel Studies (Interdisciplinary) specialization, see the separate listing in this Calendar.

In cooperation with the Department of Philosophy, the History Department offers a Masters of Arts degree in the History and Philosophy of Science. Students who choose this concentration are required to take courses in the relevant departments. Candidates enrolled in the Department of History are expected to work with more than one instructor in History.

Students must take one half-course seminar in a field unrelated to the student's research interests. In instances where there are no seminars being offered in the student's research field, students may, with permission of the chair of graduate studies, take one 500-level undergraduate seminar but on the understanding that extra course work will be required.

The Graduate Studies Committee may vote to allow students to enroll in History 691 directed reading courses after reviewing a written request from the student's supervisor.

c) A thesis of 80 to 150 pages, including notes, charts, tables and appendices, but excluding bibliography. Students begin thesis preparation as they undertake their course work and may fulfill the requirements for their Master of Arts degree in twelve months.
d) A demonstration of reading knowledge of a second language related to the major field of study prior to the oral thesis defence

#### Master of Arts (course-based)

There is no full-time requirement for this program.

a) A minimum of six full-course equivalents; two may be senior undergraduate courses at the 500-level, two must be graduate seminars and at least two are to be graduate seminars in a secondary field
b) Completion of History 690 in the first year and History 651 and History 653 in the final year of program
c) A 50–60 page research paper prepared in the final year and defended in an oral examination
d) A demonstration of reading knowledge of a second language related to the major field of study before the oral examination.
e) Completion of at least one-half course per semester

#### Doctor of Philosophy

a) A minimum of two years of full-time study at the University of Calgary
b) Three full-course equivalents at the graduate level,

including courses in the major, minor and cognate fields. Doctoral students are required to complete 2.5 FCE in History coursework at the graduate level, of which at least 1 FCE must be completed in the major field and one-half course in the minor field. Doctoral students must also complete one-half course in a cognate field. The fields will be defined in detail by the supervisor and the student in consultation with the Supervisory Committee and must be approved by the Department Graduate Studies Committee. During the candidacy examination, the student will demonstrate a comprehensive understanding of the major and minor fields as well as his or her particular area of research.

The minor field will be selected from an area of history outside of the major field. The cognate/thematic field will consist of a non-history discipline. The reading list for a thematic history field will span three geographical areas. The availability of minor fields will depend on faculty members' expertise. Each of a student's fields must be taught by a different faculty member or as defined by the committee.

*Major fields:* Canada; History of Science, Latin America; Medieval and Early Modern Europe; Military/Diplomatic Modern Europe and Britain; United States; World.

*Minor Fields* (to be chosen from outside of Major Field): Canada; History of Science; Latin America; Medieval and Early Modern Europe; Military/Diplomatic; Modern Europe and Britain; United States; World.

*Cognate Course:* Students will complete one half course of graduate level coursework in a field outside of History. A student's cognate course will be determined in consultation with the supervisor.

c) A thesis normally of 400 pages, including notes, charts and tables, but excluding bibliography and appendices
d) A reading knowledge of one language other than English.
e) Written and oral candidacy examinations in major and minor fields. In addition to these fields, a faculty member outside of History, preferably from the field covered in the cognate course, will serve on the candidacy examination committee. The History Department urges candidates to take candidacy examinations within 20 months of first registration. Examinations must be completed within 28 months of first registration.

The doctoral program consists of two terms of coursework relevant to the major and minor fields, and cognate course. During the third and fourth terms, students read for the candidacy examinations. Four to five terms of thesis preparation will normally follow. Students who have not taken History 690 or its equivalent will be required to take it as part of their program in the first year and in addition to the requirements above.

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

Students enrolled in the part-time course-based Master of Arts program may take two of the required six full-course equivalents at the 500-level. Students enrolled in the Master of Arts thesis program may apply for no more than one 500-level course for graduate credit, subject to the approval of the Department. Graduate students taking a 500-level course for graduate credit will be required to complete additional assignments.

### 8. Time Limit

Expected completion time is 12 to 20 months for the Master of Arts thesis program, and four years for the doctoral program. Maximum completion time is four years for the Master of Arts thesis program and six years for the course-based Master of Arts and doctoral programs.

### 9. Supervisory Assignments

Upon acceptance into the program, students are assigned an interim supervisor. Each student should select a permanent supervisor, subject to the consent of the faculty member, within three months of entering program. Admission to the Master's and the doctoral programs is dependent upon the agreement of a faculty member to supervise in an interim capacity.

The supervisor establishes a doctoral supervisory committee in consultation with the student. The supervisory committee must be selected within three months of the supervisor's appointment (no later than March of the first year of a program).

### 10. Required Examinations

Doctoral candidacy examinations have a written and an oral component and are taken upon completion of all course and language requirements. Each doctoral student takes one three-hour written candidacy examination within a period of ten calendar days in each of the three fields of study. The supervisory committee, in consultation with the student, sets the subjects. A level of general knowledge consistent with teaching an introductory survey course is expected for each field. The oral candidacy examination is taken no later than twenty calendar days after the last written examination. The department strongly urges candidates to complete their candidacy examinations within 20 months of their first date of registration; candidacy examinations must be taken within 28 months of first registration.

Final thesis oral examinations are open.

### 11. Research Proposal Requirements

In consultation with the supervisory committee, each doctoral student is required to submit a brief thesis proposal which will be discussed and if necessary revised at a meeting of the supervisory committee no later than four weeks before the candidacy exam. The thesis proposal may serve as an additional basis for questioning during the candidacy exam.

### 12. Special Registration Information

Students should plan their courses in consultation with their supervisors, complete the *Course Registration Form* supplied by the department, obtain the supervisor's signature, and bring their course program to the Graduate Coordinator for approval before registration.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their online applications to the Department by 15 January.

### 14. Other Information

Since resources are limited, the Department may, in any year, admit fewer applicants than those who are qualified to undertake graduate studies.

### 15. Faculty Members/Research Interests

The research interests of current faculty can be found http://hist.ucalgary.ca/faculty

### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

**History 501** H(3S-0)

*Topics in the History of British Imperialism*
A thematic and comparative approach to British Imperialism in Africa and South Asia. Topics can include: race, sex and class and the fashioning of imperial cultures, methods of coercion and resistance in imperial territories, medicine and imperialism, and law and imperialism.

**History 502** H(3S-0)

*Empire and Settlement in the British Atlantic World, 1550-1700*
An investigation of the ways the British discovered, established sovereignty over, settled, and used portions of the Atlantic world, circa 1550-1700. Topics include comparative analysis of British and European justifications for claiming new found lands, settlement and migration patterns, and impact upon native peoples and the landscape.

**History 503** H(3S-0)

*Topics in East Asian History*
Topics may include Japanese and Chinese responses to western culture and expansion, ideas, politics.
Prerequisite: One of East Asian Studies 317, East Asia 300, History 209, 301, 315, 317, 405, 407.01, 407.02, 407.03, or consent of the Department.
MAY BE REPEATED FOR CREDIT

**History 505** H(3S-0)

*History of Western Monasticism from 600 to 1500*
The history of monastic spirituality in Western Europe. The origins, nature, and various forms of monasticism and their evolution from the Benedictine to the Friar in the context of the commercial revolution.
Prerequisite: History 319 or 321, or consent of the Department.

**History 506** H(3S-0)

*The Century of the Black Death: Economy, Society and Religion*
A global examination of the fourteenth-century crises: famine, epidemics, civic unrest, warfare, and Papal politics. Selected topics will lead to the comparative study of the period from England, France, Italy and the Holy Roman Empire, with a critical assessment of the impact of the Black Death on late medieval society.
Prerequisites: History 319 or 321 or consent of the Department.

**History 507** H(3S-0)

*Gender and Sexuality in Modern Europe*
An overview of gender theory in modern European history, with emphasis on issues of sexuality.
Prerequisite: A European History course at the 300 or 400 level or consent of the Department.

History 508 H(3S-0)

*Topics in Twentieth-Century German History*
Topics may include: thematic explorations and/or comparisons of dictatorial regimes (Nazi Germany and the German Democratic Republic); the history of the GDR; the two Germanies during the Cold War; memory and memorialization in popular culture; the contested formation of a multicultural society; and social protest in the post-WWII period. For further information on specific topics to be offered in any year, consult the History Department.
Prerequisite: One of History 307, 333, 375, 381, 383, 411.02, 413.02, 483, 485, 490, 491, or consent of the Department.

History 509 H(3S-0)

*Religion, Politics, and Culture in Early Modern Europe*
Topics may include the nature of late medieval religion, the social impact of the Reformations, religious violence and co-existence, and the nature and practice of royal absolutism.
Prerequisite: History 323 or 325 or 327, or consent of the Department.
MAY BE REPEATED FOR CREDIT

History 511 H(3S-0)

*The Age of Enlightenment and the Era of Revolution and Napoleon*
Selected themes from the Enlightenment to revolution including the imperial experience in France and Europe in the eighteenth and nineteenth centuries.
Note: Not open to students with credit in any one or both of HTST 511.01 or HTST 511.02.

History 513 H(3S-0)

*Topics in Modern Russian and Soviet History*
Topics may include: the establishment and dismantling of the imperial service state; the social, cultural, and economic transformation of late imperial Russia; women and gender; the experience of empire; the origins and fate of the Bolshevik Revolution; Stalinism; the Cold War.

History 515 H(3S-0)

*History of the Holocaust*
Nazi persecution and destruction of the European Jews during World War II. Topics will include: the roots of modern anti-Semitism; Nazi policy towards the Jews of Germany in the 1930s; the Nazi "New Order" in occupied Europe; the technology of murder; Jewish resistance; the attitudes/actions of occupied peoples and Allied governments; the war crimes trials.
Prerequisite: History 333 or 413.02 or consent of the Department.

History 517 H(3S-0)

*Social and Political History of Modern Britain*
Topics in social, cultural and political history in early modern and modern times: e.g., the rise of the gentry and the middle class, working class identity, radical ideology and two-party politics.

History 519 H(3S-0)

*Canada from Laurier to Pearson*
Political developments in Canada from 1896-1968, with emphasis on the national scene.
Prerequisite: History 337 or 351 or consent of the Department.

History 520 H(3-0)

*Canada and the First World War*
Discussion topics will focus on the major themes in Canada's Great War military experience, including the Canadian Expeditionary Force's recruitment and training, leadership, tactical doctrine, and integration within the British Expeditionary Force, as well as developments in civil-military relations, conscription politics and the country's postwar military legacy.

History 521 H(3S-0)

*Canadian Biography*
A thematic approach to Canadian personalities, emphasizing the biographer's method and changing interpretations of major Canadian figures, e.g., the prime ministers, prominent women, radicals, prophets, scientists, explorers, entrepreneurs, journalists and artists.

History 523 H(3S-0)

*Topics in Alberta History*
Selected topics in Alberta history with emphasis upon the use of local archival sources.
MAY BE REPEATED FOR CREDIT

History 525 H(3S-0)

*Topics in Canadian Intellectual History*
Ideas of Canadian political, economic, and cultural theorists and social reformers in the late nineteenth and twentieth centuries.
MAY BE REPEATED FOR CREDIT

History 526 H(3S-0)
(Strategic Studies 609)

*The Canadian Military in the Second World War*
Through examination of topics such as leadership and adapting to warfare, this course will examine the Canadian military's ability to cope with the harsh realities of war. Emphasis will be placed on the political parameters imposed by the Canadian government on the military, the quality of Canadian leadership, and the "fit" between British forms of military organization and the fighting quality of Canadian soldiers, sailors and aircrew.
Prerequisites: History 349 or History 431 and consent of the Department.

History 527 H(3S-0)

*History of Canadian Foreign and Defence Policy from 1919 to the Cold War Era*
Selected topics in Canadian foreign policy and defence policy from the end of World War I to the 1980's.
Prerequisite: One course in Canadian History and consent of the Department.

History 529 H(3S-0)

*Topics in Native History*
A history of the Aboriginal peoples of Canada: the First Nations, Inuit and Metis.
MAY BE REPEATED FOR CREDIT

History 531 H(3-0)

*Canadian Historiography*
Major schools of historical writing in Canada: imperial, continental and nationalist interpretations; regional historiography of the Maritimes, central Canada and the West; selected historians and their historical methods.

History 533 H(3S-0)

*Gender History in Canada*
The history of women's diverse experience in Canada will be examined through the study of aboriginal, immigrant, working-class and farm women.

History 535 H(3S-0)

*Topics in American History*
Selected topics in the history of the United States from the colonial period to the present.
Prerequisite: History 359 or 361 or consent of the Department.
MAY BE REPEATED FOR CREDIT

History 541 H(3-0)

*Topics in the History of Science*
Selected aspects of the history of science, e.g., the scientific revolution, science and religion in the seventeenth century, history of scientific methods, studies of individual scientists such as Galileo, Boyle, Newton, or Darwin. For further information in the specific topics to be offered in any year, consult the History Department.
Prerequisite: At least one of the following courses: History 371, 373, 477.01 or 477.02.
MAY BE REPEATED FOR CREDIT

History 543 H(3S-0)

*Topics in Great Power Diplomacy and Intelligence*
An exploration of selected themes in the history of modern statecraft. Topics may include: theories of international relations, war origins, treaty-making, Fascist diplomacy, appeasement, wartime alliances, intelligence and policy, cold war diplomacy. A seminar in which primary sources will be used.
Prerequisite: One of History 483, 485, 489, 491.01, 491.02 or consent of the Department.

History 545 H(3S-0)

*Topics in Military History*
An examination of selected problems in modern military history. Topics may include: military theory; guerrilla warfare from the 18th century to the 20th century; evolution of tactics in World War I; development of military medicine; innovation in European armies; colonial wars.
Prerequisite: One of History 349, 379, 381, 383, 431, 471, 481, 483, 485, 489, 491, or consent of the Department.
MAY BE REPEATED FOR CREDIT

History 565 H(3S-0)

*Slavery in Latin America and the Caribbean, 1492-1888*
Themes may include the slave trade, plantation and urban slavery, resistance and rebellion, women, culture and religion, abolition, free people of colour in slave societies, and the post-abolition legacy.

History 569 H(3S-0)

*Latin America and the Outside World*
The Latin American nations in world affairs with special reference to their intellectual, economic, and political relations with Europe, North America, Africa, and the Pacific Rim. Themes will be drawn from the sixteenth to the twentieth centuries.

History 571 H(3S-0)

*Religion in History*
A thematic approach to religious beliefs, rituals, and behaviour in Europe and North America from the medieval era to the present.

History 583 H(3-0)
(Political Science 583)

*The United States and the World since 1890*
A historical and analytical examination of the development of modern United States foreign policy from the late nineteenth century to the present. Topics include the institutional structure of foreign policy decision-making, including the role of the President, Congress, State Department, Pentagon, and public opinion, and the relationship between domestic politics and foreign policy. Historical dimensions include the turn to imperialism, World War I, the coming of World War II, the Cold War, Korea, Vietnam, Latin American relations, strategic arms limitations talks, and detente.
Prerequisites: Third or fourth year standing and one of History 361, Political Science 381 or consent of the Department.

History 591 H(3S-0)

*Directed Reading and Research*
The analysis of historical problems and the use of primary sources. The content of each course will reflect the interests of the instructor.
Prerequisite: Consent of the Department.
Note: May not be used to fulfill the 500-level requirement for a Major in history without the written consent of the Department.
MAY BE REPEATED FOR CREDIT

History 593 H(3-0)

*Selected Topics in History*
Topics will vary from year to year, and will be announced in advance.
MAY BE REPEATED FOR CREDIT

History 597 H(3-0)

*Honours Directed Reading*
Directed readings for Honours students in their third or fourth year.
Note: Not open to students with credit in History 596.
Note: May be repeated for credit with consent of the Department.
MAY BE REPEATED FOR CREDIT

History 598 F(3-0)

*Honours Special Subject*
The Honours Essay for Honours students in their fourth year.

### Graduate Courses

Only a limited number of these 600-level courses will be offered in any one year. Students may obtain further information from the Department.

History 601 H(3-0)

*Topics in Imperial History*
MAY BE REPEATED FOR CREDIT

History 603 H(3-0)

*Topics in Religious History*
MAY BE REPEATED FOR CREDIT

History 607 H(3-0)

*Topics in Western Canadian History*
MAY BE REPEATED FOR CREDIT

History 623 H(3-0)

*Topics in Canadian History*
An examination of crucial issues in Canada's political, economic, social and cultural history.
MAY BE REPEATED FOR CREDIT

History 633 H(3-0)

*Topics in Modern European History*
MAY BE REPEATED FOR CREDIT

History 637 H(3-0)

*Topics in Military History*
MAY BE REPEATED FOR CREDIT

History 639 H(3-0)

*Topics in History of Science*
Topics may include the scientific revolution, science and religion, and the reception of scientific ideas.
MAY BE REPEATED FOR CREDIT

History 641 H(3-0)

*Topics in Medieval or Early Modern European History*
MAY BE REPEATED FOR CREDIT

History 645 H(3-0)

*Topics in U.S. History*
MAY BE REPEATED FOR CREDIT

History 647 H(3-0)

*Topics in Latin American History*
MAY BE REPEATED FOR CREDIT

History 651 H(3S-0)

*Reading Seminar*

History 653 H(3S-0)

*Research and Methods Seminar*

History 655 H(3-0)

*Classics of Strategy*
Strategic thought from Sun Tzu to Clausewitz, Mahan to Corbett. Analyzes the writings of classic strategic thinkers, and then by way of case studies examines their theories as they pertain to military and political planners from the Peloponnesian War to the present.

History 673 H(3-0)

*Topics in Legal History*
MAY BE REPEATED FOR CREDIT

History 675 H(3-0)

*Selected Topics in History*
MAY BE REPEATED FOR CREDIT

History 690 H(3-0)

*Historiography and the Theories of History*

History 691 H(3-0)

*Conference Course in Special Topics*
Note: Open only to graduate students.
MAY BE REPEATED FOR CREDIT

History 791 H(3S-0)

*Conference Course in Special Topics (Advanced Level)*
Note: Open only to graduate students.
MAY BE REPEATED FOR CREDIT

History 795 H(3S-0)

*Advanced Seminar in Historiographical Interpretations*

History 797 H(3S-0)

*Advanced Seminar in Historical Research*

## INTERDISCIPLINARY GRADUATE PROGRAM IGP

### Contact Info

Location: Professional Faculties Building, Room 3168
Faculty number: (403) 220-7209
Fax: (403) 210-8872
E-mail address: pfisk@ucalgary.ca
Web page URL: http://www.ucalgary.ca/igp

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), thesis-based
Master of Science (MSc), thesis-based

All degrees are research and thesis-based and can be completed on a full-time or part-time basis.

The program emphasizes interdisciplinary research in areas not offered by other programs.

For over four decades, it has provided an intellectually enriching vehicle for many students and faculty members to pursue their research interests where these cross the limits of other program structures. It is particularly well suited to self-motivated learners and mature, independent researchers who have a strong sense of the academic path they wish to pursue.

Students may approach potential supervisors directly or, in the case of applicants from off-campus, the Director will attempt to identify potential supervisors if the applicant has submitted a research proposal well in advance of the applicable application deadline.

### 2. Admission Requirements

In addition to Faculty of Graduate Studies requirements, the Program requires:

a) For applicants required to prove proficiency in English a TOEFL score of 600 (paper-based test) including at least 5.0 on the Test of Written English (TWE), and a score of at least 50 on the Test of Spoken English (TSE); or 100 (internet-based test); or an IELTS score of 7.5; or a MELAB score of 84; or a PTE score of 70.
b) Three Reference Letters

#### Master of Arts and Master of Science

a) A thesis proposal (approximately 3,500 words plus preliminary bibliography).
b) A statement explaining the interdisciplinary nature of the program of study. This shall include the three academic areas being combined for interdisciplinary study and the list of proposed courses. It shall show the relationship among the proposed courses, supervisory committee members, and areas of study (matrix format is recommended).
c) A recommendation for a supervisory committee of three people from different academic areas relevant to the research work (see section 9).

#### Doctor of Philosophy

a) Normally, a grade point average of 3.50 or higher on a four point scale over a Master's program
b) A thesis proposal (approximately 3,500 words plus preliminary bibliography).
c) A statement explaining the interdisciplinary nature of the program of study. This shall include the three academic areas being combined for interdisciplinary study and the list of proposed courses. It shall show the relationship among the proposed courses, supervisory committee members, and areas of study (matrix format is recommended).

d) A recommendation for a supervisory committee of four people from at least three different academic areas relevant to the research work (see section 9).
e) A four-year funding proposal.

### 3. Application Deadline

Deadlines for submission of complete applications for Canadians and Permanent Residents:

1 February for September admission
1 August for January admission

Deadlines for the submission of complete applications for students that require a study permit to enter the program:

1 February for September admission
1 April for January admission

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Advanced credit requests may not exceed one-third of the course load identified at the Admission Seminar.

### 5. Program Course Requirements

In addition to Faculty of Graduate Studies requirements, the Program normally requires:

#### Master of Arts and Master of Science

A minimum of four graded half-courses, as determined by the supervisory committee.
It is expected that at least half of the courses in a student's program will be at the graduate level.

#### Doctor of Philosophy

A minimum of three graded graduate-level half-courses, as determined by the supervisory committee.

Specializations are determined by the supervisory committee in consultation with the Director.

Fieldwork and research done off-campus may be counted toward fulfillment of the full-time study and research requirement.

### 6. Additional Requirements

After an applicant's file is complete (including thesis proposal and proposed supervisory committee), the file is reviewed by the Director. If approved by the Director, the student, proposed supervisory committee members, and Director attend an admissions seminar. If the result is a favourable recommendation, the Director will forward the file to Graduate Studies with a recommendation for admission and approval of the supervisory committee. Applicants are admitted to undertake the specific program approved at the admissions seminar.

In the event that an applicant cannot attend the admission seminar, special arrangements for applicant participation will be made.

### 7. Credit for Undergraduate Courses

None.

### 8. Time Limit

Maximum completion time is four years for a Master's program and six years for a doctoral program.

### 9. Supervisory Assignments

Students must identify a supervisor and supervisory committee in conjunction with completion of the thesis proposal. Supervisory committees for Master's students normally consist of three people (supervisor plus two additional members). Supervisory committees for doctoral students normally consist of four members (supervisor plus three additional members). At least three different academic areas should be represented on the supervisory committee. Identification of the proposed supervisory committee must also include confirmation of the supervisory committee members' willingness to assume this role after review of the research proposal.

### 10. Required Examinations

Doctoral candidacy examinations have a written and an oral component. The written candidacy examination commences following the completion of the required course work and the Supervisory Committee's approval of the final thesis proposal. The exam normally consists of a set of three questions established by the supervisory committee. The student has three weeks to complete the written candidacy papers. The student will defend the written candidacy papers during an oral candidacy examination within one month of their submission. Although the written paper forms the basis of the oral candidacy examination, questions may extend beyond the written papers to areas as outlined in the notice of candidacy examination.

Final thesis oral examinations will be open.

### 11. Research Proposal Requirements

A fully developed thesis proposal is required for admission. However, the thesis proposal may be modified with the approval of the supervisory committee.

### 12. Special Registration Information

IGP students register using the Student Centre accessible through the Portal at https://my.ucalgary.ca; however, course registration must be completed manually by completion of the Faculty of Graduate Studies *Change of Registration* form.

### 13. Financial Assistance

Limited financial assistance may be available to qualified full-time students. Applicants and program students are strongly encouraged to apply for internal and external awards. For information on awards, see the Awards and Financial Assistance section of this Calendar. Graduate Teaching Assistantships may also be available to doctoral students.

Students applying for scholarships must submit their applications to the Program by 15 January.

### 14. Other Information

Enquiries concerning the program should be addressed to the Program Administrator, Interdisciplinary Graduate Program, University of Calgary, Professional Faculties Building, Room 3168, Calgary, Alberta T2N 1N4.

## KINESIOLOGY KNES

### Contact Info

Location: Kinesiology B, Room 146
Faculty number: (403) 220-5183
Fax: (403) 220-0105
E-mail address: knesgrad@ucalgary.ca
Web page URL: http://wcm2.ucalgary.ca/knes/grad

### 1. Degrees and Specializations Offered

#### Doctor of Philosophy
#### Master of Science

The Doctor of Philosophy (PhD) and Master of Science (MSc) degree programs are full-time thesis-based degree programs that may be taken in a variety of specializations according to Members' research interests.

#### Master of Kinesiology

The Master of Kinesiology (MKin) is a full-time course-based program specializing in Advanced Applied Exercise Physiology.

The Universities of Calgary and Alberta offer a joint Biomedical Engineering Program. Further information can be obtained at the website http://www.schulich.ucalgary.ca/Biomedical/.

Students are normally registered as full-time students however in very exceptional circumstances, registration as part-time students may be recommended by the Faculty of Kinesiology, Associate Dean (Graduate) for subsequent approval by the Dean, Faculty of Graduate Studies or designate.

### 2. Admission Requirements

In addition to Faculty of Graduate Studies requirements, the Faculty of Kinesiology requires the following:

#### Doctor of Philosophy

a) Consent for supervision from an approved Faculty Member in Kinesiology.
b) An appropriate academic background for the area of specialization
c) A minimum Grade Point Average (GPA) of 3.2 or higher on a four-point scale over approximately the last two years of study
d) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (written), or 92 (internet-based), or an IELTs score of 7.5, or a MELAB score of 82, or a PTE score of 64.
e) Two Reference Letters
f) Written confirmation of external funding in accordance with policies of the Faculty of Kinesiology Graduate Program.
g) A student may request a transfer from the Master of Science degree program to the Doctoral degree program, upon the recommendation of the supervisory committee and subsequent approval of the Associate Dean (Graduate) and Dean, Faculty of Graduate Studies.

#### Master of Science

a) Consent for supervision from an approved Faculty Member in Kinesiology
b) An appropriate academic background for the area of specialization
c) A minimum GPA of 3.2 or higher on a four-point scale over approximately the last two years of study

d) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (written) or 92 (internet-based), or an IELTs score of 7.5, or a MELAB score of 82, or a PTE score of 64.
e) Two Reference Letters

Master of Kinesiology

The following are the *minimum* requirements for applying to the program. Please note, normally applicants with higher GPAs are selected for admission to the program.

a) A minimum grade of B or 3.0 in each of the following undergraduate prerequisite courses or equivalents: Anatomy, Exercise Physiology, Biomechanics, Sport Psychology and Statistics.
b) A minimum admission GPA of 3.0 or higher on a four-point scale over approximately the last two years of study in Kinesiology or an appropriate academic background for the area of specialization.
c) A demonstrated ability to be self-motivated and capable of independent study as shown in undergraduate studies, volunteer work and/or work experience in exercise science areas will be considered.
d) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (written) or 92 (internet-based), or an IELTs score of 7.5, or a MELAB score of 82, or a PTE score of 64.
e) Two Reference Letters

## 3. Application Deadline

Doctor of Philosophy
Master of Science

The deadline for the submission of complete applications to thesis-based programs is 31 March for 01 September admission.

Master of Kinesiology

The deadline for the submission of complete applications to the course-based program is 01 March for 01 September admission.

## 4. Advanced Credit

Advanced credit will be limited to two full course equivalents with a grade of B or higher for students admitted to the Master of Kinesiology program. The student must request advanced credit in writing at the time of application for admission to the Faculty of Kinesiology.

## 5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements, the Faculty of Kinesiology requires:

Doctor of Philosophy

A minimum of three graduate-level half-courses selected according to the student's background research focus and will be approved by the graduate supervisor and supervisory committee

Master of Science

a) One graduate-level half-course in statistics
b) One- graduate-level half-course half course in research design

Master of Kinesiology

a) A total of 5.50 graduate-level full-course equivalents.
   Core Courses (Required of all students): Kinesiology 606, Kinesiology 615, Kinesiology 617, Kinesiology 637, Kinesiology 673, Kinesiology 690, Kinesiology 715, Kinesiology 773, Kinesiology 775 and Kinesiology 785
b) A final oral presentation is considered the capstone event. This will be undertaken in conjunction with KNES 715.

## 6. Additional Requirements

None.

## 7. Credit for Undergraduate Courses

Graduate credit may be granted for courses offered at the 500-level at the discretion of the Associate Dean (Graduate).

## 8. Time Limit

Doctor of Philosophy

Expected completion time is four years.
Maximum completion time is six years.

Master of Science

Expected completion time is two years.
Maximum completion time is four years.

Master of Kinesiology

Expected completion time is sixteen (16) consecutive months commencing in September.
Maximum completion time is six years.

## 9. Supervisory Assignments

Doctor of Philosophy
Master of Science

Supervisor(s) must be identified at the time of admission for thesis-based programs. Within three months of admission, the student and supervisor(s) must select a supervisory committee according to the Faculty of Graduate Studies' procedures. The composition of the supervisory committee must be approved by the Associate Dean (Graduate).

Master of Kinesiology

Not applicable.

## 10. Required Examinations

Doctor of Philosophy

a) Doctoral Candidacy Examination will occur after a student's research proposal is approved by the Supervisory Committee and Associate Dean (Graduate). The Candidacy Examination has both written and oral components. The student and supervisor select one of the two formats for the written portion of the examination:
   i) A closed book, six-hour examination administered on one-day in two three-hour blocks will be invigilated by the supervisor. The supervisor will provide the student with five questions determined by the Candidacy Examination Committee. The student will answer four out of five questions. The written answers are circulated to the Candidacy Examination Committee immediately after the written examination concludes.
   ii) The Candidacy Examination Committee will determine five questions to be distributed to the student four weeks before the Oral Candidacy Examination. The student will prepare a written paper for four of the questions and submit a copy of each paper to each examiner one week before the Oral Candidacy Examination. Each paper should be a maximum of twenty double-spaced pages.

   Oral Candidacy Examination: The basis of the Oral Candidacy Examination will be the written examination, general knowledge and the thesis topic. The Oral Candidacy Examination will occur seven (7) days after the written component concludes. Final thesis oral examinations are open. Both the written and the oral components of the Candidacy Examination must be found acceptable in order to receive a *Pass*.
b) Doctoral Thesis Oral Examinations are administered according to the Faculty of Graduate Studies' procedures.

Master of Science

Master's Thesis Oral Examinations are administered according to the Faculty of Graduate Studies' procedures.

Master of Kinesiology

Not applicable.

## 11. Research Proposal Requirements

Doctor of Philosophy
Master of Science

Each thesis-based student drafts and presents a research proposal to his/her supervisory committee prior to commencing data collection.

The proposal consists of:

a) Background information from the scientific literature, including a critical evaluation of previous work;
b) A clear statement of the objectives of the proposed research program;
c) An analysis of the methodology to be used in the implementation of the proposal;
d) An indication of the contributions to scientific knowledge that should result from the candidate's research.

The supervisory committee may limit the length of the proposal, and must officially approve it before it is submitted to the Faculty of Kinesiology, Associate Dean (Graduate).

Students whose research involves human subjects must receive approval from the University of Calgary Conjoint Health Research Ethics Board before beginning data collection. Research with animals must receive approval from a University Animal Care Committee.

Master of Kinesiology
Not applicable.

## 12. Special Registration Information

None

## 13. Financial Assistance

Doctor of Philosophy

Evidence of external financial support in accordance with the Faculty of Kinesiology Graduate Program requirements must be provided before admission. This external funding must be in the form of a Supervisor's Grant, external award(s), government funding, etc.

Master of Science
Are encouraged to apply for external awards, government funding, etc.

Financial assistance may be available to qualified thesis-based students in the form of Graduate Assistantships (Teaching).

For information on other awards, please contact the Faculty of Kinesiology Graduate Program.

## 14. Other Information

Initial enquiries should be directed to Faculty of Kinesiology Graduate Program.

## 15. Faculty Members/Research Interests

Current Faculty Members and their areas of research can be found at
http://wcm2.ucalgary.ca/knes/facultycontact

Dance (DNCE) Course Offerings

Graduate Courses

Dance 681 H(2-S2)

*Special Topics in Dance*
Prerequisite: Consent of the Program of Dance
MAY BE REPEATED FOR CREDIT

## Kinesiology (KNES) Course Offerings

### Graduate Courses

Kinesiology 601 H(3S-0)

*Graduate Seminar*
Seminar discussion and critique on current research in human physical activity and related subjects.
Prerequisite: Admission to a Graduate Program in Kinesiology.

Kinesiology 603 H(3-0)

*Special Topics*
Intensive study of selected topics in human physical activity and related subjects.
Prerequisite: Admission to a Graduate Program in Kinesiology.
MAY BE REPEATED FOR CREDIT

Kinesiology 605 H(4T-8)

*Practicum*
Prerequisite: Consent of the Faculty.
Note: Open to Exercise and Functional Fitness students only. If this choice is made, the student must select another approved graduate level half-course option.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

Kinesiology 606 F(3T-3)

*Practical Skills for Applied Exercise Physiology*
To develop practical skill and techniques associated with applied exercise physiological measurement vs.measurements in the areas of body composition, cardio-respiratory and musculokeletal fitness.
Prerequisite: Admission to a Graduate Program in Kinesiology.

Kinesiology 607 H(0-3T)

*Project*
Students will identify, address, and resolve problems relating to their specialty. The project will be completed under the direction of a supervisor. A final report in a format appropriate to the nature of the project will be required.
Prerequisite: Admission to a Graduate Program in Kinesiology.

Kinesiology 609 H(3-1T)

*Statistical Techniques in Kinesiology*
Basic concepts of statistical analysis as they apply to research methods used in various disciplines in kinesiology.
Prerequisite: Admission to a Graduate Program in Kinesiology.
Note: Credit for both Kinesiology 609 and 603.84 will not be allowed.

Kinesiology 611 H(3-0)

*Research Methods in Kinesiology*
An overview of research methods including study design, data collection, measurement, interpretation of data, scientific writing, and critical appraisal of the literature relevant to kinesiology.
Prerequisite: One graduate course in Biostatistics or Statistics (including Kinesiology 609, Medical Science 643.01, Psychology 614, or equivalent) and admission to a Graduate Program in Kinesiology

Kinesiology 615 Q(1-1S)

*Seminar in Applied Exercise Physiology I*
Lectures and seminar presentations, discussion and critique of current research in applied exercise physiology and related subjects.
Prerequisite: Admission to a Graduate Program in Kinesiology.

Kinesiology 617 Q(1-1S)

*Seminar in Applied Exercise Physiology II*
Lectures and seminar presentations, discussion and critique of current research in applied exercise physiology and related subjects. Focus on chronic disease.
Prerequisite: Admission to a Graduate Program in Kinesiology.

Kinesiology 637 H(3-0)

*Nutrition for Physically Active Populations*
The nutritional requirements of specific athletic and/or physically active groups such as cardiac rehabilitation patients and child athletes.
Prerequisite: Admission to a Graduate Program in Kinesiology.

Kinesiology 643 H(3S-0)

*Selected Topics in Sport and Fitness Management*
An examination of the managerial role in selected sport and fitness situations.
Prerequisite: Admission to a Graduate Program in Kinesiology.
MAY BE REPEATED FOR CREDIT

Kinesiology 651 H(3S-0)

*Cognitive Science: Vision and Motor Behaviour*
An exploration of research in cognitive science, vision, and eye movement as these areas relate to motor learning and performance with particular attention to the development of motor expertise, in both normal and atypical populations.
Prerequisite: Kinesiology 251 and 253 or 250 or equivalent and admission to a Graduate Program in Kinesiology.

Kinesiology 653 H(3-0)

*Special Topics in Neuromotor Psychology*
Prerequisite: Admission to a Graduate Program in Kinesiology.
MAY BE REPEATED FOR CREDIT

Kinesiology 655 H(2-2)

*Kinanthropometry*
The quantitative study of size, shape, proportion, composition, and maturation of the human body in relation to gross motor function in sport, physical activity, and the work place.
Prerequisite: Kinesiology 355 or admission to a Graduate Program in Kinesiology.

Kinesiology 661 H(3-0)

*Special Topics in Biomechanics*
Prerequisite: Admission to a Graduate Program in Kinesiology.
MAY BE REPEATED FOR CREDIT

Kinesiology 663 H(3-0)
(Mechanical Engineering 663)
(Medical Science 663)

*Advanced Biomechanics*
Theoretical and applied aspects of biomechanics in the acquisition and performance of sport skills.
Prerequisite: Admission to a Graduate Program in Kinesiology.

Kinesiology 669 H(3-0)

*Special Topics in Sport Medicine*
Prerequisite: Admission to a Graduate Program in Kinesiology.
MAY BE REPEATED FOR CREDIT

Kinesiology 673 H(3-3)

*Exercise Physiology*
Topics in exercise physiology will include the effects of exercise on muscle, metabolism, hormones, respiration, and the cardiovascular system. Nutrition, body composition, ergogenic aids, and environmental factors will also be examined.
Prerequisite: Kinesiology 473 or admission to a Graduate Program in Kinesiology.

Kinesiology 675 H(3-0)

*Special Topics in Exercise Physiology*
Prerequisite: Admission to a Graduate Program in Kinesiology.
MAY BE REPEATED FOR CREDIT

Kinesiology 690 F(1T-8)

*Practicum*
The practicum will consist of multiple experiences in applied physiology environments.
Prerequisite: Consent of the Faculty.
NOT INCLUDED IN GPA

Kinesiology 695 H(3-0)

*Special Topics in Sport and Exercise Psychology*
Prerequisite: Admission to a Graduate Program in Kinesiology.
MAY BE REPEATED FOR CREDIT

Kinesiology 697 H(3S-0)

*Health and Exercise Psychology*
An examination of applied psychological theories, research, and practices in promoting exercise adherence and in the development of optimal health through physical fitness.
Prerequisite: Admission to a Graduate Program in Kinesiology.

Kinesiology 699 H(3S-0)

*Applied Sport Psychology I*
The examination and practice of mental training theory and skills in maximizing athletic performance.
Prerequisite: Admission to a Graduate Program in Kinesiology.

Kinesiology 703 H(3-0)

*Special Topics*
Intensive study of selected topics in Kinesiology.
Prerequisite: Admission to a Graduate Program in Kinesiology.
MAY BE REPEATED FOR CREDIT

Kinesiology 715 H(1-1S)

*Seminar in Clinical and Applied Exercise Physiology*
An advanced level of presentation and critical appraisal of research in applied physiology. Students will assume a leadership role in a seminar setting.
Prerequisite: Admission to a Graduate Program in Kinesiology.

Kinesiology 751 H(3T-0)

*Directed Study in Neuro-Motor Psychology*
Individual study in a tutorial setting. An individual course is set for each student based on a mutually agreed upon topic. Students are required to read extensively in a specialist area of their choice.
Prerequisite: Kinesiology 651.

Kinesiology 773 H(3-3)

*Integrative Exercise Physiology*
The effects of exercise on the complex physiological interactions between different systems in the human body.
Prerequisite: Kinesiology 673 and admission to a Graduate Program in Kinesiology.

Kinesiology 775 H(3-3)

*Clinical Exercise Physiology*
Exercise for clinical populations: exercise assessment and prescription for disease modification.
Prerequisite: Kinesiology 773 and admission to a Graduate Program in Kinesiology.

Kinesiology 777 H(3-0)

*Physiology of Skeletal Muscle*
An in-depth study of the structural and contractile properties of skeletal muscle.
Note: Credit for both Kinesiology 777 and 675.85 will not be allowed.

Kinesiology 785 H(3-3)

*Training Strategies for Health and Sport*
The science of improving health and athletic performance with appropriate periodized stress and recovery.
Prerequisite: Kinesiology 773 and admission to a Graduate Program in Kinesiology.

Kinesiology 799 H(3S-0)

*Applied Sport Psychology II*
An examination of further selected topics in applying psychological technique to athletic performance.
Prerequisite: Kinesiology 699.

# LAW LAW

### Contact Info

Location: Murray Fraser Hall
Faculty number: (403) 220-8154
Fax: (403) 210-9662
E-mail address: law@ucalgary.ca
Web page URL: http://www.law.ucalgary.ca

## 1. Degrees and Specializations Offered

The Faculty of Law offers thesis-based and course-based Master of Laws (LLM) programs exclusively in the Faculty's areas of specialization: natural resources, energy and environmental law.

Applicants interested in a Doctoral degree in Law on a Special Case basis should contact the Faculty of Law. Currently, only students with degrees from the University of Calgary, Faculty of Law will be considered.

Subject to government approval, the Faculty will also offer a Post Baccalaureate Certificate in Natural Resources, Energy and Environmental Law. For more information on the Certificate, please see the Faculty of Law Calendar or website.

## 2. Admission Requirements

In addition to the requirements of the Faculty of Graduate Studies, the Faculty of Law requires, for both the thesis-based and course-based LLM degree programs:

a) A first academic degree in law.
b) For applicants required to provide proof of proficiency in English, a minimum TOEFL Internet-based score of 100, of which the reading, listening and writing component must total 75; or a minimum TOEFL Paper-based score of 600 and a TWE score of 5.5; or the minimum IELTS overall band score of 7.0, with a reading and writing band minimum of 7.0; or a MELAB score of 85; or a PTE score of 70; or successful completion of a University of Calgary Faculty of Law Post Baccalaureate Certificate.
c) Applicants to the LLM program must submit a brief statement of their proposed thesis or major paper and indicate their proposed supervisor. Forms and details are available from the Faculty.
d) Two Reference Letters.

## 3. Application Deadline

a) Thesis-based LLM applications are accepted for September admission only. The deadline for submission of completed applications is 15 December.
b) Course-based LLM and Post Baccalaureate Certificate applications are accepted for September or January admission. The deadline for completed applications for September admission is 15 December and the deadline for completed applications for January admission is 15 July.
c) Deadlines are firm for international students, but may be flexible for Canadian students.
d) Normally students with international LLB degrees will be considered for September admission only.

## 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for courses taken as part of another completed degree/diploma/certificate or for courses taken to bring the grade point average to a required level for admission. Credit may be given for courses taken towards the Faculty of Law's thesis-based or course-based LLM degree program or as part of the Faculty's Post Baccalaureate Certificate program when transferring between programs.

## 5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements, the Faculty of Law requires:

### LLM (thesis-based)

a) Law 703: Graduate Seminar in Legal Research & Methodology. Students must receive a passing grade in this course to advance in the program.
b) Law 705: Graduate Seminar in Legal Theory.
c) At least two additional 600-level half-courses in the areas of natural resources, energy or environmental law or in a related area or from a related discipline with the approval of the Graduate Director.
d) A substantial research thesis in the area of natural resources, energy or environmental law, approximately 100 to 125 pages (30,000 - 38,000 words) in length, exclusive of the bibliography, prepared under the supervision of a faculty member or other suitable person appointed by the Graduate Director.
e) Two terms in residence, normally consecutive and normally from September to April. Students need at least 15 to 18 months from initial registration for thesis completion and defence.

### LLM (course-based)

a) Law 703: Graduate Seminar in Legal Research & Methodology. Students must receive a passing grade in this course to advance in the program.
b) An additional five half-courses in the areas of natural resources, energy or environmental law or in a related area or from a related discipline with the approval of the Graduate Director. At least two of the five additional courses must be at the 600-level and at least two of them must have research paper evaluations. One of the additional courses may be Law 705, the Graduate Seminar in Legal Theory.
c) A major research paper, approximately 50 to 60 pages (15,000 – 18,000 words) in length, prepared under the supervision of a Faculty member or other suitable person appointed by the Graduate Director and evaluated on a Pass/Fail basis.

### Post Baccalaureate Certificate Program

The completion of four courses in the area of natural resources, energy or environmental law or a related area, including at least one with a research paper evaluation and including at least two at the 600- level. All courses require the approval of the Graduate Director. This program is still pending approval.

## 6. Additional Requirements

None.

## 7. Credit for Undergraduate Courses

Not applicable.

## 8. Time Limit

a) All requirements for the thesis-based LLM degree must be completed within three calendar years of initial registration.
b) All requirements for the course-based LLM degree must be completed within five years of initial registration. It is expected that full-time students will complete the program in one calendar year.
c) All requirements for the Post Baccalaureate Certificate program must be completed within three calendar years of initial registration.
d) All requirements for the Special Case PhD must be completed within six calendar years.

## 9. Supervisory Assignments

Contact the Faculty of Law Graduate Director for information.

## 10. Required Examinations

Thesis oral examinations are open.

## 11. Research Proposal Requirements

The proposal submitted at the time of application must be in the area of natural resources, energy or environmental law.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Financial assistance may be available to qualified students, although funding for course-based LLM and Post Baccalaureate Certificate students will very rarely be provided. For information on awards, see the Awards and Financial Assistance section of this calendar or the Faculty of Law Calendar or website.

Students applying for scholarships must submit their scholarship applications to the Faculty of Law by the deadlines for completed admission applications.

## 14. Other Information

Attaining an LLM degree without a Canadian LLB degree will not qualify graduates to practice law in Canada. Inquiries on this issue must be addressed to the appropriate provincial governing body for the legal profession. In Alberta, contact the Law Society of Alberta.

## 15. Faculty Members/Research Interests

The active research interests of members of the Faculty of Law and the affiliated Canadian Institute of Resources Law (CIRL) can be found on the Faculty of Law website at http://www.law.ucalgary.ca

### Graduate Courses

Law 601 H(2-0)(2 credits)

*Advanced Criminal Law*
In depth examination of selected areas of criminal law with an emphasis on substantive issues. Topics may include: double jeopardy, police entrapment, conspiracy, corporate crime, theft and related offences, impaired driving and breathalyzer offences, plea negotiations, ethical aspects of practicing criminal law, mistake of law as a defence, juveniles and the criminal process. Reference is made to special evidential and procedural problems associated with the chosen topics.
Prerequisite: Law 511 or consent of the Faculty.

Law 603 H(2-0)(2 credits)

*Advanced Labour Law*
Examines the process of resolving disputes arising out of the interpretation and application of collective agreements by way of grievance and arbitration procedures. Topics include pre-arbitration procedures, arbitrability, the arbitration tribunal and hearing, arbitral remedies, and the enforcement and judicial review of arbitration awards. Selected issues in grievance determination will be studied such as discipline, discharge, seniority, promotion, work assignment, contracting out, technology change and management rights.
Prerequisite: Law 517 or consent of the Faculty.

Law 605 H(2-0)(2 credits)

*Advanced Oil and Gas Law*
Selected problems in oil and gas law including special industry contractual problems (farm out, joint operating and royalty agreements), and legislative and regulatory issues. In dealing with the latter, emphasis is laid upon the law and practice of the Alberta Department of Energy and Natural Resources, the Federal Department of Energy, Mines and Resources, the E.R.C.B., the Public Utilities Board and the N.E.B.
Prerequisite: Law 523 or consent of the Faculty.

Law 607 Q(1-0)(1 credit)

*Advanced Legal Research*
Advanced legal research including recent developments in technological and electronic legal research. The emphasis is on advanced legal research skills required for successful legal practice.

Law 609 H(3-0)(3 credits)

*Canadian Legal History*
Selected topics in the history of the development of law and legal institutions in Canada, with particular reference to the Northwest Territories and the early legal history of Alberta. Topics are chosen to reflect the interests of the students, and course work includes research in the original court records.

Law 613 H(3-0)(3 credits)

*Conflict of Laws*
An examination of the doctrines and rules governing the disposition of legal disputes which cut across provincial or national boundaries. Topics covered include jurisdiction, distinctions between substantive and procedural rules, the recognition and enforcement of foreign judgments, domicile, proof of foreign law and the choice of law rules relating to areas of private law - torts, contracts, property, succession and family law.

Law 619 H(2-0)(2 credits)

*Estate Planning*
The elements of estate planning including: the use of trusts; the transfer of interests in businesses; planning for spouses, farmers, and disabled people. The impact of the Income Tax Act on estate planning will be considered.
Prerequisite: Law 527 or consent of the Faculty.

Law 629 H(2-0)(2 credits)

*Trial Evidence and Procedure*
An examination of the particular problems and requirements of litigation with the focus on the trial and criminal law evidence; topics will include relevance; character evidence; self-serving evidence; the trial structure; witnesses and experts; examination-in-chief and cross-examination; documentary evidence; views; verdicts and judgements; costs and appeals.

Law 633 H(2-0)(2 credits)

*Advanced Contracts and Torts*
An examination of the appropriate province of the law of contract and the law of tort, with special emphasis upon the historical development of contractual and tortious liability; the availability of contractual and tortious claims arising out of pre-contractual negotiations; the possibility of concurrent or alternative liability in contract and tort arising out of the performance of a contract; the advantages or disadvantages, and the effects, of claiming in contract or tort; and the encroachment of tort upon contract's preserve.

Law 635 H(3-0)(3 credits)

*Aboriginal Law*
A survey of issues in aboriginal law; topics include: law of aboriginal societies and recognition of aboriginal custom; self-determination and other applicable principles of international law; self-government; common law recognition of aboriginal title; treaties; the fiduciary duty of the Crown; constitutional entrenchment of aboriginal and treaty rights; application of provincial law: Indian Act, land surrenders and exemptions from seizure and taxation; aboriginal justice systems.

Law 637 H(2-0)(2 credits)

*Energy Law*
Selected legal issues related to the energy industry, including the stages of research and exploration, development and production, transportation, marketing and consumption. Emphasis is on the relevant fiscal systems and regulatory processes, particularly in the national and international context.

Law 639 H(2-0)(2 credits)

*Trial Advocacy*
Simulated trial practice using various substantive law fields; discoveries and pre-trial settlement negotiations; supervised preparation of all trial documentation; filing requirements for trial; concludes with full trial moot.
Note: This course is graded CR, D or F.

Law 643 H(3-0)(3 credits)

*Trusts*
The concept of the trust and its development in Equity; its relationship to other legal concepts; various types of trusts; constituting, administering and terminating the trust; trustee duties and powers; variation of trusts; breach of trust and the doctrine of tracing; with some attention to the modern uses of the trust and its statutory modifications.

Law 649 H(2-0)(2 credits)

*Law and Contemporary Problems*
The impact of a variety of contemporary issues upon the law and legal institutions; law reform and the development of new legal structures to accommodate change in society.
MAY BE REPEATED FOR CREDIT

Law 651 H(0-2)(2 credits)

*Directed Research I*
A supervised research project involving the in-depth examination of a legal problem or area of concern not normally covered in a substantive or procedural course and which provides the basis for an article, research paper, brief, memorial, draft legislation, etc. Admission to this course depends on the availability of a Faculty member to supervise the particular projects.
Prerequisite: Consent of the Faculty.
MAY BE REPEATED FOR CREDIT

Law 653 H(0-3)(3 credits)

*Directed Research II*
A supervised research project involving the in-depth examination of a legal problem or area of concern not normally covered in a substantive or procedural course and which provides the basis for an article, research paper, brief, memorial, draft legislation, etc. Admission to this course depends on the availability of a Faculty member to supervise the particular projects.
Prerequisite: Consent of the Faculty.
MAY BE REPEATED FOR CREDIT

Law 655 H(2-0)(2 credits)

*The Legal Profession and Ethics*
The Canadian legal profession from sociological and legal perspectives, focusing on the roles lawyers play in our legal system. Conflicts between and among those roles, and conflicts between 'official ethics' and broader ethical values are explored.

Law 657 H(2-0)(2 credits)

*Law and Medicine*
The focus is on legal aspects of frontier developments in medical practice including professional confidentiality, birth technology, prolongation of life, human experimentation, mental illness, determination of competency and fitness to stand trial, transplantation, genetics, rights of the unborn child and sterilization. The seminar format will involve a number of practitioners from both Law and Medicine.

Law 659 H(3-0)(3 credits)

*Corporate Finance and Securities*
The financing of business entities, and their reorganization; particular emphasis on securities regulation.
Prerequisites: Law 509 and 535 or consent of the Faculty.

Law 661 H(2-0)(2 credits)

*Advanced Business Transactions*
Selected topics relating to mergers and acquisitions, including the structure and regulation of take-over bids and plan of arrangement transactions.

Law 663 H(2-0)(2 credits)

*Dispute Resolution*
Various dispute resolution processes and the role of lawyers. The focus is on mediation and arbitration, but hybrid processes (mediation/arbitration and mini-trials both private and judicial), pre-trial conferences, and the design of dispute resolution systems (preventative lawyering) are included. The seminar addresses 'how' and also 'what' is being done in dispute resolution. Political, social, and cultural dimensions of dispute resolution, and particularly mediation, will be introduced. Role playing and simulations will be used.
Prerequisite: Law 501 or consent of the Faculty.

Law 665 H(2-0)(2 credits)

*International Trade Law*
The public law framework for international trade. Emphasis will be placed on the FTA, NAFTA, and GATT. Topics to be covered include basic principles of international trade law, anti-dumping and countervail actions, and dispute resolution.

Law 667 H(2-0)(2 credits)

*Advanced Constitutional Law*
Selected topics in constitutional law. Course content will vary, but will cover fundamental principles represented by sections 1, 7, 15, 24, and 52 of the Constitution Act, 1982.

Law 669 H(2-0)(2 credits)

*Mooting and Clinical Studies*
Preparation for and participation in approved external competitive moots including the Gale Cup Moot and the Alberta Challenge Moot or participation in an approved clinical experience in an area not otherwise the subject of a clinical course.
Prerequisite: Consent of the Faculty.
MAY BE REPEATED FOR CREDIT

Law 671 H(2-0)(2 credits)

*Advanced Environmental Law*
Selected topics in Environmental Law. Topics to be covered may include the law and practice of environmental impact assessment; the law of protected areas and protected species; sustainable development; biodiversity; global warming; command and control regulations vs. market based emissions control measures.
Prerequisite: Law 531.

Law 673 H(3-0)(3 credits)

*Jessup Moot*
Preparation for and participation in the Philip C. Jessup International Law Moot Court Competition.
Prerequisite: Consent of the Faculty.

Law 675 H(2-0)(2 credits)

*Western Canada Trial Competition*
Preparation for and participation in the Western Canada Trial Competition.
Prerequisite: Consent of the Faculty.

Law 679 H(2-0)(2 credits)

*Feminist Legal Theory*
A critical inquiry into the nature and function of law from a variety of different perspectives within feminist legal theory; the role of rights and of legal discourse, and the possibilities and limitations of law as a strategy for social transformation.

Law 681 H(3-0)(3 credits)

*Current Legal Problems*
The impact of a variety of contemporary issues upon the law and legal institutions; law reform and the development of new legal structures to accommodate change in society.
MAY BE REPEATED FOR CREDIT

Law 683 H(2-0)(2 credits)

*Advanced Family Law*
Selected topic in Family Law such as division of pensions, international family law and the law relating to children (including regulatory aspects e.g. Child Welfare). Current developments in law reform and social policy change will be addressed. Short placements may be offered.
Prerequisite: Law 515 or consent of the Faculty.

Law 685 H(2-0)(2 credits)

*Business Clinical Seminar*
A clinical seminar in the practice of business law. Supervised clinical experience will be gained through appropriate placements.
Prerequisite: Law 509 or consent of the Faculty.
Note: This course is graded CR, D or F.

Law 687 H(2-0)(2 credits)

*Criminal Justice Clinical Seminar*
A clinical seminar considering the law and practice of the criminal justice system, involving simulated exercises and/or placements.
Prerequisites: Law 511 and 639 or consent of the Faculty.
Note: This course is graded CR, D or F.

Law 689 H(2-0)(2 credits)

*Family Law Clinical Seminar*
A clinical seminar in elements of family law practice. The clinical experience may be obtained through simulated exercises, supervised handling of files and/or placements. Topics include Chambers advocacy, marital dispute consultations and drafting of a settlement.
Prerequisite: Law 515 or consent of the Faculty.
Note: This course is graded CR, D or F.

Law 691 H(2-0)(2 credits)

*Natural Resources Clinical Seminar*
A clinical seminar involving placements in any one of the following practice areas: energy law, resources law, water law, and environmental law.
Prerequisites: One of Law 523 or 531; plus one of Law 605, 637, 671 or 649.01; or consent of the Faculty.
Note: This course is graded CR, D or F.

Law 703 H(3-0)(3 credits)

*Graduate Seminar in Legal Research & Methodology*
Preparation for developing, researching and writing a thesis or major research paper. The distinctive nature of legal scholarship and its professional context will be explored. Students will be introduced to specific research techniques and to the challenges of comparative and cross-cultural work.
Note: This course is only open to students in the LLM program.

Law 705 H(0-3)(3 credits)

*Graduate Seminar in Legal Theory*
An exploration of schools of legal theory, with the goal of helping students situate their graduate research within one or more of those approaches to legal scholarship. The seminar is structured around a series of readings describing different theoretical approaches and applying these approaches to the areas of natural resources, energy and environmental law.
Note: This course is only open to students in the LLM program.

Law 706 F(0-5)(5 credits)

*Major Research Paper*
Under the supervision of a member of the Faculty of Law or other suitable person appointed by the Graduate Director, students will complete a major research paper, approximately 50 to 60 pages (15,000 – 18,000 words) in length. The paper must reflect extensive research on a topic in natural resources, energy or environmental law, and it must propose a solution to a problem or present a critical evaluation of an issue in this area of law. The paper will be evaluated on a Pass/Fail basis by the supervisor and one other person appointed by the Graduate Director. In the event of disagreement between the supervisor and the other appointee, the Graduate Director shall determine whether the paper is a Pass or Fail after reading the paper and then consulting with the supervisor and other appointee.
Note: This course is only open to students in the LLM program.

Law 707 H(2-0)(2 credits)

*Selected Problems in Natural Resources, Energy and Environmental Law*
Selected legal issues in the renewable and non-renewable energy and natural resources sectors and in environmental law.
Note: This course is only open to graduate students.
MAY BE REPEATED FOR CREDIT

Law 709 H(3-0)(3 credits)

*Selected Problems in Natural Resources, Energy and Environmental Law*
Selected legal issues in the renewable and non-renewable energy and natural resources sectors and in environmental law.
Note: This course is only open to graduate students.
MAY BE REPEATED FOR CREDIT

## LINGUISTICS LING

### Contact Info

Location: Social Sciences Building, Room 820
Faculty number: (403) 220-5469
Fax: (403) 282-3880
E-mail address: linggrad@ucalgary.ca
Web page URL: http://ling.ucalgary.ca/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), thesis-based

The norm is full-time study, but part-time study may also be arranged. Full-time study is defined in the Graduate Calendar ("Student Status") and is not compatible with full-time employment. Status of students with part-time employment will be determined on a case-by-case basis.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

#### Master of Arts

a) Significant undergraduate training in linguistics, normally including at least one course in syntax and one course in phonology;
b) A statement of purpose specifying the applicant's research interests and reasons for wishing to pursue a Master of Arts degree at the University of Calgary;
c) A sample of previous work in linguistics or a related field (e.g., an Honours undergraduate thesis, or a course paper);
d) For applicants required to provide proof of proficiency in English, a minimum IELTS score of 7.0; OR a minimum TOEFL score of 560 (written test), 83 (internet-based test); OR a minimum score of 550 (written test), 80 (internet-based test) AND a minimum score of 5.0 on the Test of Written English (TWE); OR a MELAB score of 81; OR a PTE score of 59.
e) Three Reference Letters.

#### Doctor of Philosophy

a) A Master's degree in linguistics, or a Master's degree in a related field with significant training in linguistics at the graduate level, normally including at least one graduate course in syntax and one graduate course in phonology, with a minimum grade point average of 3.40 on a four point scale
b) A statement of purpose specifying the applicant's research interests and reasons for wishing to pursue a doctoral degree at the University of Calgary
c) A sample of previous work in linguistics or a related field (e.g., a seminar paper or Master of Arts thesis)
d) For applicants required to provide proof of proficiency in English, a minimum IELTS score of 7.0; OR a minimum TOEFL score of 560 (written test), 83 (internet-based test); OR a minimum score of 550 (written test), 80 (internet-based test) AND a minimum score of 5.0 on the Test of Written English (TWE); OR a MELAB score of 81; OR a PTE score of 59.
e) Three Reference Letters.

### 3. Application Deadline

Students applying for admission and university scholarships must submit their applications to the department by January 15. All applications submitted by the this deadline will also receive full consideration for department scholarships and assistantships. Applications received by January 15 will normally be considered for September admission. Financial support may be limited for applications received after January 15. We strongly encourage individuals to apply as soon as possible.

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

### 5. Program/Course Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the Department requires:

#### Master of Arts

a) A departmental presentation relating to the student's thesis research. Continuation in program is dependent upon this presentation being judged acceptable by the faculty members of the Linguistics Department.
b) A minimum of six half-course equivalents, including Linguistics 611, Linguistics 613 and Linguistics 697
c) Linguistics 600
d) A demonstrated knowledge of a language other than English. This requirement can be met in the following ways:
   - having received credit for one full course equivalent in a language other than English at the undergraduate level
   - *Note: This may include field methods courses and/or courses on the structure of the language offered in the Department of Linguistics.*
   - demonstrating a native or near native ability in a language other than English
   - demonstrating a strong reading knowledge of a language other than English

#### Doctor of Philosophy

a) Completion of six half-course equivalents in Linguistics beyond the MA, including Linguistics 711 and Linguistics 713. Course requirements are normally completed during the first two years. *Note: No more than two half-courses can be taken with the same instructor.*
b) Linguistics 600 and Linguistics 797
c) Either a knowledge of two languages other than English, or one language other than English and one research tool. This requirement can be met by fulfilling two of the following three possibilities, subject to approval by the supervisor:

   i. A reading knowledge of a commonly used world language. Acceptable languages for the reading language requirement are those in which a significant body of writing pertaining to theoretical linguistics exists. Such languages include, but are not limited to, French, German, Russian, Chinese, and Japanese. This requirement can be met in the following ways: *
   - successful completion of at least one full-course equivalent at the senior level in the language;
   - satisfactory performance in an examination given within this Department or evidence of past schooling in which this was the language of instruction

   ii. A working knowledge of a second language. Acceptable languages for the working knowledge requirement include all non-Indo-European languages and all lesser studied Indo-European languages. This requirement can be met in the following ways: *
   - successful completion of a graduate level course on the structure of the language;
   - successful completion of at least one full-course equivalent at the senior level in the language;
   - a demonstrated ability to conduct field work with bilingual speakers of the language;
   - satisfactory performance in an examination given within this Department;
   - evidence of past schooling in which a less-commonly used language was the language of instruction.

   iii. A working knowledge of statistics and experimental design. This requirement can be met by passing one graduate-level half-course pre-approved by the department (for example, Psychology 615 or 617).*

   ***It is the responsibility of the student to supply evidence that course work in a language and/or in statistics and experimental design at another university meets these requirements.***

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

At both the Master's and the doctoral level, with the approval of the Graduate Director and the Department Head, a student may take a maximum of two undergraduate half-course equivalents for credit. Normally, only 500-level courses are approved as acceptable, and students must provide evidence that such courses represent a necessary contribution to their program.

### 8. Time Limit

Expected completion time is two years for a Master's degree and four years for a doctoral degree. Maximum completion time is four years for a Master's degree and six years for a doctoral degree.

### 9. Supervisory Assignments

#### Master of Arts

A student is assigned an interim advisor (in most cases the Departmental Graduate Director) when first registering in the program. Students must choose a thesis supervisor by the end of the second term of study (usually April). Selection of a supervisor should be by mutual agreement between the student and the faculty member concerned, in consultation with the Graduate Director. It is normal practice for the student to approach an appropriate faculty member about thesis or program supervision, rather than vice versa. In cases where the student is unsure of how to select a supervisor, the help of the Graduate Director, the Department Head, or another professor should be sought.

#### Doctor of Philosophy

Selection of a supervisor should be by mutual agreement between the student and the faculty member concerned, in consultation with the Graduate Director.

Students are strongly advised to finalize their choice by the end of the second term of study, and must do so no later than the second annual registration. It is normal practice for the student to approach an appropriate faculty member about dissertation or program supervision, rather than vice versa. In cases where the student is unsure of how to select a supervisor, the help of the Graduate Director, the Department Head, or another professor should be sought.

The supervisory committee should be constituted in consultation with the student and will normally consist of the supervisor and two members recommended by the Department Head, and approved by the Graduate Director. One of the two members of this committee may be external to the department. It is desirable to have at least one committee member with supervisory experience at the doctoral level. The supervisory committee must be submitted to the Faculty of Graduate Studies no later than three months after the appointment of the supervisor.

### 10. Required Examinations

#### Doctor of Philosophy

A doctoral student is required to take the Candidacy Examination after completion of all course work, normally within 20 months of their entry into the program. Doctoral candidacy examinations have a written and an oral component. The written candidacy examination consists of an original research paper in the student's research area, and the student's portfolio which consists of final papers from 3 of the 6 required courses (papers are chosen by the student in consultation with supervisor), their current CV, and presentations and publications (if any). The oral examination questions will be based on the original research paper and the student's portfolio papers.

### 11. Research Proposal Requirements

#### Master of Arts

Students in the Master's program must complete Linguistics 697.

#### Doctor of Philosophy

Students in the doctoral program must submit a written thesis proposal to their supervisory committee within twenty-eight months of the first registration, but not before the student has passed his/her oral candidacy examination. The body of the proposal (excluding bibliographic references) must not exceed ten pages in length.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance is normally available to qualified students. Funding is provided to full-time students only. Students are required to inform the department of any part-time employment. Failure to do so will result in revocation of departmental funding.

For information on awards, see the Awards and Financial Assistance section of this calendar. Students applying for scholarships must submit their applications to the Department by January 15.

Students whose applications are complete by January 15 will automatically be considered by the Department for Graduate Research Scholarships and Graduate Assistantship support. In addition, faculty members of this Department may have special project funds for research assistantships.

Information on Departmental assistantships is available on the Department's Graduate Programs web page: http://ling.ucalgary.ca/graduate

### 14. Other Information

Students should consult the Departmental *Graduate Handbook* for further information and regulations governing the graduate program. Copies are available from the Graduate Program Administrator, SS 756; or may be downloaded from the Department's graduate program web page: http://ling.ucalgary.ca/graduate

### 15. Faculty Members/Research Interests

Current faculty research interests can be found at http://ling.ucalgary.ca/graduate

### Graduate Courses

Admission to all 600-level courses is with the consent of the Department in addition to any other prerequisites that may be stated.

**Linguistics 600** Q(2-0)

*Introduction to Graduate Studies in Linguistics*
An introduction to areas of faculty research and theoretical orientations, as well as to research and professional skills.
NOT INCLUDED IN GPA

**Linguistics 605** H(3-0)

*Field Methods*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

**Linguistics 611** H(3-0)

*Advanced Syntactic Analysis I*
Prerequisite: Linguistics 511 or consent of the Department.

**Linguistics 613** H(3-0)

*Advanced Phonological Analysis I*
Prerequisite: Linguistics 403.

**Linguistics 631** H(3-0)

*Topics in Linguistic Theory*
Seminar in any area of theoretical linguistics, including phonetics, phonology, morphology, syntax, and semantics.
631.01. Phonetics
631.02. Phonology
631.03. Morphology
631.04. Syntax
631.05. Semantics
Prerequisite: Consent of the Department.
Note: Consult the Department regarding topics offered in any given year as topics vary. Not offered every year.

**Linguistics 633** H(3-0)

*Topics in Language Acquisition*
Seminar in language acquisition.
633.01. First Language Acquisition
633.02. Second Language Acquisition
Prerequisite: Consent of the Department.
Note: Consult the Department regarding topics offered in any given year as topics vary. Not offered every year.

**Linguistics 635** H(3-0)

*Analysis of a Language or Language Family*
Seminar in the analysis of a selected language or language family.
Prerequisite: Consent of the Department.
Note: Consult the Department regarding topics offered in any given year as topics vary. Not offered every year.
MAY BE REPEATED FOR CREDIT

**Linguistics 651** H(3-0)

*Topics in Historical Linguistics*
Seminar in historical linguistics.
Note: Consult the Department regarding topics offered in any given year as topics vary. Not offered every year.
MAY BE REPEATED FOR CREDIT

**Linguistics 697** H(3-0)

*Thesis Research Development*

**Linguistics 699** H(3S-0)

*Conference and Reading Course*
MAY BE REPEATED FOR CREDIT

**Linguistics 711** H(3-0)

*Advanced Syntactic Analysis II*

**Linguistics 713** H(3-0)

*Advanced Phonological Analysis II*

**Linguistics 797** Q(2-0)

*Senior Doctoral Seminar*
A forum for discussing and presenting candidacy paper research, thesis research, and conference presentations/ publications in preparation.
NOT INCLUDED IN GPA

MANAGEMENT PROGRAMS – See listing under Haskayne School of Business.

# MATHEMATICS AND STATISTICS MTST

### Contact Info

Location: Math Sciences Building, Room 462
Faculty number: (403) 220-6299
Fax: (403) 282-5150
E-mail address: gradapps@math.ucalgary.ca
Web page URL: http://math.ucalgary.ca/gradstudies

## 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), course-based and thesis-based
Divisions: Applied Mathematics, Pure Mathematics and Statistics

## 2. Admission Requirements

In addition to Faculties of Graduate Studies and Science requirements, the Department requires:

### Master of Science

a) Normally, an Honours Bachelor's degree, or its equivalent, in the subject of the division for which application is made;
b) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 600 (written test); or 100 (internet-based test); or minimum IELTS score of 7.0; or minimum MELAB score of 84; or a minimum PTE score of 70;
c) Three Reference Letters.

### Doctor of Philosophy

a) A Master's degree or equivalent in the subject of the division to which application is made;
b) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 600 (written test); or 100 (internet-based test); or minimum IELTS score of 7; or minimum MELAB score of 84; or a minimum PTE score of 70.
c) Three Reference Letters;
d) Excellent students, admitted to the Master's program, may be admitted after the first year to the PhD program with three completed half-courses with a 3.7 GPA and Divisional Graduate Committee approval. Such transfers are to be initiated by supervisors and are to include information about research ability.

## 3. Application Deadline

The deadline for submission of complete applications is 15 January for September admission. After this date, complete applications may be considered if space is available.

## 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

## 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Science requirements, the Department normally requires that:

### Master of Science (thesis-based)

All students in Applied Mathematics, Pure Mathematics and Statistics take course work to the equivalent of an Honours Bachelor's degree plus at least five half-course equivalents, or four half-course equivalents if completing program in one year (not counting the seminar course 621) at the graduate level. In addition:

a) Applied Mathematics students must include two of AMAT 605, AMAT 617, PMAT 607, PMAT 613 in their program; and, in each of the first two years of their program, the seminar course AMAT 621.
b) Pure Mathematics students must include two of AMAT 605, AMAT 617, PMAT 607, PMAT 613 in their program; and, in each of the first two years of their program, the seminar course PMAT 621.
c) Statistics students must include any three of STAT 701, STAT 703, STAT 721, STAT 723 in their program; and, in each of the first two years of their program, the seminar course STAT 621.

### Master of Science (course-based)

This degree can be completed on a full-time or part-time basis. In addition to the Faculty of Graduate Studies requirement that full-time students must be registered in six or more half-courses per annual registration, the normal course load for a full-time course-based Master of Science student is three half-courses per term.

a) Applied Mathematics students take ten half-course equivalents which must include two of AMAT 605, AMAT 617, PMAT 607, PMAT 613; and, in each of the first two years of their program, the seminar course AMAT 621.
b) Pure Mathematics students take ten half course equivalents which must include two of AMAT 605, AMAT 617, PMAT 607, PMAT 613; and, in each of the first two years of their program, the seminar course PMAT 621.
c) Statistics students take eight half course equivalents which must include any three of STAT 701, STAT 703, STAT 721, STAT 723; and, in each of the first two years of their program, the seminar course STAT 621.

All students complete a project resulting in a written report, followed up by an oral examination on the report.

### Doctor of Philosophy

Course requirements for the Doctor of Philosophy beyond those for a Master's degree are determined on an individual basis, but the following rules apply:

a) Applied Mathematics students must include eight half-course equivalents in their total graduate program (MSc and PhD) including the equivalent of two of AMAT 605, AMAT 617, PMAT 607, PMAT 613; and, in each of the first three years of their program, the seminar course AMAT 621.
b) Pure Mathematics students must include eight half-course equivalents in their total graduate program (MSc and PhD); including the equivalent of two of AMAT 605, AMAT 617, PMAT 607, PMAT 613; and, in each of the first three years of their program, the seminar course PMAT 621.
c) Statistics students must include eight half-course equivalents in their total graduate program (MSc and PhD); including the equivalent of STAT 701, STAT 703, STAT 721, and STAT 723; and, in each of the first three years of their program, the seminar course STAT 621.

## 6. Additional Requirements

All MSc graduate students are required to register in one of the Seminar courses AMAT 621, PMAT 621, or STAT 621 in each of the first two years of their programs.

All PhD students are required to register in one of the Seminar courses AMAT 621, PMAT 621, or STAT 621 in each of the first three years of their program.

The Seminar courses are not counted in the calculation of the number of required half-courses in each program.

## 7. Credit for Undergraduate Courses

Credit may be given for courses taken below the 600-level. At least one half of a graduate student's course work must be at the 600-level or higher and only where appropriate to a student's program may credit be given for courses numbered 500–599.

## 8. Time Limit

Expected completion time for full-time Master's students is two years. The maximum completion time allowed for a thesis-based Master's program is four years, and for a course-based Master's program is six years. The expected completion time for a doctoral student is four years, and the maximum completion time is six years.

## 9. Supervisory Assignments

The Director of Graduate Studies, Department of Mathematics and Statistics assigns supervisors based upon the graduate student's proposed program.

## 10. Required Examinations

Course-based Master's students must pass an oral examination on the written report within three months of the completion of all course-based requirements.

Doctoral students must pass written Preliminary Examinations during first year but no later than sixteen months from the beginning of their doctoral programs and before the oral candidacy examination.

Final thesis oral examinations are open.

Further details about the written and oral examinations may be obtained from the Department website:
http://math.ucalgary.ca/gradstudies/programs

## 11. Research Proposal Requirements

At least three months before a PhD Oral Candidacy Examination, a research proposal (prepared by student and supervisor) will be submitted to the student's Supervisory Committee. The Committee will inform the student of the material (topics, books, articles, etc) to be mastered for the Oral Candidacy Examination. The material will be based upon the proposal, and will be agreed upon with the student.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Details for financial assistance can be obtained from the Department website:
http://math.ucalgary.ca/student-finances.

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to the Department by 15 January.

## 14. Other Information

None.

## 15. Faculty Members/Research Interests

Information about current faculty and their research interests is available from the Department website:
http://math.ucalgary.ca/gradstudies/research

## Applied Mathematics (AMAT)

### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are undergraduate courses.

**Applied Mathematics 501** H(3-0)

*Seminar in Applied Mathematics*
Topics will be chosen according to the interests of instructors and students and could include analysis of optimization algorithms, approximation theory, control theory, differential equations, mathematical physics.
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

**Applied Mathematics 503** H(3-0)

*The Mathematics of Wavelets, Signal and Image Processing*
Continuous and discrete Fourier transforms, the Fast Fourier Transform, wavelet transforms, multiresolution analysis and orthogonal wavelet bases, and applications.
Prerequisite: Applied Mathematics 491 or Computer Science 491.

**Applied Mathematics 505** H(3-0)

*Calculus on Manifolds*
Integral and differential calculus on manifolds including tensor fields, covariant differentiation, Lie differentiation, differential forms, Frobenius' theorem, Stokes' theorem, flows of vector fields.
Prerequisites: Pure Mathematics 445 or 545; and one of Applied Mathematics 311 or 307; or consent of the Division.

**Applied Mathematics 507** H(3-0)

*Introduction to Relativity Theory*
Mathematical theories of space and time. Special Relativity. Electro-dynamics. General Relativity.
Prerequisites: Applied Mathematics 505 or consent of the Division.

**Applied Mathematics 509** H(3-0)

*Analytical Dynamics*
Symplectic geometry, Hamilton's equation, Hamilton-Jacobi theory, constraints and reduction.
Prerequisites: Applied Mathematics 505 or consent of the Division.

**Applied Mathematics 581** H(3-0)

*Advanced Futures and Options*
Stochastic calculus and the dynamics of asset prices, martingale theory and risk-neutral valuation, interest rate models, energy and commodity markets, value-at-risk and risk management.
Prerequisites: Applied Mathematics 483 and Statistics 407.

### Graduate Courses

In addition to the prerequisites listed below, consent of the Applied Mathematics Division is a prerequisite for all graduate courses in Applied Mathematics.

**Applied Mathematics 601** H(3-0)

*Topics in Applied Mathematics*
Topics will be chosen according to the interests of instructors and students.
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

**Applied Mathematics 605** H(3-0)

*Differential Equations III*
Linear systems, classification. Nonlinear systems: Existence and uniqueness. Flow and one parameter groups of transformations. Stability theory. Hyperbolicity, Unstable/Stable/Center manifold theorems. Poincare-Bendixson.
Prerequisites: Applied Mathematics 411 and Pure Mathematics 445 or 545 or equivalents.

**Applied Mathematics 613** H(3-0)

*Partial Differential Equations II*
Fundamental solutions, integral equations, eigenvalue problems, non-linear problems.
Prerequisite: Consent of the Division.

**Applied Mathematics 617** H(3-0)
(formerly Pure Mathematics 617)

*Analysis IV*
Analysis in abstract spaces. Function spaces.
Prerequisite: Pure Mathematics 545.

**Applied Mathematics 621** Q(2S-0)

*Research Seminar*
Reports on studies of the literature or of current research.
Note: All graduate students in Mathematics and Statistics are required to participate in one of Applied Mathematics 621, Pure Mathematics 621, Statistics 621 each semester.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

**Applied Mathematics 643** H(3-0)

*Perturbation Theory*
Perturbation problems for ordinary differential equations, matrices and more general operators. Applications. Methods will be motivated by discussion of physical problems.
Prerequisite: Familiarity with complex variables, linear algebra and differential equations.

**Applied Mathematics 671** H(3-0)

*Numerical Linear Algebra*
Iterative and elimination methods for linear systems of equations, determination of eigenvalues, linear and convex programming.
Prerequisites: Applied Mathematics 441 or Mathematics 411; and Applied Mathematics 491.

**Applied Mathematics 673** H(3-0)

*Approximation Theory*
Existence, uniqueness of minimal solutions, Haar systems, characterization by alternation, Remez algorithm, monotone operators, spline approximation.
Prerequisites: Applied Mathematics 491; and Pure Mathematics 435 or 455.

**Applied Mathematics 677** H(3-0)

*Numerical Solution of Partial Differential Equations*
Explicit and implicit methods for PDE, difference equations.
Prerequisites: Applied Mathematics 311 and 491.

In addition to the numbered and titled courses shown above, the department offers a selection of advanced level graduate courses specifically designed to meet the needs of individuals or small groups of students at the advanced doctoral level. These courses are numbered in the series 800.01 to 899.99. Such offerings are, of course, conditional upon the availability of staff resources.

## Pure Mathematics (PMAT)

### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are undergraduate courses.

**Pure Mathematics 501** H(3-0)

*Integration Theory*
Abstract measure theory, basic integration theorems, Fubini's theorem, Radon-Nikodym theorem, further topics.
Prerequisite: Pure Mathematics 545 or consent of the Division.
Note: Credit for both Pure Mathematics 501 and 601 will not be allowed.

**Pure Mathematics 503** H(3-0)

*Topics in Pure Mathematics*
This course is offered under various subtitles. Consult Department for details.
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

**Pure Mathematics 505** H(3-0)

*Topology I*
Metric spaces. Introduction to general topology.
Prerequisite: Pure Mathematics 435 or 455 or consent of the Division.

**Pure Mathematics 511** H(3-0)

*Rings and Modules*
Ring theory, and structure of modules. Application to Abelian groups and linear algebra. Additional topics.
Prerequisite: Pure Mathematics 431 or Mathematics 411 or consent of the Division.
Note: Credit for both Pure Mathematics 511 and 611 will not be allowed.

**Pure Mathematics 521** H(3-0)

*Complex Analysis*
A rigorous study of functions of a single complex variable. Consequences of differentiability. Proof of the Cauchy integral theorem, applications.
Prerequisite: Pure Mathematics 435 or 455 or consent of the Division.

Pure Mathematics 529 H(3-0)

*Advanced Cryptography and Cryptanalysis*
Cryptography based on quadratic residuacity. Advanced techniques for factoring and extracting discrete logarithms. Hyperelliptic curve cryptography. Pairings and their applications to cryptography. Code based and lattice based cryptography. Additional topics may include provable security, secret sharing, more post-quantum cryptography, and new developments in cryptography.
Prerequisites: Pure Mathematics 429.

Pure Mathematics 545 H(3-0)

*Honours Real Analysis II*
Sequences and series of functions; theory of Fourier analysis, functions of several variables: Inverse and Implicit Functions and Rank Theorems, integration of differential forms, Stokes' Theorem, Measure and Lebesgue integration.
Prerequisite: Mathematics 455; or a grade of B+ or better in Pure Mathematics435.

Graduate Courses

In addition to the prerequisites listed below, consent of the Pure Mathematics Division is a prerequisite for all Graduate Courses in Pure Mathematics.

Note: Students are urged to make their decisions as early as possible as to which graduate courses they wish to take, since not all these courses will be offered in any given year.

Pure Mathematics 601 H(3-0)

*Integration Theory*
Abstract measure theory, basic integration theorems, Fubini's theorem, Radon-Nikodym theorem, further topics.
Prerequisite: Pure Mathematics 545 or consent of the Division.
Note: Credit for both Pure Mathematics 601 and 501 will not be allowed.
Note: Lectures may run concurrently with Pure Mathematics 501.

Pure Mathematics 603 H(3-0)

*Conference Course in Pure Mathematics*
This course is offered under various subtitles. Consult Department for details.
MAY BE REPEATED FOR CREDIT

Pure Mathematics 607 H(3-0)

*Topology II*
General topology, elementary combinatorial topology.
Prerequisite: Pure Mathematics 505 or consent of the Division.

Pure Mathematics 611 H(3-0)

*Rings and Modules*
Ring theory, and structure of modules. Application to Abelian groups and linear algebra. Additional topics.
Prerequisite: Pure Mathematics 431 or Mathematics 411 or consent of the Division.
Note: Lectures may run concurrently with Pure Mathematics 511.

Pure Mathematics 613 H(3-0)

*Introduction to Field Theory*
Field theory, Galois theory.
Prerequisite: Pure Mathematics 431 or consent of the Division.

Pure Mathematics 615 H(3-0)

*Topics in Logic*
MAY BE REPEATED FOR CREDIT

Pure Mathematics 621 Q(2S-0)

*Research Seminar*
Reports on studies of the literature or of current research.
Note: All graduate students in Mathematics and Statistics are required to participate in one of Applied Mathematics 621, Pure Mathematics 621, Statistics 621 each semester.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

Pure Mathematics 627 H(3-0)

*Topics in Computational Number Theory*
An investigation of major problems in computational number theory, with emphasis on practical techniques and their computational complexity. Topics include basic interger arithmetic algorithms, finite fields, primality proving, factoring methods, algorithms in algebraic number fields.
Prerequisite: Pure Mathematics 427 or 429 or consent of the Division.

Pure Mathematics 629 H(3-0)

*Elliptic Curves and Cryptography*
An introduction to elliptic curves over the rationals and finite fields. The focus is on both theoretical and computational aspects; subjects covered will include the study of endomorphism rings. Weil pairing, torsion points, group structure, and efficient implementation of point addition. Applications to cryptography will be discussed, including elliptic curve-based Diffie-Hellman key exchange, El Gamal encryption, and digital signatures, as well as the associated computational problems on which their security is based.
Prerequisite: Pure Mathematics 315 or consent of the Division.

Pure Mathematics 631 H(3-0)

*Algebraic Topology I*
Elements of category theory and homological algebra. Various examples of homology and cohomology theories. Eilenberg-Steenrod axioms. Geometrical applications.

Pure Mathematics 633 H(3-0)

*Algebraic Topology II*
Cohomology operations, CW-complexes, introduction to homotopy theory.

Pure Mathematics 669 H(3-0)
(Computer Science 669)

*Cryptography*
An overview of basic techniques in modern cryptography, with emphasis on fit-for-application primitives and protocols. Topics include symmetric and public-key cryptosystems; digital signatures; elliptic curve cryptography; key management; attack models and well-defined notions of security
Prerequisite: Consent of the Division.
Note: Computer Science 413 and Mathematics 321 are recommended as preparation for this course. Students should not have taken any previous courses in cryptography.

Pure Mathematics 685 H(3-0)

*Topics in Algebra*
The following topics are available as decimalized courses: Algebraic Number Theory, Algebraic K-Theory, Algebraic Geometry, Representation Theory, Abelian Group Theory, Brauer Group Theory, Homological Algebra, Ring Theory, Associative Algebras, Commutative Algebra, Universal Algebra.
MAY BE REPEATED FOR CREDIT

Pure Mathematics 727 H(3-0)

*Advanced Topics in Computational Number Theory*
Depending on student demand and interests this could cover topics concerning efficient computation in various number theoretic structures such as number rings, finite fields, algebraic number fields and algebraic curves.

Pure Mathematics 729 H(3-0)

*Advanced Topics in Cryptography*
Depending on student demand and interests this could cover topics in cryptography developed in diverse mathematical structures such as: finite fields, lattices, algebraic number fields and algebraic curves.

In addition to the numbered and titled courses shown above, the department offers a selection of advanced level graduate courses specifically designed to meet the needs of individuals or small groups of students at the advanced doctoral level. These courses are numbered in the series 800.01 to 899.99. Such offerings are, of course, conditional upon the availability of staff resources.

Statistics (STAT)

Undergraduate Courses

Only where appropriate to a student's program will graduate credit be received for courses numbered 500-599.

Some 500- and 600-level statistics courses may have concurrent lectures. Extra work in these courses (e.g., extra assignments, advanced examination questions, a term project) will be required for credit at the 600-level.

Statistics 505 H(3-1T)

*Time Series Analysis*
Trend fitting, auto-regressive schemes, moving average models, periodograms, second-order stationary processes, ARCH models, statistical software for time series. Additional topics may include Bayesian analysis, spectral theory, Kalman filtering.
Prerequisite: Statistics 429 or consent of the Division.

Statistics 509 H(3-0)

*Operations Research*
Topics selected from: decision analysis, linear programming, dynamic programming, integer programming, probabilistic models of queues and inventories, project scheduling, systems reliability.
Prerequisite: Mathematics 323 or consent of the Division.
Note: Credit for both Statistics 509 and Actuarial Science 435 will not be allowed.

Statistics 517 H(3-1)

*Practice of Statistics*
Intended for students in their final year of study. Introduction to real-world statistical practice. Model selection. Messy data. Statistical software. Report writing and presentation. Working in groups. Ethical considerations in statistics.
Prerequisite: Statistics 429 or consent of the Division.
Note: Not open to students with Statistics 513 or 515.
Note: Prior or concurrent completion of Statistics 429 is strongly recommended.

Statistics 519 H(3-0)

*Bayesian Statistics*
Fundamentals of Bayesian inference, single and multiparameter models, hierarchical models, regression models, generalized linear models, advanced computational methods, Markov chain Monte Carlo.
Prerequisites: Mathematics 323 and 353 or consent of the Division.
Note: Statistics 421 is highly recommended as preparation.

Statistics 523 H(3-0)

*Nonparametric Statistics*
Nonparametric estimation and tests of hypotheses. Distributions useful to handle nonparametric inference. Distribution-free tests. Asymptotic Theory.
Prerequisites: Mathematics 323 and 353 or consent of the Division.
Note: May not be offered every year. Consult the department for listings.

Statistics 525 H(3-0)

*Multivariate Analysis*
Normal distribution. Statistical inference: confidence regions, hypothesis tests, analysis of variance, simultaneous confidence intervals. Principal components. Factor Analysis. Discrimination and classification. Canonical correlation analysis.
Prerequisite: Statistics 421 or consent of the Division.
Note: May not be offered every year. Consult the department for listings.

Statistics 529 H(3-1)

*Special Topics in Applied Statistics*
Content of the course will vary from year to year. Consult the Statistics Division for information on choice of topics.
Prerequisite: Consent of the Division.
MAY BE REPEATED FOR CREDIT

Statistics 531 H(3-1)

*Monte Carlo Methods and Statistical Computing*
Introduction to a variety of statistical languages and packages and introductory statistical programming in SPLUS. Pseudo-random variate generation. Bootstrapping. Variance reduction techniques. Computation of definite integrals. Model design and simulation, with applications.
Prerequisite: Mathematics 323 or consent of the Division.
Note: Statistics 421 is highly recommended as preparation.

Graduate Courses

In addition to the prerequisites listed below, consent of the Statistics Division is a prerequisite for all graduate Courses in Statistics.

Note: Some 500- and 600-level statistics courses may have concurrent lectures. Extra work in these courses (e.g., extra assignments, advanced examination questions, a term project) will be required for credit at the 600 level.

Students are urged to make their decisions as early as possible as to which Graduate Courses they wish to take, since not all these courses will be offered in any given year.

Statistics 601 H(3-0)

*Topics in Probability and Statistics*
The content of this course is decided from year to year in accordance with graduate student interest and instructor availability. Topics include but are not restricted to: Advanced Design of Experiments, Weak and Strong Approximation Theory, Asymptotic Statistical Methods, the Bootstrap and its Applications, Generalized Additive Models, Order Statistics and their Applications, Robust Statistics, Statistics for Spatial Data, Statistical Process Control, Time Series Models.
MAY BE REPEATED FOR CREDIT

Statistics 603 H(3-1)
(formerly Statistics 601.14)

*Applied Statistics for Nursing Research*
Descriptive statistics; probability theory; statistical estimation/inference; power analysis; regression analysis; anova; logistic regression analysis; nonparametric tests; factor analysis; discriminant analysis; Cox's Proportional Hazard Model.

Statistics 619 H(3-0)

*Bayesian Statistics*
Fundamentals of Bayesian inference, single and multiparameter models, hierarchical models, regression models, generalized linear models, advanced computational methods, Markov chain Monte Carlo.
Note: Lectures may run concurrently with Statistics 519.

Statistics 621 Q(2S-0)

*Research Seminar*
Reports on studies of the literature or of current research.
Note: All graduate students in Mathematics and Statistics are required to participate in one of Applied Mathematics 621, Pure Mathematics 621, Statistics 621 each semester.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

Statistics 625 H(3-0)

*Multivariate Analysis*
Normal distribution. Statistical inference: confidence regions, hypothesis tests, analysis of variance, simultaneous confidence intervals. Principal components. Factor Analysis. Discrimination and classification. Canonical correlation analysis.
Note: Lectures may run concurrently with Statistics 525.

Statistics 633 H(3-0)

*Survival Models*
Advanced topics in survival models such as the product limit estimator, the cox proportional hazards model, time-dependent covariates, types of censorship.

Statistics 635 H(3-0)

*Generalized Linear Models*
Exponential family of distributions, binary data models, loglinear models, overdispersion, quasi-likelihood methods, generalized additive models, longitudinal data and generalized estimating equations, model adequacy checks.

Statistics 637 H(3-0)

*Nonlinear Regression*
Topics include but are not restricted to selections from: linear approximations; model specification; various iterative techniques; assessing fit; multiresponse parameter estimation; models defined by systems of DEs; graphical summaries of inference regions; curvature measures.

Statistics 639 H(3-0)

*Conference Course in Actuarial Modelling*
Topics in advanced actuarial theory and practice, such as: insurance risk models; practical analysis of extreme values; advanced property and casualty rate making; actuarial aspects of financial theory.
MAY BE REPEATED FOR CREDIT

Statistics 701 H(3-0)

*Theory of Probability I*

Statistics 703 H(3-0)

*Theory of Probability II*

Statistics 721 H(3-0)

*Theory of Estimation*

Statistics 723 H(3-0)

*Theory of Hypothesis Testing*

Statistics 761 H(3-0)

*Stochastic Processes I*

## MEDICINE PROGRAMS

### Contact Info

Graduate Medical Education Office
Location: HSC G329
Fax: (403) 210-8109
Web page URL: http://medicine.ucalgary.ca/grad

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD), thesis-based
Master of Science (MSc), thesis-based
Master of Biomedical Technology (MBT), course-based
Master of Community Medicine (MCM), course-based
Master of Disability and Community Studies (MDCS), course-based

Joint programs, offered with other Faculties:
The Faculty of Medicine and the Haskayne School of Business offer a combined Master of Biomedical Technology/Master of Business Administration (MBT/MBA) program. Contact either program for further information.

Students in the Faculty of Medicine and the Departments of Anthropology and Archeology may choose an interdisciplinary specialization in Biological Anthropology. For further information on the Biological Anthropology (Interdisciplinary) specialization, see the separate listing in this calendar.

The University of Calgary and Alberta offer a joint Biomedical Engineering Program. Further information can be obtained from the separate listing in this Calendar.

In addition, the University of Calgary offers the joint Leaders in Medicine Program leading to MD/Masters or MD/Doctoral degrees. Students applying to the MD/MSc or MD/PhD program must apply individually to each program and complete a supplementary application for the Leaders in Medicine Program.

Further information regarding the Leaders in Medicine Program is provided under the Degree Regulations Summary section in this Calendar.

### 2. Admission Requirements

In addition to the Faculty of Graduate Studies regulations, the Faculty of Medicine graduate programs require a minimum admission grade point average of 3.20 (on a 4-point system; approximately equivalent to a B+) on the work of the last two undergraduate years for thesis-based programs.

The minimum GPA requirement for course-based programs in Medicine is 3.0 Master's Programs

- BSc degree or equivalent

Doctor of Philosophy

- MSc degree recognized by the Faculty of Graduate Studies, or transfer from MSc program, or, in exceptional cases, BSc degree or equivalent.

Refer to the individual program entries for additional program admission requirements.

### 3. Application Deadline

Refer to individual program information.

### 4. Advanced Credit

Applicants must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission Refer to individual programs for additional advanced credit information.

### 5. Program/Course Requirements

Refer to individual program information.

### 6. Additional Requirements

Refer to individual program information.

### 7. Credit for Undergraduate Courses

Refer to individual program information.

### 8. Time Limit

Maximum completion times follow the Faculty of Graduate Studies regulations.

- Maximum completion time for a course-based Master's program is six years;
- Maximum completion time for a thesis-based Master's program is 4 years
- Maximum completion time for a doctoral program is 6 years.
- Maximum completion time for the MD/Master's program is six years
- Maximum completion time for the MD/PhD program is eight years.

For specific program expected time to completion, please refer to individual program information.

### 9. Supervisory Assignments

Supervisors and supervisory committees are assigned according to the Faculty of Graduate Studies *Handbook of Supervision and Examination* and are approved by the Graduate Program Director of each program.

Master of Science students in the Leaders in Medicine Program must have supervisory committees constituted according to the regulations of the graduate home program. Both master's and doctoral students will also be evaluated and advised by a Joint Liaison Committee composed of the Associate Dean (Graduate Sciences Education), Associate Dean (Undergraduate Medical Education), and the Associate Dean (Research) of the Faculty of Medicine.

For specific program supervisory assignment information, please refer to the individual program entry.

### 10. Required Examinations

All thesis-based programs, MSc and PhD require successfully passing the Final Thesis Oral Examination. For more specific program examination information, please refer to the program section.

Doctoral Candidacy Examinations

In addition to Faculty of Graduate Studies regulations, the Faculty of Medicine candidacy examinations consist of both a written and an oral component.

The student's approved research proposal will serve as the examination's written component. The written component shall consist of a 13-17 page (single spaced) document, excluding references and figures, that includes a literature review of the students topic area and a description of the proposed research. The oral examination will take place one month after the submission of the written document to the examination committee and must be completed within 24 months after initial registration. The supervisor is a non-voting observer at the doctoral candidacy exam. The final thesis defence for MSc and PhD degrees will consist of a public seminar followed by an open oral examination.

Refer to individual program sections for specific candidacy examination information.

### 11. Research Proposal Requirements

All MSc and PhD students must defend a written research proposal to their supervisory committee. For MSc students, this document must be submitted within 12 months after initial registration in the program. For PhD students, the research proposal forms the written component of the candidacy exam, and an approved version of the proposal must be submitted one month before the candidacy exam, with all exam requirements being fulfilled by 24 months after initial registration in the program.

For additional information, refer to the individual program sections.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Refer to the individual program sections.

### 14. Other Information

Research Integrity Day is a Research Ethics session offered in January and April of each year. All graduate students in the Faculty of Medicine are required to attend Research Integrity Day once during their program as part of their course requirements.

- PhD students must meet this requirement prior to their candidacy exam.
- MSc students must meet this requirement prior to defending their thesis.
- MBT, MCM and MDCS students must contact the program administrator or review the program webpage for further information on when they must meet this requirement.

### 15. Faculty Members/Research Interests

Refer to the individual program sections.

## BIOCHEMISTRY AND MOLECULAR BIOLOGY MDBC

### Contact Info

Location: Health Sciences Centre, Room G329
Faculty number: (403) 220-8306
Fax: (403) 210-8109
E-mail address: bmbgrad@ucalgary.ca
Web page URL: http://www.ucalgary.ca/bmb

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based

Faculty members in the Department are affiliated with one or more of the Faculty of Medicine's Institutes and Centres. In addition, faculty research is grouped according to research streams: Molecular and Developmental Genetics, Molecular Biology of Disease, Genomics, Proteomics and Bioinformatics and Cell Signalling and Structure. All students will

have the specialization "Biochemistry and Molecular Biology."

All Master's Thesis and Doctoral students are considered full-time. In exceptional circumstances part-time status may be considered and must be approved by the Graduate Director

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Medicine requirements, the Department requires:

a) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 600 (written), or 100 (internet-based), or an IELTS score of 7.50, or a MELAB score of 84, or a PTE score of 70;
b) International applicants are required to submit scores from the Graduate Record Examination (GRE).A competitive GRE score has usually been in the 90th percentile;
c) Master's applicants are required to submit two reference letters PhD applicants are required to submit three reference letters.

### 3. Application Deadline

Deadlines for submission of complete applications for students with international transcripts:
April 30 for September admission
August 31 for January admission
December 31 for May admission
Deadlines for submission of complete applications for students with Canadian or U.S. transcripts:
September 1 for September admission
January 1 for January admission
May 1 for May admission
Students applying to the MD/Master's or MD/PhD program must also apply to the Leaders in Medicine program by completing a supplementary application.

### 4. Advanced Credit

Any credit to be given for courses completed will be included in the letter of offer for admission to the Faculty of Graduate Studies.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Medicine requirements, an interim supervisory committee will determine the courses required for each student, based on the student's previous academic background and proposed area of research. In general, Master's students will be required to take at least two graduate level half-courses and doctoral students will be required to take at least three graduate level half-courses.

### 6. Additional Requirements

Each student is required to participate regularly in journal club and work-in-progress seminar programs administered by the Research Group to which the student and his/her supervisor belong, and the student will present at least one journal club seminar and one work-in-progress presentation per year. Attendance at a Research Integrity Day workshop is required for all graduate students. Consult the program website for details.

### 7. Credit for Undergraduate Courses

Courses at the 500-level are not usually considered graduate courses. Students should register in 500-level courses only upon the recommendation of their supervisory committee. Credit will be given for 500-level courses appropriate to a student's program as long as an equal or greater number of courses at the 600-level or above is included in the program.

### 8. Time Limit

See "Medicine Programs".

### 9. Supervisory Assignments

The Biochemistry and Molecular Biology Graduate Program has an optional rotation program that may last up to six months. This allows the graduate student and the potential supervisor to learn more about each other's research interests and available research projects. The student will spend two months in each laboratory of up to three faculty members. After the rotation program, the student will select a permanent supervisor. Alternatively, a student may begin the program with a permanent supervisor, if such arrangements have been made prior to arrival. Supervisory committees are required for both Master's and doctoral students in the BMB Graduate Program. A permanent supervisory committee must be in place no later than 3 months after the appointment of the supervisor.

Students in the Leaders in Medicine program must have a supervisory committee constituted according to the regulations of the graduate program. In addition, these students are monitored by a Joint Liaison Committee of the Leaders in Medicine program.

### 10. Required Examinations

See "Medicine Programs" entry in this Calendar.

### 11. Research Proposal Requirements

See "Medicine Programs" entry in this Calendar.

### 12. Special Registration Information

None.

### 13. Financial Assistance

All students who are accepted into the Biochemistry and Molecular Biology Graduate Program will receive a minimum stipend [$20,000 for MSc students and $22,000 for doctoral students (fourth year post-candidacy PhD students will receive $23,000/yr).] Students are encouraged to apply to external agencies for financial assistance from scholarships or studentships. Some of these awards provide stipends in excess of the program minimum. Information on awards can be obtained from the office of the Biochemistry and Molecular Biology Graduate Program. Students applying for University scholarships must submit their applications to the Department by 1 February.

### 14. Course Information

All Biochemistry and Molecular Biology graduate students are required to take either the Biochemistry and Molecular Biology core course MDSC 721; or Advanced Genetics, MDSC 641.01 as part of their course work requirement.
Descriptions of courses with biochemistry and molecular biology content at the University of Calgary are included under Biochemistry (BCEM), Cellular, Molecular and Microbial Biology (CMMB) and Medical Science (MDSC) listings elsewhere in the Calendar. Relevant courses for the Biochemistry and Molecular Biology graduate program include:

500-level Courses – Courses at the 500-level are not usually considered graduate courses. Students should register in 500-level courses only upon the recommendation of their supervisory committee.

Graduate-level Courses
BCEM 731 Protein and Metabolic Engineering
MDSC 603 Biology of Laboratory Animals (BIOL 603)
MDSC 604 Integrative Human Physiology
MDSC 605 Information Storage and Processing in Biological Systems (CPSC 605)
MDSC 609.02 Genes and Development
MDSC 613.05 Regulation of Gene Expression in Bacteria
MDSC 619.01 Cellular and Molecular Neuroscience
MDSC 619.03 Developmental Neuroscience
MDSC 621.01 Basic Principles of Pharmacology
MDSC 631 Muscle Physiology
MDSC 639.01 Principles of Immunology
MDSC 639.02 Cellular and Molecular Immunology
MDSC 641.01 Advanced Genetics I
MDSC 641.04 Genomics
MDSC 643 Biostatistics I and II
MDSC 671 Techniques in Medical Science
MDSC 675 Bioinformatics Resources for the Biologist
MDSC 683.01 Cancer Pathology, Epidemiology and Therapy
MDSC 683.02 Molecular Mechanisms of Cancer
MDSC 683.04 Cell Biology of Cancer
MDSC 717 Functional Genomics Technologies
MDSC 721 Biochemistry and Molecular Biology
MDSC 751.02 Cellular and Molecular Pathogenic Mechanisms of Diabetes
MDSC 751.09 Ion Channel Diseases

### 15. Other Information

For further information on graduate program application and admission, consult the department website at: http://www.ucalgary.ca/bmb/.

### 16. Faculty Members/Research Interests

Research interests of the Groups can be found on the department website at
http://www.ucalgary.ca/bmb/FacultyResearch

## MEDICINE, BIOMEDICAL TECHNOLOGY MDBT

Contact Info

Location: Health Sciences Centre, Room G341B
Faculty number: (403) 210-9572
Fax: (403) 210-8109
E-mail address: mbtgrad@ucalgary.ca
Web page URL: http://www.biotech.ucalgary.ca/

### 1. Degrees and Specializations Offered

Master of Biomedical Technology (MBT), course-based

This interdisciplinary program involves several areas of Medical Science: genetics, biochemistry, cell biology, physiology, immunology, microbiology, and pharmacology.

The Master of Biomedical Technology Graduate Program and the Haskayne School of Business offer a combined MBT/MBA program. Contact the Graduate Science Education Office for further information.

### 2. Admission Requirements

In addition to the Faculties of Graduate Studies and Medicine requirements, the program requires:

a) Normally, a four year Bachelor of Science degree in biological sciences, or its equivalent
b) For students required to provide proof of proficiency in English, a TOEFL score of 600 (written), or 100 (internet-based), or IELTS score of 7.5, or MELAB test score of 84, or a PTE score of 70

c) Two reference letters and completed reference forms
d) A current resume and a personal statement (approx. 300 words) outlining career goals, and how the MBT program will help achieve them

### 3. Application Deadline

Deadline for the submission of completed applications for September admission:

1 June for applicants with Canadian or US transcripts
31 March for applicants with international transcripts

### 4. Advanced Credit

See"Medicine Programs".In consultation with the graduate program Graduate Program Director, advanced credit may be requested in accordance with Faculty of Graduate Studies regulations.

### 5. Program/Course Requirements

In addition to the Faculties of Graduate Studies and Medicine requirements, the program requires a minimum of nine half-courses, normally carried out from September to August.

Students will be required to complete a twelve-week student practicum and successful completion of the final program course Medical Science 670. Information on the practicum can be found at http://www.biotech.ucalgary.ca/.

### 6. Additional Requirements

Suggested prerequisites: Genetics (BIOL 311 or equivalent), Cell Biology (BIOL 331 or equivalent, Biochemistry or macro molecules (BCEM 393 or equivalent).

### 7. Credit for Undergraduate Courses

None.

### 8. Time Limit

This program may be completed in one year on a full-time basis. It may also be completed on a part-time basis. Maximum completion time is six years.

### 9. Supervisory Assignments

The Graduate Program Director will serve as interim supervisor for all newly admitted students. It is recommended that students find a supervisor within two months. The selection of the supervisor must be by mutual agreement between the student and the faculty member concerned and approved by the MBT Graduate Program Director.

See “Medicine Programs” for more information.

### 10. Required Examinations

None.

### 11. Research Proposal Requirements

None.

### 12. Special Registration Information

None.

### 13. Financial Assistance

None.

### 14. Other Information

None.

### 15. Faculty Members/Research Interests

MDSC 672: Biotechnology Business Aspects
MDSC673: Biomedical Technology Careers
MDSC674: Integrated Systems Courses
.01: Physiological and Pharmacological Aspects of Therapeutics Development
.02: Molecular Cell Biology of Diagnostic and Vaccine Development
MDSC678: Project in Biomedical Technology
MDSC669: Topics in Applied Biotech
.01: Laboratory Techniques and Commercial Applications
.02: BioManufacturing and Clinical Trials
MDSC668: Biotech Technology Commercialization
MDS670: Practicum in Biomedical Technology
Course information can be found at http://biotech.ucalgary.ca/curriculum.

Contact the Graduate Science Education Office for more information.

## MEDICINE, CARDIOVASCULAR/ RESPIRATORY SCIENCES MDCV

Contact Info

Location: Health Sciences Centre, Room G329
Faculty number: (403) 210-3937
Fax: (403) 210-8109
E-mail address: cvrgrad@ucalgary.ca
Web page URL: http://www.ucalgary.ca/crs_gse/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based

Faculty members within the Department hold academic appointments in Biochemistry and Molecular Biology, Biology, Medicine, Medical Physiology and Biophysics, or Pharmacology & Therapeutics. Faculty members are affiliated with the Cardiovascular, Smooth Muscle and Respiratory Research Groups.

Students in the master and doctoral degree programs are normally considered full-time.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Medicine requirements, the Department requires:

a) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 600 (written test), or 100 (internet-based test), a minimum IELTS score of 7.0, or a minimum MELAB score of 84, or a minimum PTE score of 70.
b) Two references from individuals that can attest to the applicants academic background. Each referee to provide a reference form and accompanying letter on institutional letterhead.

### 3. Application Deadline

Deadlines for submission of complete applications for students with international transcripts:

1 April for September admission
1 August for January admission
1 Dec for May admission

Deadlines for submission of complete applications for students with Canadian and US transcripts:

1 June for September admission
1 October for January admission
1 March for May admission

### 4. Advanced Credit

Advanced credit for previous course work is usually not given. See “Medicine Programs”

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Medicine requirements, the Department requires:

a) The minimum course requirement is normally two half-courses for an MSc and an additional one half-course for a PhD program. At least one course for an MSc program and two courses for a PhD program should be from the list of recommended MDCV graduate courses. The amount of course work is determined by the student’s supervisory committee. However, it also must meet the departmental minimum requirements.
b) Students holding a completed BSc degree entering the PhD program are required to successfully complete a minimum of three half courses
c) Students holding a completed MSc degree in the same area of study entering the PhD program are required to complete a minimum of one half course provided that a minimum of two half courses were completed in their MSc program
d) Students transferring from the MSc program to the PhD program are required to complete a minimum of one additional half course.
e) Students holding a completed MSc degree in an unrelated field of studies entering the Ph.D. program are required to complete a minimum of three half courses unless otherwise agreed by the student's supervisory committee.
f) Attendance at the seminar and journal club series organized by the student’s respective research group (Cardiovascular, Respiratory, or Smooth Muscle) and the presentation of at least one research-in-progress seminar annually. Students are also required to participate in the monthly MDCV student seminar program, which will include an annual presentation.

The amount of course work is determined by the student’s supervisory committee; however, it also must meet the departmental minimum requirements.

### 6. Additional Requirements

Attendance at a Research Integrity Day workshop is required for all graduate students. MSc students must attend prior to defending their thesis and PhD students must attend prior to their candidacy oral examination.

### 7. Credit for Undergraduate Courses

Credit may be given for courses taken below the 600-level. At least one half of a graduate student’s course work must be at the 600-level or higher. Only under unusual circumstances and upon the recommendation of the supervisory committee and approval by the Graduate Coordinator may credit be received for courses numbered 500–599.

### 8. Time Limit

Expected completion time is four years for the Doctor of Philosophy program. Expected completion time is four to five years for the MD/Master’s program and six to seven years for the MD/PhD program.
See “Medicine Programs” for maximum completion times.

### 9. Supervisory Assignments

The selection of the supervisor must be by mutual agreement between the student and the faculty member concerned and approved by the MDCV Graduate Coordinator. The supervisor will be a member of the Cardiovascular, Respiratory or Smooth Muscle Research Groups. Every graduate student must have a supervisory committee named within eight months after initial registration.The final composition of the supervisory committee must be approved by the MDCV Graduate Coordinator.

### 10. Required Examinations
See "Medicine Programs" entry in this Calendar.

### 11. Research Proposal Requirements
See "Medicine Programs" entry in this Calendar.

### 12. Special Registration Information
None.

### 13. Financial Assistance
All students who are accepted into the Cardiovascular/Respiratory Science Graduate Program will receive a minimal stipend as reflected by current CIHR/AHFMR awards. Students are encouraged to apply to external agencies for financial support and studentship awards. University of Calgary Scholarships are also available (see Awards and Financial Assistance section of this Calendar). Possible sources of financial support are listed on the Faculty of Graduate Studies website: http://grad.ucalgary.ca/awards

Students in the program are eligible to receive a Graduate Student Support scholarship to assist them with tuition while paying full program fees. The amount of the scholarship varies from year to year.

### 14. Other Information
Courses in the Department of Cardiovascular / Respiratory Sciences are offered under the auspices of the Department of Medical Science. For information on course requirements please visit the graduate program's webpage at
http://www.ucalgary.ca/crs_gse/
Detailed course descriptions are available at http://www.ucalgary.ca/pubs/calendar/ and timetabling information can be found through the MyUofC portal.

### 15. Faculty Members/Research Interests
Faculty members and their research interests may be found at http://www.ucalgary.ca/crs_gse/node/30

## MEDICINE, COMMUNITY HEALTH SCIENCES MDCH

**Contact Info**

Location: Teaching, Research and Wellness (TRW)
Faculty number: (403) 220-4288/ 210-6689
Fax: (403) 210-8109
E-mail address: chsgrad@ucalgary.ca
Web page URL:
http://www.ucalgary.ca/communityhealthsciences

The Department of Community Health Sciences offers a number of degrees and specializations. Details on the course-based Master's degrees are presented first, followed by the thesis-based degrees.

Further information on degree offerings can be obtained from the Department's website.

## COURSE-BASED DEGREES

### 1. Degrees and Specializations Offered
a) Master of Community Medicine (MCM), a course-based degree available only to physicians registered in the Community Medicine Residency Training Program.
b) Master of Disability and Community Studies (MDCS), a course-based degree examines the intersection between community, disability, chronic illness, and marginalizing conditions within a social justice framework. The goal is to generate research, leadership, capacity, innovation, and partnerships. The graduate program attracts professionals across disciplines and sectors. The MDCS is offered in an alternate delivery format (combined face-to-face and online) and has a differential tuition fee.

Students wishing to charter as Counseling Psychologists should apply to the Division of Applied Psychology.

### 2. Admission Requirements
In addition to Faculties of Graduate Studies and Medicine requirements, the Department requires:

a) MCM
- Currently enrolled in the Royal College Residency Training Program in Community Medicine at University of Calgary
- Hold an MD or equivalent degree
- Meet the admission requirements of the Department of Community Health Sciences
- Two Letters of Reference

b) MDCS
- Minimum admission grade point average of 3.0 on a four point scale over the last two full years or equivalent
- Three years of experience in a field of practice in community rehabilitation
- A written statement and professional profile of past education and work experience
- Two Letters of Reference

### 3. Application Deadline
a) MCM -15 January for September admission
b) MDCS - 15 August for January admission

### 4. Advanced Credit
a) MCM - Applicable graduate courses may be considered.
b) completed at a satisfactory level (minimum B+) and within three years of admission to the graduate program, may be credited toward a student's degree requirements.
See "Medicine Programs".

### 5. Program/Course Requirements
In addition to Faculties of Graduate Studies and Medicine requirements, the Department requires:

a) MCM - A minimum of twelve half-course equivalents, in combination with the Community Medicine Residency Program.
b) MDCS - A minimum of twelve half-course equivalents.

Course descriptions and detailed outlines of courses offered by the Department of Community Health Sciences are found on the departmental website at http://www.ucalgary.ca/communityhealthsciences/ They are also listed at the end of this Community Health Sciences Calendar entry.

### 6. Additional Requirements
None

### 7. Credit for Undergraduate Courses
The Department does not normally give credit for undergraduate courses.

### 8. Time Limit
a) MCM - Expected completion time is within 6 years.
b) MDCS - Expected completion time is 3 years
See "Medicine Programs" for maximum completion times.

### 9. Supervisory Assignments
a) MCM - A Supervisor must be named as part of the admission process. The Supervisory Committee must be named prior to planning the MDSC 649.01: Practicum in Community Medicine, usually in the second term of the second year of the student's program.
b) MDCS - A faculty member is assigned as a supervisor prior to the final project; supervisory committee is not required.

### 10. Required Examinations
a) MCM - A final comprehensive written and oral examination with respect to the course content, plus a practicum evaluation.
b) MDCS - A capstone project with a public presentation and paper will be required for completion of the degree. For further details, please see the department website.

### 11. Research Proposal Requirements
a) MCM – A formal research proposal is not necessary, however a practicum proposal is required.
b) MDCS – Not applicable.

### 12. Special Registration Information
None.

### 13. Financial Assistance
Financial assistance may be available to qualified students. For information on awards, please see the Awards and Financial Assistance section of this Calendar.

### 14. Other Information
MDCS - Students are encouraged to produce an article for publication.

### 15. Faculty Members/Research Interests
Current faculty and their areas of research can be found at:
http://www.ucalgary.ca/communityhealthsciences/

## THESIS-BASED DEGREES

### 1. Degrees and Specializations Offered
a) Doctor of Philosophy (PhD)
b) Master of Science (MSc)

Within the thesis-based programs, the student must select a specialization in Biostatistics, Epidemiology, Healthcare Epidemiology, Clinical Epidemiology, Health Services Research, Population/Public Health or Community Rehabilitation and Disability Studies.

Descriptions of each specialization and its requirements are found on the Departmental website at: http://www.ucalgary.ca/communityhealthsciences/

### 2. Admission Requirements
In addition to Faculty requirements, the Department requires:

a) A BSc, BA, BCR, MD or equivalent degree for admission to the Master of Science program
b) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 600 (written test), or 100 (internet-based test), an IELTS score of 7.0, a MELAB score of 84, or PTE score of 70.
c) A statement outlining the applicant's interest and reasons for choosing the program
d) A letter from a faculty member of our Department indicating interest in supervising the applicant
e) Work and/or research experience in the health system, community rehabilitation and/or disability studies is highly recommended.
f) Two Letters of Reference

### 3. Application Deadline
The deadline for the submission of complete applications is 15 January for September admission. Students applying to the MD/MSc or MD/PhD

program must apply individually to each program and complete a supplementary application for the Leaders in Medicine Program.

### 4. Advanced Credit

Open Studies Students may take courses before applying for admission to a graduate program. However, Open Studies Students are not eligible to enroll in the three core courses, Essentials of Biostatistics (MDSC 643.01), Fundamentals of Epidemiology (MDSC 647.01) and Health Research Methods (MDSC 659.02). A maximum of two half-courses, completed at a satisfactory level (minimum B+) and within three years of admission to the graduate program, may be credited toward a student's degree requirements. Completing courses does not guarantee admission into the program.

### 5. Program/Course Requirements

In addition to Faculty requirements, the Department requires that all students complete two Block Week courses: "Introduction to Community Health Sciences" and "Determinants of Health" and the following:

#### Master of Science

A minimum of six half-course equivalents (three core courses and three electives) for all specializations. The CRDS specialization requires a minimum of six CORE half courses.
See departmental website for specific course requirements for each MSc specialization.

#### Doctor of Philosophy

A minimum of four half-course equivalents, in addition to the three core courses if not completed previously. The CRDS specialization requires a minimum of four CORE half courses.
See departmental website for specific course requirements for each PhD specialization.

Brief course descriptions follow this section. Courses in CRDS specialization are only offered in block weeks. More detailed course schedules and outlines are found on the departmental website at: http://www.ucalgary.ca/communityhealthsciences/

### 6. Additional Requirements

In addition to the Faculty requirements, the Department requires that all students attend the two research seminars offered weekly and bi-weekly during the academic year. Some students (including CRDS) may be exempt from this requirement. Attendance at Research Integrity Day is required once during a student's program.

### 7. Credit for Undergraduate Courses

The Department does not normally give credit for undergraduate courses.

### 8. Time Limit

Expected completion time is two to three years for the MSc program and 4-5 years for the PhD program. See "Medicine Programs" for maximum completion times.

#### Leaders in Medicine

Expected completion time is four to five years for the MD/MSc program and six to seven years for the MD/PhD program. See "Medicine Programs" for maximum completion times.

### 9. Supervisory Assignments

Applicants must secure a proposed supervisor prior to applying for admission. During the second academic term of the first year of the program, each student must confirm a permanent Supervisor. The student and Supervisor complete and submit an *Appointment of Supervisor* form.

For thesis-based Master's students, the Supervisory Committee is usually named at the same time as the confirmation of the Supervisor. For doctoral students, the Supervisory Committee must be appointed within three months of the confirmation of the Supervisor. The Supervisor, in consultation with the student and the Graduate Program Coordinator, recommends the Supervisory Committee.

Students in the Leaders in Medicine Program must also have a Supervisory Committee constituted according to the above regulations. Both Master of Science and doctoral students will also be evaluated and advised by a Joint Liaison Committee composed of the Associate Dean (Graduate Sciences Education), Associate Dean (Undergraduate Medical Education), and the Associate Dean (Research) of the Faculty of Medicine.

### 10. Required Examinations

The student and his/her Supervisory Committee establish a concept map outlining the student's study area and an accompanying reading list to prepare for the exam. The Supervisory Committee develops three exam questions that meet the competency requirements as outlined by the department. These questions are derived from the concept map and reading list developed for each student. Questions on the research proposal are not included. The student has three weeks to prepare written solutions to the three questions.

In both MSc and PhD programs final thesis oral examinations are open.

### 11. Research Proposal Requirements

The proposal is usually 12 to 15 single-spaced, typed pages. Appendices are permitted and should include the research instrument and, if the research involves agencies or institutions outside of the Department, their written permission to conduct the research. Doctoral students should include a complete literature review as an appendix.

After approval by the student's Supervisory Committee and before commencement of data collection, all proposals are submitted to the Conjoint Health Research Ethics Board for ethical review, and most are submitted to the appropriate committee for impact review.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, please see the Awards and Financial Assistance section of this calendar.

The Department's deadline for applications to the Open Scholarship Competition is 15 January.

### 14. Other Information

Medical Science (MDSC) and Community Rehabilitation (CORE) Courses in Community Health Sciences are listed following this section.

### 15. Faculty Members/Research Interests

Current faculty and their areas of research are on the departmental website at:
http://www.ucalgary.ca/communityhealthsciences/

## Community Rehabilitation Courses (CORE)

### Graduate Courses

**Community Rehabilitation 601** Q(1-1)

*Professional Foundations of Community Rehabilitation*
Graduate challenge units enable experienced professionals from a number of disciplines to challenge professional practice competencies in Community Rehabilitation.
MAY BE REPEATED FOR CREDIT

**Community Rehabilitation 603** H(2-3)

*Foundations of Disability, Community and Rehabilitation Studies*
In-depth study of theory and practice in community rehabilitation domains.
MAY BE REPEATED FOR CREDIT

**Community Rehabilitation 611** Q(1-1)

*New Alliances in Community Rehabilitation*
A series of quarter courses delivered during the Pan Canadian Summer Institute. Introduces new practices for change.
MAY BE REPEATED FOR CREDIT

**Community Rehabilitation 624** F(2-3)

*Specialization Theory and Practice in Community Rehabilitation*
An individual study of both theory and practice in one specialization domain.
MAY BE REPEATED FOR CREDIT

**Community Rehabilitation 641** H(3-0)

*Special Topics in International Disability Research and Policy*
Selected topics in disability research and policy whereby the student learns to understand and compare the perspective as developed in two or more countries.

**Community Rehabilitation 676** F(2-3)

*Consultation and Evaluation in Human Services and Systems*
The study of qualitative and quantitative evaluation research methods will inform the design and implementation of collaborative evaluations of a community service program, policy or system.

**Community Rehabilitation 691** H(2-3)

*Graduate Specialization Topics in Community Rehabilitation*
MAY BE REPEATED FOR CREDIT

**Community Rehabilitation 693** Q(1-1)

*Graduate Specialization Topics*
MAY BE REPEATED FOR CREDIT

Medical Science Courses (MDSC)

Medical Science 643 H(3-2)
(Veterinary Medicine 643)

*Biostatistics*
Focuses on the key methods necessary to understand and critically interpret results from common biostatistical analyses, as well as, gaining hands-on experience analyzing data using statistical software. Medical Science 643.01 introduces the fundamental concepts of summarizing data and statistical inference, including graphical displays, hypothesis testing, p-values, confidence intervals, and sample size determination. Medical Science 643.02 extends the fundamental concepts to modelling health outcomes using modern regression analysis techniques. Logistic and linear regressions, and their extensions, are covered in detail. Medical Science 643.03 broadens the techniques to include generalized linear models (GLM), generalized additive models (GAM), Poisson regression, generalized estimating equations (GEE), and proportional hazards regression.
643.01 Biostatistics I: Essentials of Biostatistics
643.02 Biostatistics II: Models for Health Outcomes.
643.03. Biostatistics III: Models for Repeated Measures Studies and Time-to-Event Studies

Prerequisites: Admission to a graduate program in Community Health Sciences or the Community Medicine Residency Training Program is required. Medical Science Medical Science 643.02 requires either 643.01 or a graduate-level introductory course in (bio)statistics. Medical Science 643.03 requires Medical Science 643.02.

Note: 643.01 requires no formal prerequisites but good quantitative and mathematical skills are an asset. Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other graduate and undergraduate students. These courses are not available to Open Studies students.

*Medical Science 644* *H(3-0)*

Introduction to Community Health Sciences
Required for all thesis-based MSc and PhD students entering graduate programs in the Department of Community Health Sciences. It is intended to provide an introduction to the Department and a general orientation to the education and research programs in Community Health Sciences.

Note: Admission to a graduate program in Community Health Sciences or the Community Medicine Residency Training Program is required. Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other graduate and undergraduate students. These courses are not available to Open Studies students.
This is a fall block week course.
NOT INCLUDED IN GPA.

Medical Science 645 H(3-0)

Health Services Research
Health services research is a multidisciplinary field of scientific investigation, both basic and applied, that studies how social factors, financing systems, organizational structures and process, health technologies and personal behaviours affect access to health care, the quality and cost of health care, and ultimately our health and well-being
645.01. Systems of Health and the Health Care System
645.10. Leadership in Health Care Organizations
645.15. Health Policy: Policy Issues in the Canadian Health Care System
645.17. Introduction to the Legal and Ethical Framework of Health Care in Canada
Note: Admission to a graduate program in Community Health Sciences or the Community Medicine Residency Training Program is required. Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other graduate and undergraduate students. These courses are not available to Open Studies students. Medical Science 647

Epidemiology H(3-2)

Epidemiology is the study of the distribution of diseases in populations and of factors that influence the occurrence of disease. Courses focus on principles and methods of descriptive, analytic and experimental epidemiology, as well as epidemiological methods specific to certain health conditions and the preventive strategies available for various health conditions.
647.01. Fundamentals of Epidemiology
647.05. Epidemiology of Aging.
647.07. Research in Healthcare Epidemiology and Infection Control
647.09. Epidemiology of Chronic Diseases
647.10. Surveillance 1: Data Handling for Infection Control
647.11. Surveillance 2: Principles of Surveillance
647.12. Introduction to Population Health Surveillance
647.15 Clinical Epidemiology
Prerequisites: Medical Science 643.01 or consent of the Faculty.
Note: Admission to a graduate program in Community Health Sciences or the Community Medicine Residency Training Program is required. Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other graduate and undergraduate students. These courses are not available to Open Studies students. Medical Science 647.01 or equivalent is required for MDSC 647.09, MDSC 647.12, MDSC 647.15

Medical Science 649 H(1-3)

*Practicum in Community Health Sciences*
Clinical or field-based practicum for students enrolled in certain programs of the Department of Community Health Sciences.
649.01. Practicum in Community Medicine
649.02. Practicum in Healthcare Epidemiology
649.03 Practicum in Community Health Sciences Specialization
Note: Admission to a graduate program in Community Health Sciences or the Community Medicine Residency Training Program is required. Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other graduate and undergraduate students. These courses are not available to Open Studies students.
NOT INCLUDED IN GPA

Medical Science 651 H(3-0)

*Population/Public Health*
The courses within the Population/Public Health family provide graduates the opportunity to gain competencies required to become researchers, planners, and practitioners in fields that require a depth of understanding of the determinants of health, the values and philosophies of population and public health, behaviour change theory, and the role of the ecosystem in promoting and protecting the health of the public.
651.01. Health Promotion Planning
651.02. Health Promotion for Women
651.03. Community Interventions: Theory, Research and Practice
651.04. Foundations of Population/Public Health
651.05 Determinants of Health II
651.06 Environmental Health
651.07 Health of Canadian Aboriginal Peoples
651.08 Global Health and Development
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students. Medical Science 647.01 is a prerequisite for Medical Science 651.06.
Note: Medical Science 651.06: one or more field trips may be required outside regular class time.

Medical Science 657 H(3-0)

*Telehealth and E-health*
These online courses explore many aspects of e-health, beginning with an initial focus on telehealth. They reflect a range of practice-based activities and research areas in e-health including business plan development, implementation and evaluation of clinical and learning applications.
657.02. e-Health Sustainability: From Business Case to Policy Development
657.03. Evaluation of e-Health Initiatives
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students..
Note: These are online courses.

Medical Science 659 H(3-2)

*Research Methods*
An introduction to research design, sampling, measurement, data collection and data analysis applied to research in community health sciences.
659.02. Health Research Methods
659.03. Health Program Planning and Evaluation
659.04. Introduction to Clinical Trials
659.05. Qualitative Health Research
659.06. Decision Analysis in Health Economic Evaluation
659.07. Administrative Data Analysis Methodology
659.08 Economic Evaluation
Prerequisite: Medical Science 643.01 or consent of the Faculty
**Note:** Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students. Medical Science 659.02; it is not available to Open Studies students.
Note: MDSC 659.08 is typically completed prior to MDSC 659.06.

Medical Science 660 F(3-1.5)

*On-line Basic Infection Control*
Provides novice Infection Control Professionals (ICPs) with the basic knowledge, tools and strategies needed to do Infection Control in a broad range of health care environments from health care institutions to the community. The purpose of this entry to practice course is 1) to identify and describe the scope of infection prevention and control problems and issues for novice ICPs and 2) to examine and integrate their current expertise with the basic knowledge, tools and strategies needed to examine problems and develop practical solutions in Infection Control.
Prerequisite: none
Note: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students.

Medical Science 661 H(3-0)

*Science Value and Philosophy*
Philosophical issues which fall into two categories: the Nature of Scientific Inquiry and Science and Moral Value.
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students.

Medical Science 679 H(3-0)
(Economics 679)

*Health Economics I*
Applies basic concepts from economics to the examination of health and health care policy issues such as why we have the kind of health care system we have, various aspects of health care reform, promotion of health, and evaluation in interventions.
**Notes:** Enrollment is open to all MDCH graduate Students. Consent of the instructor is required for other students.

Medical Science 705 H(3-0)

*Advanced Methods in Health Research*
Advanced health research designs (both quantitative and qualitative) and measurement techniques.
Prerequisite: Medical Science 659.02
Note: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students.

Medical Science 709 H(3-2)

*Advanced Epidemiology*
Topics to include causal inference, epidemiologic measures, induction latent period, internal and external validity, control of confounding variables and interaction between study factors.
Prerequisite: Medical Science 647.01
Note: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students.

Medical Science 711 H(3S-0)

*Systematic Reviews and Meta-Analysis*
Exposes students to all steps involved in the conduct of a systematic review and meta-analysis.
Prerequisite: Medical Science 643.01, 643.02, 647.01 and 659.02 or consent of the instructor.
Note: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students.

Medical Science 755 H(1-6)

*Directed Study*
Lectures, seminars, term papers or training in theoretical and/or laboratory methods at the advanced level in the medical sciences.
Prerequisite: Consent of faculty member who will supervise the chosen study.
MAY BE REPEATED FOR CREDIT

## MEDICINE, GASTROINTESTINAL SCIENCES MDGI

### Contact Info

Location: Health Sciences Centre, Room G329
Faculty number: (403) 220-8306
Fax: (403) 210-8109
E-mail address: gigrad@ucalgary.ca
Web page URL: http://www.ucalgary.ca/gisgp/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based
Specializations: Physiology, Biochemistry, Molecular Biology, Pharmacology, Immunology, Immunopharmacology, Nutrition, Parasitology, Pathology, Epidemiology

All Master's Thesis and Doctoral students are considered full-time. In exceptional circumstances part-time status may be considered and must be approved by the Graduate Coordinator.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Medicine Program requirements, the Department requires:

a) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 600 (written test), or 100 (internet-based test), or an IELTS score of 7.5, or a MELAB score of 84 or a PTE score of 70;
b) Two Reference Letters.

### 3. Application Deadline

Students may be admitted for September, January, or May. Contact the department for general application guidelines.

Students applying to the MD/MSc or MD/PhD program must apply individually to each program and complete a supplementary application for the Leaders in Medicine Program.

### 4. Advanced Credit

See "Medicine Programs".

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Medicine requirements, the Department requires:

a) The completion of a minimum of two half-course equivalents for the Master of Science. For the degree of Doctor of Philosophy, the completion of a minimum of two half-course equivalents for those entering with an Master's degree in a related subject and a minimum of three half-course equivalents for those entering with a Bachelor of Science or equivalent. Normally, one of these courses is MDSC 637.01. Exceptions, however, can be approved by the coordinator on the recommendation of the supervisor or the graduate education committee;
b) A supervisory committee;
c) A written research proposal presented to the supervisory committee within twelve months of initial registration;
d) A seminar presentation once a year. Exceptions require recommendation by the supervisory committee and approval of the Graduate Coordinator;
e) For doctoral students, a comprehensive written examination (ie. answers for two questions provided by the supervisor following agreement by the candidacy examination committee) must be completed and submitted to the examiners one week before the oral candidacy examination;
f) Regular attendance at the G.I. Sciences seminar program.

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

No credit given.

### 8. Time Limit

Expected completion time is two years for the Master's program and four years for the doctoral program.

Expected completion time is four to five years for the MD/MSc program and six to seven years for the MD/PhD program.

See "Medicine Programs" for maximum completion times.

### 9. Supervisory Assignments

See "Medicine Programs".

The various laboratories in the group assess students, and the laboratory that has a need/interest in the student will offer the student a placement.

### 10. Required Examinations

See "Medicine Programs" entry in this Calendar.

### 11. Research Proposal Requirements

See "Medicine Programs" entry in this Calendar.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to the Department by 1 February.

### 14. Other Information

Please visit the Department of Gastrointestinal Sciences Website at http://www.ucalgary.ca/gisgp for additional information.

### 15. Faculty Members/Research Interests

Current faculty research interests can be found at http://www.ucalgary.ca/girg/membership

## MEDICINE, IMMUNOLOGY MDIM

#### Contact Info

Location: Health Sciences Centre, Room G329
Faculty number: (403) 210-3937
Fax: (403) 210-8109
E-mail address: imgrad@ucalgary.ca
Web page URL: http://www.ucalgary.ca/irg/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based

#### Area of Study: Immunology

Faculty members are affiliated with the Faculties of Medicine, Science, and Veterinary Medicine.

The Immunology Graduate Program is offered in collaboration with the above faculties, and the curriculum has been designed for students with undergraduate or MSc degrees in those faculties. Background experience, qualifications, and areas of interest of applicants will be taken into account at the time of admission.

Students in the MSc and PhD degree programs are normally considered full-time.

### 2. Admission Requirements

In addition to the Faculties of Graduate Studies and Medicine requirements, this program requires:

a) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 600 (written), or 100 (internet-based), or a minimum IELTS score of 7.0, or a minimum MELAB score of 84, or a minimum PTE score of 70.
b) Two references from individuals that can attest to the applicant's academic background. Each referee to provide a reference form and accompanying letter on institutional letterhead.
c) Endorsement by the Chairperson, Immunology Graduate Education Committee (IGEC) that the applicant is acceptable and that adequate supervision of the proposed program is available.
d) An undergraduate course in immunology (CMMB 527 or equivalent). It will be possible for a student to take MDSC 639.01 during the first year of their program if he/she does not have an appropriate prerequisite course.
e) Meeting the minimum admission criteria above does not guarantee acceptance into the program. Applications will be ranked according to academic excellence, prior research experience and commitment to the study of immunology.

### 3. Application Deadline

Deadlines for submission of complete applications for students with international transcripts:

1 April for September admission
1 August for January admission
1 December for May admission

Deadlines for submission of complete applications for students with Canadian and US transcripts:

1 June for September admission
1 October for January admission
1 March for May admission

### 4. Advanced Credit

Applicants may request to receive credit for previously completed courses at the time of application. Where credit is to be given, it will be noted in the letter to the Faculty of Graduate Studies recommending the student's admission.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Medicine requirements, the Immunology Graduate Program requires:

a) Completion of a minimum of two half-courses for an MSc and three half-courses for a PhD. MDSC 639.02 or MDSC 639.04 is compulsory for all MSc students. Both courses are compulsory for PhD students. Optional courses for either degree can be drawn from any 600 level courses offered by the Faculty of Medicine in areas that are relevant to the student's research proposal, and approved by the supervisor and supervisory committee. Courses taken while a student is an Open Study student cannot be used as credits in either the MSc or PhD program.
b) Participation in the seminar program of the Immunology Research Group (IRG). This will entail the annual presentation of a 30 - 50 minute Research in Progress seminar, attendance at the weekly seminars and journal club.
c) Presentation on the thesis project to the IRG around the time of the defence.

### 6. Additional Requirements

Attendance at a Research Integrity Day workshop is required for all graduate students. MSc students must attend prior to defending their thesis and PhD students must attend prior to their candidacy oral examination.

Contributions to journals, relevant journal clubs and/or seminars are desirable.

### 7. Credit for Undergraduate Courses

Credit will not be given for courses taken below the 600-level.

### 8. Time Limit

Expected completion time is 2.5 years for an MSc and 5 years for a PhD. See "Medicine Programs" for maximum completion times.

### 9. Supervisory Assignments

Individuals intending to apply for admission to the Immunology Graduate Program are encouraged to contact faculty members directly regarding the possibility of acting as a supervisor. If a potential supervisor has not been identified at the time of application, applications that meet or exceed the minimum criteria will be circulated to potential supervisors based on the indicated areas of interest (declared by candidates in the application). A supervisor and a source of funding (minimum of $18,750 per annum) must be identified for a student to be admitted to the Immunology Graduate Program.

The supervisor, in consultation with the student, selects a Supervisory Committee. For MSc students, the Supervisory Committee consists of the supervisor plus 2 faculty members, at least one of whom must have completed the supervision of an MSc student. For PhD students, the Supervisory Committee consists of the supervisor plus a minimum of 2 faculty members. At least two members should be from the IRG, and at least two members must have completed the supervision of a doctoral graduate.

### 10. Required Examinations

See "Medicine Programs" entry in this Calendar.

### 11. Research Proposal Requirements

See "Medicine Programs" entry in this Calendar.

### 12. Special Registration Information

A request for transfer of program from the Master of Science program to the doctoral program may be made no later than 24 months after initial registration in the Faculty of Graduate Studies. Students who request a transfer will be required to give a 45 minute seminar to the Immunology Research Group followed by a one hour oral examination, based on the research proposal, attended by the supervisory committee and one member of the IGEC. Approval of transfer will be determined by the examining committee. Written feedback on the performance will be provided to the student jointly by the supervisor and the IGEC member. The student will be required to submit a revised research proposal and complete the course requirements of the doctoral program. He/she must meet the 36-month deadline for the candidacy examination.

### 13. Financial Assistance

Applicants must identify a source of funding to be admitted into the Immunology Program. Graduate students are generally funded by their supervisor's operating grants, internal awards, and/or external awards. Self funding is not an option. Possible sources of financial support are listed on the Faculty of Graduate Studies awards database: http://grad.ucalgary.ca/awards

These include Graduate Assistantships (Teaching), Faculty of Graduate Studies Scholarships, Dean's Excellence Awards, Dean's Entrance Awards, and the Faculty of Graduate Studies Open Scholarship Competition.

Students in the program are eligible to receive a Graduate Student Support scholarship to assist them with tuition while paying full program fees, upon completion of annual program requirements.

### 14. Other Information

The Immunology Graduate Program offers the following four courses:

MDSC 639.01: Principles of Immunology
MDSC 639.02: Cellular and Molecular Immunology
MDSC 639.03: Topics in Immunology
MDSC 639.04: Inflammation

Information regarding the courses can be obtained at http://www.ucalgary.ca/irg/Education

Detailed course descriptions are available at http://www.ucalgary.ca/pubs/calendar/ and

Timetabling information can be found through the myUofC portal.

### 15. Faculty Members/Research Interests

The research interests of current IRG faculty members can be found at:
http://www.ucalgary.ca/irg/faculty

## MEDICINE, MICROBIOLOGY AND INFECTIOUS DISEASES MDMI

#### Contact Info

Location: Health Sciences Centre, Room G329
Faculty number: (403) 220-2558
Fax: (403) 210-8109
E-mail address: midgrad@ucalgary.ca
Web page URL: http://www.ucalgary.ca/microinfect/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Medicine requirements, the Department requires:

a) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (written test), or 92 (internet-based test), or an IELTS score of 7.0, or a MELAB score of 82 or a PTE score of 64.
b) Two Reference Letters.

*Applicants who do not meet the above requirements will be considered only in exceptional circumstances.*

### 3. Application Deadline

Deadlines for the submission of complete applications:

15 May for September admission
15 September for January admission
15 January for May admission

Students applying to the MD/Master's or MD/PhD program must apply individually to each program and complete a supplementary application to the Leaders in Medicine Program.

Students with international transcripts should contact the department for application deadlines.

### 4. Advanced Credit

See "Medicine Programs".

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Medicine requirements, the Department requires:

#### Master of Science

a) The completion of a minimum of one full course equivalent
b) The presentation of an annual seminar in the applicable research group

#### Doctor of Philosophy

a) The completion of a minimum of one and one-half full course equivalents
b) The presentation of an annual seminar in the applicable research group
c) The presentation of a seminar on the results of his/her thesis research

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

No more than half a student's program may be done at the 500-level.

### 8. Time Limit

Expected completion time is two years for students in the Master of Science program and four years for doctoral students.

Leaders in Medicine - Expected completion time for the MD/Master's program is four to five years, and for the MD/PhD program, six to seven years.
See "Medicine Programs" for maximum completion times.

### 9. Supervisory Assignments

Students may interview several potential supervisors. The decision to establish a relationship is based upon mutual agreement between the student and the supervisor. Supervisory committees are established based upon the needs of the student and the expertise of the committee members, following discussions between the student and the supervisor.

### 10. Required Examinations

See "Medicine Programs" entry in this Calendar.

### 11. Research Proposal Requirements

See "Medicine Programs" entry in this Calendar.

### 12. Special Registration Information

None.

### 13. Financial Assistance

The general policy of the Microbiology and Infectious Diseases Graduate Program is that all students shall be full-time and that all students will receive financial support for the entire period of their program.

### 14. Other Information

Courses in Microbiology and Infectious Diseases are offered under the auspices of the Department of Medical Science and are listed in this Calendar under that heading.

### 15. Faculty Members/Research Interests

The research interests of the faculty can be found at http://www.ucalgary.ca/microinfect/faculty

## MEDICINE, NEUROSCIENCE MDNS

#### Contact Info

Location: Health Sciences Centre, Room G329
Faculty number: (403) 220-2558
Fax: (403) 210-8109
E-mail address: neurosci@ucalgary.ca
Web page URL:
http://www.ucalgary.ca/neuroscience

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Medicine requirements, the Department requires:

a) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (written test), or 92 (internet-based test), or an IELTS score of 7.0, or MELAB score of 82, or a PTE score of 64;
b) Two Reference Letters.

### 3. Application Deadline

Deadlines for submission of complete applications for students with Canadian and U.S. transcripts:

15 May for September admission
15 September for January admission
15 February for May admission
15 April for July admission

Students with international transcripts should contact department for application deadlines.

### 4. Advanced Credit

Not given.

### 5. Program/Course Requirements

In addition to the Faculties of Graduate Studies and Medicine requirements, the Department requires:

#### Master of Science

a) Satisfactory completion of at least two of Cellular and Molecular Neuroscience (MDSC 619.01) and Systems Neuroscience (MDSC 619.02), Developmental Neuroscience (MDSC 619.03), or Neuroanatomy (MDSC 619.04)
b) Participation in a seminar program and journal club, and presentation of research seminar.

#### Doctor of Philosophy

a) Satisfactory completion of at least two of Cellular and Molecular Neuroscience (MDSC 619.01) and Systems Neuroscience (MDSC 619.02). Revising to Cellular, Molecular and Developmental Neuroscience (MDSC 619.01) and Systems and Functional Neuroscience (MDSC 619.02).
b) Satisfactory completion of one graduate level course in an area that is pertinent to the student's thesis project.
c) Participation in a seminar program and journal club, and presentation of research seminars.

### 6. Additional Requirements

As determined by agreement with Supervisor and Supervisory Committee

### 7. Credit for Undergraduate Courses

Not given.

### 8. Time Limit

Expected completion time for students in a Master's program is two years, four years for a doctoral program. See "Medicine Programs" for maximum completion times.

### 9. Supervisory Assignments

Supervisors must be identified and committed to support the student for the first two years, before admission is recommended. The decision should be by mutual agreement between the prospective student and the faculty member, and approved by the Graduate Coordinator. For relevant criteria and responsibilities of supervisors, see the *Policies and Procedures of the Department of Neuroscience and the Handbook of Supervision and Examinations in this calendar.* A Supervisory Committee must be struck within three months of initial registration. The method of striking, composition and functions of the Supervisory Committee are detailed in the *Policies and Procedures*.

### 10. Required Examinations

See "Medicine Programs" entry in this Calendar.

### 11. Research Proposal Requirements

See "Medicine Programs" entry in this Calendar.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance is available to qualified students through supervisor operating grants or competitive awards (a minimum stipend of $20,000 is recommended). For information on awards, see the Awards and Financial Assistance section of this Calendar, the Department of Neuroscience, the Faculty of Medicine Research Office and the education section of the Hotchkiss Brain Institute at http://www.hbi.ucalgary.ca/education

### 14. Other Information

Rather than study in "classical" disciplines such as anatomy or physiology, students are placed with a supervisor who is a member of a multidisciplinary research group. This multidisciplinary scheme greatly facilitates the development of individual research programs, especially with respect to collaborations involving different techniques and model systems. Students are encouraged to take advantage of such collaborations to enhance the scope and quality of their thesis research.

The purpose of the graduate program is to educate independent, reliable, and competent research neuroscientists. Although many holders of Master of Science and Doctor of Philosophy degrees find employment that does not directly involve research, having such degrees implies that an individual is able to pursue a research problem to a meaningful conclusion. The main role of the program is to provide a favourable environment both for creative research and for the acquisition of a basic body of knowledge in the neurosciences. The Master of Science and doctoral degrees are distinguished both in the degree of originality expected in the candidate's research, and in the normal course load undertaken. Members of the Department of Neuroscience, other than the supervisor, have an important role to play in each student's training.

Further information on applications and admission, and brochures describing the research interests of individual Department members may be obtained from the Graduate Program Administrator, Neuroscience Graduate Program, Graduate Science Education, Faculty of Medicine, University of Calgary, Room G329, Health Sciences Centre, 3330 Hospital Drive NW, Calgary, Alberta T2N 4N1. Faculty research interests can also be accessed on the Department of Neuroscience website (http://www.ucalgary.ca/neuroscience) or the Hotchkiss Brain Institute website at http://www.hbi.ucalgary.ca/index.php.

Courses in Neuroscience are offered under the auspices of the Department of Medical Science and are listed in this Calendar following the Medical Science heading.

### 15. Faculty Members/Research Interests

The research interests of the department can be found at either the Department of Neuroscience website (http://www.ucalgary.ca/neuroscience) or the HBI website
http://www.hbi.ucalgary.ca/Members

## MEDICINE, MEDICAL SCIENCE MDSC

Contact Info

Location: Health Sciences Centre, Room G321
Faculty number: (403) 220-6852
Fax: (403) 210-8109
E-mail address: medgrad@ucalgary.ca
Web page URL: http://www.ucalgary.ca/mdsc

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based

Students in the MSc and PhD degree programs are normally considered full-time. Students can specialize in an area covered by one of the Faculty of Medicine Research Institutes and include topics as wide-ranging as Medical Education to Physiology. Cancer Biology, Critical Care Medicine, Mountain Medicine and High Altitude Physiology, Joint Injury and Arthritis, and Medical Education also have their own specializations within the Medical Science Graduate Program. A part-time option may be available within these specializations. In addition to these areas students may also specialize in Biomechanics and Biomedical Ethics. Students may select additional areas of specialization with the approval of the Graduate Coordinator.

In co-operation with the Department of Surgery, a Master of Science program with a specialization in surgery is also offered through the Surgeon Scientist Program.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Medicine requirements, the Medical Science Graduate Program requires:

a) For applicants required to provide proof of proficiency in the English language, a minimum TOEFL score of 600 (paper based test), 100 (internet-based test), or a minimum IELTS score of 7.0, or a minimum MELAB score of 84, specializations may have additional requirements
b) Two Reference Letters
c) For admission to the Master of Science program with a specialization in surgery, prior admission to the surgery residency program is required. Students will normally apply to the Master of Science program in the third year of the surgery residency program. For admission to the Surgeon Scientist Program prior admission to the Medical Science Graduate Program is required.

### 3. Application Deadline

Students may be admitted for September, January, May, or July. Contact the Medical Science Graduate Program office for general application deadlines.

### 4. Advanced Credit

Advanced credit is not normally given in a thesis-based program. See "Medicine Programs".

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Medicine requirements, the Department requires:

Master of Science

a) A minimum of two half-courses
b) Regular attendance and presentation at a journal club and a final seminar which precedes the thesis defence, although specific training programs may have additional requirements

Doctor of Philosophy

a) A minimum of three half-courses
b) Regular attendance and presentation at a journal club and a final seminar which precedes the thesis defence, although specific training programs may have additional requirements

### 6. Additional Requirements

Attendance at a half-day Research Integrity Day seminar during their program. Students must attend this seminar before they are approved to defend their thesis. The seminar is held only twice per year, once in January and again in April. Contact the Graduate Program Advisor for more information.

### 7. Credit for Undergraduate Courses

Graduate credit may be given for 500-level courses. No more than one half-course of credit will be allowed in a two half-course program (e.g., if a 500-level full-course is taken, only one half-course credit is allowed toward the completion of program course requirements.)

### 8. Time Limit

Average completion time for students in the MSc program is 2.5 years, 4.5 years in the PhD program.

Leaders in Medicine - Expected completion time is four to five years in the MD/MSc program, six to seven years in the MD/PhD program.

See "Medicine Programs" for maximum completion times.

### 9. Supervisory Assignments

Students in thesis-based programs have identified a supervisor at the time of admission. In consultation with their supervisors, students must select a supervisory committee consisting of their supervisor plus two other faculty members (MSc) or three other faculty members (PhD) within three months of the appointment of the Supervisor. The Graduate Coordinator must approve the composition of the supervisory committee. Specializations may have additional requirements.

### 10. Required Examinations

See "Medicine Programs" entry in this Calendar.

### 11. Research Proposal Requirements

See "Medicine Programs" entry in this Calendar.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this calendar.

Information and deadlines for Medical Science Faculty of Graduate Studies' award competitions will be provided throughout the year.

### 14. Other Information

None.

### 15. Faculty Members/Research Interests

Information about institutes in the Faculty of Medicine can be found at
http://medicine.ucalgary.ca/research/institutes

Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

Medical Science 501 H(3-0)
(Biology 501)

*Principles and Mechanisms of Pharmacology*
Basic principles of pharmacology, with specific emphasis on receptor signaling mechanisms.
Prerequisites: Enrolment in the BHSc Honours program, Biochemistry 443, and one of Zoology 461, 463, or Medical Science 404; or consent of the Faculty.

Medical Science 503 H(3-0)
(Biology 503)

*Pharmacology of Organ Systems*
Pharmacology of the nervous, cardiovascular, renal and immune systems, as well as anti-cancer therapies. Principles of toxicology.
Prerequisite: Medical Science 501 (Biology 501) or consent of the Faculty.

Medical Science 507 H(3-3)

*Special Problems in Medical Science*
Lectures, seminars, term papers and training in theoretical and/or laboratory methods. After consultation with a faculty member who will supervise the chosen problem, an approval form obtained from the Graduate Sciences Education Office must be signed by the Associate Dean (Graduate Sciences Education) before a student can register.
Prerequisite: Consent of the BHSc Honours department.
MAY BE REPEATED FOR CREDIT

Medical Science 508 2xF(0-6)

*Honours Thesis and Research* Communication
Capstone research course in the BHSc to be conducted through any one of the basic research departments. Students would be expected to conduct research. Culminates with a Research Symposium Day during which students present and defend their research before an audience of peers and mentors, share their research with the faculty and staff at large through poster presentations and submit a written research thesis.
Prerequisite: Enrolment in the BHSc Honours program and Health and Society 408 or Medical Science 408 or approval of Department.
Note: This course is worth 2.0 FCE and is only offered over two sessions.

Medical Science 509 H(3-3)

*Proteomics*
An introductory course to familiarize students with techniques used for protein identification and proteome analysis, including one and two-dimensional gel electrophoresis, mass spectrometry and the databases and search engines used in the identification of expressed proteins.
Prerequisites: Biochemistry 443 and Biology 331.

Medical Science 511 H(3-0)

*Instrumental Analysis*
An overview of the analytical laboratory instruments used in research and the diagnosis and treatment of human disease.

Medical Science 515 H(3-0)
(Biology 515)

*Cellular Mechanisms of Disease*
The cellular and molecular mechanisms underlying basic human disease processes and how these can be influenced by lifestyle and environmental factors. The ways in which this knowledge can be used in the laboratory diagnosis of disease.
Prerequisites: Biochemistry 443 and Biology 331.

Medical Science 528 F(0-6)

*Independent Studies in Medical Science*
Original and independent thought, practical research and the completion of written and oral reports. After consultation with a faculty member who will supervise the chosen problem, an approval form obtained from the Graduate Sciences Education Office must be signed by the Associate Dean (Graduate Sciences Education) before a student can register.
Prerequisite: Consent of the BHSc Department.
MAY BE REPEATED FOR CREDIT

Medical Science 541 H(3-0)
(Medical Science 641.01)

*Advanced Genetics I*
Historical papers will illustrate the foundations of modern genetic principles. Topics including the chromosomal theory of inheritance, the role of pairing and recombination for chromosomal disjunction during meiosis, cytogenetics, the nature of dominant mutations, genetic screens and genetics analysis of developmental pathways. Material covered is drawn from model organisms and humans.
Prerequisite: Medical Science 341 or Biology 311 and consent of the faculty.
Note: Lectures run concurrently with Medical Science 641.01.

Medical Science 543 H(3-0)
(Medical Science 641.03)

*Advance Genetics II*
An advanced course in molecular genetic analysis. Topics will vary from year to year, but may include identification of the structure, transmission, mutation and molecular pathology of human genes, the use of experimental organisms (chick, fish, fly, mouse, worm) to model human genetic diseases, and molecular studies of human populations and evolution. The focus will be upon applied molecular genetics with recurring emphasis on the theme of relevance to issues in health and society.
Prerequisite: Medical Science 341, 402 or permission of the instructor.
Note: Lectures run concurrently with Medical Science 641.03.
Note: Previous completion of Medical Science 541 is suggested but not required.

Medical Science 545 H(3-0)
(Medical Science 641.04)

*Genomics*
Prerequisite: Medical Science 341 or Biology 311 and consent of the faculty.
Note: Lectures run concurrently with Medical Science 641.04.

Medical Science 561 H(3-0)
(Cellular, Molecular and Microbial Biology 561)

*Cancer Biology*
Advances in methodology and in theoretical concepts have permitted continuing breakthroughs in our understanding of the organismal, cellular and molecular biology of cancer cells, and in the development of novel strategies for cancer prevention, diagnosis and treatment. These advances will be presented in a comprehensive overview of cancer including issues of demographics and incidence, causation and detection, origins and progression and therapeutic approaches. Emphasis will be placed on the cell and molecular biology of cancer and on the interaction of the cancer cell with the host organism.
Prerequisites: Biochemistry 443, Biology 331, and Cellular, Molecular and Microbial Biology 411.

Graduate Courses

Medical Science 603 H(3-1)
(Biology 603)

*Biology of Laboratory Animals*
The course is based on the Canadian Council of Animal Care Syllabus "Basic Principles of Laboratory Animal Science for Research Scientists." In addition to the study of common, research, farm and exotic animals, topics covered include ethical considerations, regulation and legislation, animal models, animal facilities and husbandry, hazard control, surgery, anaesthesiology, euthanasia and post-mortem examinations. Practical sessions will provide experience in handling and restraint of specific laboratory animals, injections, blood collection, anaesthesiology and surgery.
Prerequisite: Consent of the Faculty.
Note: Enrolment in this course is restricted to graduate students who will do research utilizing animals..

Medical Science 604 F(3-3)

*Integrative Human Physiology*
Physiology is the study of how living organisms function and encompasses the integration of processes from molecules to the whole-organism. Designed to provide the student with fundamental principles and concepts about the normal function of the major human organ systems. At the end of this course, the student should be well equipped to apply his/her acquired knowledge to solve complex physiological problems related to integrative human physiology.
Prerequisite: Consent of the Faculty.
Note: Lectures run concurrently with Medical Science 404.

Medical Science 605 H(3-0)
(Computer Science 605)

*Information Storage and Processing in Biological Systems*
Examination of complex biological systems; concepts and fundamentals of biological solutions to information storage and processing: modelling and computer simulation of biological systems; information storage in biological molecules; genetic networks; hierarchical organization of biological information processing in signal transduction, development, evolution, and ecology; biological control systems.
Prerequisite: Consent of the Faculty.

Medical Science 609 H(3-0)

*Gene Expression*
The flow of genetic information from DNA to final protein product. The subject will be covered in two courses offered in alternating years: gene structure and regulation of transcription, including gene structure and organization, chromatin structure, regulation of transcription and post-translational processing; and the activity of genes during development including stored messenger ribonucleoprotein particles and translational control in gametes, the switch from maternal to zygote genome control of development in early embryos and the molecular basis of morphogenesis and differentiation.
609.02. Genes and Development
Prerequisite: Medical Science 537 (Biochemistry 537) or equivalent and consent of the Faculty.
Note: Credit for both Medical Science 609.01 and 607.01 will not be allowed.
Note: Credit for both Medical Science 609.02 and 751.14 will not be allowed.

Medical Science 612 F(3-1S)

*Medical Microbiology*
The basic principles of medical microbiology and the pathogenesis of infectious disease and of clinically important microbial pathogens including bacteria, viruses, parasites and fungi. Recent concepts will be described and students will be expected to present and critically discuss research advances of their choosing from the current research literature.
Prerequisites: Cellular, Molecular and Microbial Biology 241 and 343 or equivalent or consent of the Faculty.

Medical Science 613 H(3-0)

*Advanced Studies in Microbiology*
Specialized topics including basic principles of infection; spread, prevention and control of infectious diseases; mechanisms of and approaches to study bacterial pathogenesis; mechanism, methodology and modelling of gene expression.
613.01. Epidemiology of Infectious Diseases
613.02. Pathogenesis of Microbial Disease
613.05. Regulation of Gene Expression in Bacteria
Prerequisite: Medical Science 612 or Cellular, Molecular and Microbial Biology 421 or 521 or consent of the Faculty.

Medical Science 619 H(3-0)

*Neurosciences*
Introductory neuroscience courses covering aspects of cellular, molecular, and systems physiology, neuroanatomy, and neurodevelopment.
619.01. Cellular and Molecular Neuroscience
619.02. Systems Neuroscience
619.03. Developmental Neuroscience
619.04. Neuroanatomy
Prerequisite: Consent of the Faculty.
Note: Medical Science 619.02 is open only to graduate students registered in the Neuroscience graduate program or other graduate students approved by the course coordinator. Not open to undergraduate students.

Medical Science 621 H(3-0)

*Principles of Drug Action*
The action of chemicals and drugs on biological systems ranging from subcellular particles to the intact organism.
621.01. Basic Principles of Pharmacology
Prerequisites: Zoology 461 and Biochemistry 441 and 443 or consent of the Faculty.

Medical Science 623 H(3-1T)

*Respiratory Science and Critical Illness*
Respiratory physiology including topics such as cellular, morphology, mechanics, control of breathing and respiratory muscles, necessary to an understanding of respiration and respiratory failure. As well, core physiology and molecular biology underlying critical illness.
623.01. Pulmonary Mechanics and Gas Exchange
623.02. Physiology of Respiration and Critical Illness
623.03. Respiratory Science: Basic
623.04. Respiratory Science: Applied
Prerequisite: Zoology 463 or 465 or consent of the Faculty.

Medical Science 627 H(3-0)

*Endocrinology*
Normal endocrine physiology and biochemistry. Mechanisms and principles of departure from normal endocrine homeostasis.
627.03. Selected Topics in Advanced Endocrinology
Prerequisite: Zoology 597 or consent of the Faculty.

Medical Science 629 H(3-0)

*Cardiovascular Dynamics*
Includes topics such as basic physiologic mechanisms including excitation-contraction coupling, mechanics, energetics, and cardiovascular control; major diseases entities as a means of illustrating pathologic alterations in normal physiologic mechanisms; or a systematic in-depth examination of the chemicals that affect the cardiovascular system.
629.01. Cardiovascular Physiology
629.02. Cardiovascular Pathophysiology
629.03. Cardiovascular Pharmacology
Prerequisite: Consent of the Faculty.

Medical Science 631 H(3-0)

*Muscle Physiology*
Contractile processes, excitation-contraction coupling, the control of contraction and energetics in smooth, cardiac and skeletal muscle. Molecular studies of the contractile process and of the process of excitation contraction coupling.
Prerequisite: Consent of the Faculty.

Medical Science 633 H(3-0)

*The Kidney*
Advanced courses detailing the functional organization of the kidney at all levels, from cell to intact organism. Topics encompass basic physiological principles and their relevance to experimental medicine and therapeutics, as well as the study of disease processes, which impact kidney function.
633.01. Renal Physiology
633.02. Renal Pathophysiology
Prerequisite: Medical Science 604 or equivalent or consent of the Faculty.

Medical Science 635 H(3-0)

*Psychosocial Oncology*
Focuses on developing the understanding in health care practitioners of the central concepts related to caring for cancer patients and their families. In doing so, makes use of lectures, readings, video tapes, case discussions, and current research.
Prerequisite: Consent of the Faculty.
Note: Credit for both Medical Science 635 and 645.14 will not be allowed.

Medical Science 637 H(3-0)

*Gastrointestinal Physiology*
Physiology of the gastrointestinal (GI) tract at all levels from the cell to the intact system. Medical Science 637.01 has three components 1) An introductory series of lectures covering the basic physiological principles of the regulation of the GI tract and the individual organs that comprise it or are associated with it. 2) Extended directed tutorials conducted on-line through Blackboard. Topics will be selected to reflect the needs and interests of the enrolled students. 3) A written term paper on a subject of the students' own choice and pre-approved by the course coordinator that will also be presented orally to the class.
637.01. Organization and Function of the GI Tract
Prerequisite: Consent of the Faculty.

Medical Science 638 H(3-0)

*Mucosal Pathophysiology*
An independent study course that focuses on the physiology and pathophysiology of the gastrointestinal tract, lung and other mucosal tissues. A particular emphasis will be placed on inflammatory processes in these tissues, and how they contribute to symptom generation and tissue dysfunction. Involves independent research on the part of the students, small group tutorials, written assignments and laboratory exercises. The course will be divided into three sections.
Note: Medical Science 637.01 recommended.

Medical Science 639 H(3-0)

*Immunology*
Introductory and advanced courses in immunology that cover humoral and cellular immunity and the inflammatory response at the cellular, molecular, and whole organism level. Basic mechanisms that lead to immunity or to inflammatory responses. The contribution of immunological and inflammatory processes in the immunopathogenesis of disease.
639.01. Principles of Immunology
639.02. Cellular and Molecular Immunology
639.03.Topics in Immunology
639.04. Inflammation
Prerequisite: Consent of the Faculty.
Note: Credit for both Medical Science 639.01 and 755.01 will not be allowed.
Note: Credit for both Medical Science 639.02 and 641.01 will not be allowed.
Note: Credit for both Medical Science 639.03 and 641.03 will not be allowed.
Note: Credit for both Medical Science 639 and 639.04 will not be allowed.

Medical Science 641 H(3-0)

*Genetics*
Advanced courses that provide in depth coverage of the research discipline of genetics, including the areas of cytogenetics, genomics, metabolic genetics, mouse genetics, population genetics, and human and medical genetics.
641.01. Advanced Genetics I
641.02. Advanced Human Cytogenetics
641.03. Advanced Genetics II
641.04. Genomics
Prerequisite: Consent of the Instructor.

Medical Science 642 H(3-0)
(formerly Medical Science 644.02)

Determinants of Health I
As an important research foundation in this department, the course is intended to provide an understanding of the determinants of health within a population health framework.
Prerequisite(s): Admission to a graduate program in the Department of Community Health Sciences or the Community Medicine Residency Program.
Notes: This winter block week course is a requirement for all thesis-based MSc and PhD students in graduate programs in the Department of Community Health Sciences.

Medical Science 643 H(3-2)
(Also known as : Veterinary Medicine 643)

*Biostatistics*
Focuses on the key methods necessary to understand and critically interpret results from common biostatistical analyses, as well as, gaining hands-on experience analyzing data using statistical software. Medical Science 643.01 introduces the fundamental concepts of summarizing data and statistical inference, including graphical displays, hypothesis testing, p-values, confidence intervals, and sample size determination. Medical Science 643.02 extends the fundamental concepts to modelling health outcomes using modern regression analysis techniques. Logistic and linear regressions, and their extensions, are covered in detail. Medical Science 643.03 broadens the techniques to include generalized linear models (GLM), generalized additive models (GAM), Poisson regression, generalized estimating equations (GEE), and proportional hazards regression.
643.01 Biostatistics I: Essentials of Biostatistics
643.02 Biostatistics II: Models for Health Outcomes.
643.03. Biostatistics III: Models for Repeated Measures Studies and Time-to-Event Studies

Prerequisites: Admission to a graduate program in Community Health Sciences or the Community Medicine Residency Training Program is required. Medical Science Medical Science 643.02 requires either 643.01 or a graduate-level introductory course in (bio)statistics. Medical Science 643.03 requires Medical Science 643.02.

Note: 643.01 requires no formal prerequisites but good quantitative and mathematical skills are an asset. Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other graduate and undergraduate students. These courses are not available to Open Studies students.

Medical Science 644 H(3-0)
(formerly Medical Science 644.01)

*Introduction to Community Health Sciences*
It is intended to provide an introduction to the Department and a general orientation to the education and research programs in Community Health Sciences.Prerequisite: Admission to a graduate program in the Department of Community Health Sciences or the Community Medicine Residency Program.
Note: This fall block week course is a requirement for all thesis-based MSc and PhD students entering graduate programs in the Department of Community Health Sciences.
NOT INCLUDED IN GPA

Medical Science 645 H(3-0)

*Health Services Research*
Health services research is a multidisciplinary field of scientific investigation, both basic and applied, that studies how social factors, financing systems, organizational structures and process, health technologies, and personal behaviours affect access to health care, the quality and cost of health care, and ultimately our health and well-being.
645.01. Systems of Health and the Health Care System
645.10. Leadership in Health Care Organizations
645.15. Health Policy: Policy Issues in the Canadian Health Care System
645.17. Introduction to the Legal and Ethical Framework of Health Care in Canada
645.18. Foundations of Health Services Research
Prerequisite: The prerequisite for Medical Science 645.03 is Medical Science 647.01.
Note: Admission to a graduate program in Community Health Sciences is normally required. Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other graduate and undergraduate students.

Medical Science 647 H(3-2)

*Epidemiology*
Epidemiology is the study of the distribution of diseases in populations and of factors that influence the occurrence of disease. Courses focus on principles and methods of descriptive, analytic and experimental epidemiology, as well as epidemiological methods specific to certain health conditions and the preventive strategies available for various health conditions.
647.01. Fundamentals of Epidemiology
647.05. Epidemiology of Aging.
647.07. Research in Healthcare Epidemiology and Infection Control
647.09. Epidemiology of Chronic Diseases
647.10. Surveillance 1: Data Handling for Infection Control
647.11. Surveillance 2: Principles of Surveillance
647.12. Introduction to Population Health Surveillance
647.15 Clinical Epidemiology
Prerequisites: Medical Science 643.01 or consent of the Faculty.
Note: Admission to a graduate program in Community Health Sciences is normally required. Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other graduate and undergraduate students. These courses are not available to Open Studies students.

Medical Science 649 H(1-3)

*Practicum in Community Health Sciences*
Clinical or field-based practicum for students enrolled in certain programs of the Department of Community Health Sciences.
649.01. Practicum in Community Medicine
649.02. Practicum in Healthcare Epidemiology
649.03 Practicum in Community Health Sciences Specialization
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other graduate and undergraduate students.
NOT INCLUDED IN GPA

Medical Science 651 H(3-0)

*Population/Public Health*
The courses within the Population/Public Health family are intended to provide graduates the opportunity to gain the competencies required to become researchers, planners, and practitioners in fields that require a depth of understanding of the determinants of health, the values and philosophies of population and public health, behaviour change theory, and the role of the ecosystem in promoting and protecting the health of the public.
651.01. Health Promotion Planning
651.02. Health Promotion for Women
651.03. Community Interventions: Theory, Research and Practice
651.04. Foundations of Population/Public Health
651.05 Determinants of Health II
651.06 Environmental Health
651.07 Health of Canadian Aboriginal Peoples
651.08 Global Health and Development
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students. Medical Science 647.01 is a prerequisite for Medical Science 651.06.
Note: Medical Science 651.06: one or more field trips may be required outside regular class time.

Medical Science 657 H(3-0)

*Telehealth and E-health*
These online courses explore many aspects of e-health, beginning with an initial focus on telehealth. They reflect a range of practice-based activities and research areas in e-health including business plan development, implementation and evaluation of clinical and learning applications.
657.02. e-Health Sustainability: From Business Case to Policy Development
657.03. Evaluation of e-Health Initiatives
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students.
Note: These are online courses.

Medical Science 659 H(3-2)

*Research Methods*
An introduction to research design, sampling, measurement, data collection and data analysis applied to research in community health sciences.
659.02. Health Research Methods
659.03. Health Program Planning and Evaluation
659.04. Introduction to Clinical Trials
659.05. Qualitative Health Research
659.06. Decision Analysis in Health Economic Evaluation
659.07. Administrative Data Analysis Methodology
659.08 Economic Evaluation
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students.

Note: Admission to a graduate program in Community Health Sciences is normally required for enrolment in Medical Science 659.02; it is not available to Open Studies students.

Medical Science 660 F(3-1.5)

*On-line Basic Infection Control*
Provides novice Infection Control Professionals (ICPs) with the basic knowledge, tools and strategies needed to do Infection Control in a broad range of health care environments from health care institutions to the community. The purpose of this entry to practice course is 1) to identify and describe the scope of infection prevention and control problems and issues for novice ICPs and 2) to examine and integrate their current expertise with the basic knowledge, tools and strategies needed to examine problems and develop practical solutions in Infection Control.
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other graduate and undergraduate students.

Medical Science 661 H(3-0)

*Science Value and Philosophy*
Philosophical issues which fall into two categories: the Nature of Scientific Inquiry and Science and Moral Value.
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other graduate and undergraduate students.

Medical Science 663 H(3-0)
(Kinesiology 663) (Mechanical Engineering 663)

*Advanced Biomechanics*
Theoretical and applied aspects of biomechanics in the acquisition and performance of sport skills.
Prerequisite: Consent of the Faculty.

Medical Science 668 H(3-3)

*Biotechnology Commercialization*
Technology commercialization is the process of translating research results, scientific discoveries or processes and methods into a commercially useful and profitable product. Students will study the biotechnology commercialization process and will develop a mock-up i) starting with a new product or service idea, ii) carrying out the early stage development, iii) developing the necessary strategic and business plans, iv) securing adequate and appropriate financing, and v) marketing and selling the product. The primary deliverable will be the creation of a strategic plan for an innovative biotechnology product or service..
Prerequisite: Consent of the Faculty.
Note: Registration in Medical Science 672 or admission to the Master of Biomedical Technology, Biomedical Engineering MEng(T) or Master of Business Administration (with a prior BSc) program is suggested for enrolment in this course. Can be taken concurrently with Medical Science 672.

Medical Science 669 Q(1.5-1.5T-3)

*Clinical Trials and Bio-manufacturing*
The objective of this course is to provide general understanding and appreciation, regulatory requirements and ethical considerations around conducting clinical trials as well as bio-pharmaceutical manufacturing. An emphasis will be placed on regulatory obligations. The course will provide opportunities in writing protocols, clinical trial applications, auditing facilities and process validation.

669.01. Laboratory Techniques & Commercial Applications

669.02. Bio-manufacturing & Clinical Trials
Prerequisite: Consent of the Course Coordinators.
Note: Admission to MBT program is normally required for taking this course.

Medical Science 670 F(0-6)

*Practicum in Biomedical Technology*
A full course carried out in an academic or industrial setting for a period of at least twelve weeks. Students have an opportunity to apply the principles and methods of investigation learned during the Master of Biomedical Technology program and carry out related research. Practicum projects can be focused on any of the following aspects of the commercialization process: patent filling, research and development, business development, manufacturing to clinical trials, marketing and sales.
Prerequisite: Consent of the Faculty.
Note: Completion of all other course requirements in Master of Biomedical Technology program is normally required prior to registration for this course.
NOT INCLUDED IN GPA

Medical Science 671 H(0-6)

*Techniques in Medical Science*
Introduction to the theory of operation of electronic devices commonly used in biophysical studies including principles of amplifiers and filters, micro- and patch electrode techniques and computer-laboratory interfacing.
Prerequisite: Consent of the Faculty.
MAY BE REPEATED FOR CREDIT

Medical Science 672 H(2-0)

*Biotechnology Business Aspects*
Aspects involved in taking an original scientific idea or discovery all the way to a start-up company will be covered. Lecturers discuss commercialization, venture capital, business plan, patents and law, marketing.
Prerequisite: Consent of the Biomedical Technology Graduate Coordinator.
Note: Admission to the Master of Biomedical Technology program is normally required for enrolment in this course.

Medical Science 673 H( 3S-0)

*Careers in Biotechnology*
A series of talks and workshops designed to provide students with practical knowledge of the biotechnology industry. In collaboration with the University of Calgary Career Services, the course covers personal and professional development planning, resume writing, networking, negotiation and interviewing skills and job search strategies specifically for the biotechnology field. This course runs during the fall and winter block weeks with additional retreat days throughout the year.
Note: Admission to the Master of Biomedical Technology program is normally required for enrolment in this course.

Medical Science 674 F(3-0)

*Integrated Systems Course*
The principles of molecular and cell biology, pathology, physiology, pharmacology, microbiology and immunology as applied to new diagnostics, vaccines, or therapeutics. Lectures in the two courses are in parallel and fully integrated. Both courses are required components of the MBT program. The goal of the course, with an emphasis on molecular mechanisms in health and disease, is to provide students with the skills to interface with individuals in these disciplines in the biotechnology industry. Complemented by special lectures that provide industry perspectives in these disciplines.
674.01. Physiological and Pharmacological Aspects of Therapeutics Development
674.02. Molecular Cell Biology of Diagnostic and Vaccine Development
Prerequisite: Consent of the Faculty.
Note: Admission to the Master of Biomedical Technology program is required for enrolment in either section of this course.

Medical Science 675 H(2-3T)

*Bioinformatics Resources for the Biologist*
This introductory graduate level course will familiarize biologists with algorithms and search engines used to analyze nucleic acid and protein sequences and structures.
Prerequisite: Consent of the Faculty.

Medical Science 676 H(2.5-1)

*Scripting and Database Querying for Molecular Biologists*
This course is intended for biologists who wish to improve their bioinformatics analysis capabilities by learning just a small amount of query and programming syntax. No prior programming experience is required, and the focus is on practicality rather than programming theory. The course explores how to use existing tools (on the command-line and on the Web) to gather and process large datasets all at once, rather than doing many individual analyses manually. After this course, the student should be able to find the resources to answer a bioinformatics question, and know how to design a script or workflow to answer it.

Medical Science 677 H(1-6)

*Directed Study in Biomedical Technology*
Lectures, seminars, term papers or training in theoretical and/or laboratory methods at the advanced level in biomedical technology or medical sciences.
Prerequisites: Consent of both the faculty member who will supervise and the MBT faculty member who will co-supervise the chosen study.
Note: Admission to the Master of Biomedical Technology program is required for enrolment in this course.
MAY BE REPEATED FOR CREDIT

Medical Science 678 H(1-3T-6)

*Project in Biomedical Technology*
Students will conduct both business and laboratory-based projects throughout the year. The business-based aspect will include running a business, doing market research for companies or working with their business mentor. The laboratory-based aspect will include new diagnostics development and validation. This course will cover basic principles of project management as well as biotech lab theory and practical aspects covered via tutorials, journal club, and laboratory sessions. There will be a combination of monthly meetings, lectures, lab tutorials, commercial technology reviews, tours, demos, and practical labs.
Prerequisite: Consent of the Faculty.
Note: Admission to the Master of Biomedical Technology program is required for enrolment in this course.

Medical Science 679 H(3-0)
(Economics 679)

*Health Economics I*
Applies basic concepts from economics to the examination of health and health care policy issues such as why we have the kind of health care system we have, various aspects of health care reform, promotion of health, and evaluation in interventions.
Prerequisite: Consent of the Faculty.

Medical Science 683 H(3-0)

*The Biology and Therapy of Human Cancer*
An examination and discussion of current knowledge of the molecular and cellular biology of human cancer and the scientific basis of cancer therapy. Offered in a modular format: each course will consist of one required module and two elective modules. Students can choose the elective modules from a list that is specific for each course. Modules will emphasize student presentations, critical evaluation, and discussions of current and seminal research papers on the module topic. Refer to the Southern Alberta Cancer Research Institute website at www.sacri.ucalgary.ca for more information.
683.01 Cancer Pathology, Epidemiology and Therapy
683.02. Molecular Mechanisms of Cancer
683.04. Cell Biology of Cancer
Prerequisite: Consent of the Faculty.

Medical Science 685 H(3-3)
(Mechanical Engineering 685)

*Biomechanics of Human Movement*
Introduction to the measuring methods (accelerometry, goniometry, film and film analysis, video systems) of biomechanical analysis of human movement (force and force distribution). Description of the mechanical properties of bone, tendon, ligaments, cartilage, muscles, and soft tissues. The relation between structure and function of biomaterials. Introduction in descriptive analysis of human movement.
Prerequisite: Consent of the Faculty.

Medical Science 689 H(3-0)

*Medical Imaging*
Introduction to the theory and practical applications of medical imaging. Specific courses focus on an overview of modern diagnostic imaging techniques (689.01), as well as advanced study of specific techniques including magnetic resonance imaging (689.02) and medical image processing (689.03), and molecular imaging (689.04).
689.01. Medical Imaging Techniques
689.02. Advanced Magnetic Resonance Imaging
689.03. Advanced Medical Image Processing
689.04. Advanced Molecular Imaging
689.99. Medical Imaging Project
Prerequisite: Consent of the Faculty. Medical Science 689.01 should be taken prior to the advanced courses.
Note: Courses are open to interested graduate students in medicine, engineering, and science and to appropriately prepared undergraduate students enrolled in computer engineering, electrical engineering, and physics.

Medical Science 701 H(3-0)

*Advanced Topics in Reproductive Health*
A series of topics, ranging from basic sciences to clinical topics (including ethical issues) to increase awareness and comprehension regarding current issues in reproductive health.
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students.

Medical Science 703 H(2-6)

*Human Anatomy: Concepts, Exploration and Teaching*
Introductory course for graduate students with an interest in mammalian morphology to human cadaver dissection, human anatomy concepts and teaching strategies within the medical professional curriculum. Weekly lectures and discussions supplement a cadaver dissection-based course intended for students interested in pursuing an academic career in a medically related field.
Prerequisite: Should have some previous experience with dissection. Consent of the instructors.

Medical Science 705 H(3-0)

*Advanced Methods in Health Research*
Advanced health research designs (both quantitative and qualitative) and measurement techniques.
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students.

Medical Science 706 H(3-0)

*Theory and Practice of Family Therapy*
Overview of different family therapy approaches focusing on systemic assessment and systemic intervention through therapeutic interviewing. The development of student knowledge and skills in family therapy utilizing social constructionist, narrative, systemic, collaborative, and pro-feminist ideas while fostering the professional identity of the therapist.
706.01. Theory and Practice of Family Therapy I: Systemic Approaches
706.02. Theory and Practice of Family Therapy II: Postmodern Approaches
Note: This course is open to registered graduate students in medicine and the mental health professions, all others will require consent of the instructor.

Medical Science 707 H(2S-12)

*Family Therapy Practicum*
The development of conceptual and experiential expertise in working therapeutically with families.
707.01. Family Therapy I
707.02. Family Therapy II
Prerequisite: Consent of the Faculty.
NOT INCLUDED IN GPA

Medical Science 708 H(3-0)

*Theory and Practice of Interprofessional Psychosocial Oncology*
Provides graduate students with a multidisciplinary introduction to the field of psychosocial oncology. Emphasis will be placed on understanding and interpreting the experience of cancer informed by theory, evidence and illness narratives. Case based learning in small interprofessional groups will allow students to explore a variety of key learning themes relevant to psychosocial oncology including distress assessment, depression, anxiety, adjustment and coping, sexuality, loss and grief. Attention to diversity will be integrated throughout the course.

Prerequisite: Consent of Instructor. Must have an undergraduate degree in a relevant domain (including, but not limited to medicine, psychology, nursing, social work, spiritual care/theology).

Note: This is an online course.

Medical Science 709 H(3-2)

*Advanced Epidemiology*
Topics to include causal inference, epidemiologic

measures, induction latent period, internal and external validity, control of confounding variables and interaction between study factors.
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students.

Medical Science 711 H(3S-0)

*Systematic Reviews and Meta-Analysis*
Exposes students to all steps involved in the conduct of a systematic review and meta-analysis.
Prerequisite: Enrolment is open to all MDCH graduate students. Consent of instructor is required for all other students.

Medical Science 712 H(3-0)

*Advanced Topics in Community Health Sciences Specializations*

This senior level seminar series provides an opportunity to explore current topics within each of the specialization areas. Typically each course will explore three topic areas.

712.01. Advanced Topics in Biostatistics

712.02. Advanced Topics in Epidemiology

712.03. Advanced Topics in Health Services Research

712.04. Advanced Topics in Population/Public Health

712.05. Advanced Topics in Community Rehabilitation and Disability Studies.
MAY BE REPEATED FOR CREDIT

Medical Science 713 H(0-3T)

*Topics in Mountain Medicine and High Altitude Physiology*
A tutorial-based course focused on high altitude medicine and physiology. The aim of the course is to introduce the students to the physiological adaptations of, and pathophysiology associated with, the hypoxia of altitude. Students will be introduced to several diseases associated with the hypoxia of high altitude (i.e., Acute Mountain Sickness; High Altitude Pulmonary Edema, High Altitude Cerebral Edema), and the pathophysiology underlying these diseases.
Prerequisite: Consent of Instructor.

Medical Science 717 H(150 hours)

*Functional Genomics Technologies*
An intensive "hands on" laboratory course supplemented with lectures that provides experience and theory underlying current techniques used in functional genomics research. Methods include DNA microarrays, bioinformatics analysis of DNA and protein sequences, retro-recombinant screening, gene marker and mutation analysis, gene product interactions and yeast two-hybrid screens, site-specific mutagenesis, mammalian expression systems and in situ hybridization. More conventional molecular biology methods involving plasmid preparation, Northern and Southern blotting techniques, PCR technology, restriction digestions, subcloning of DNA fragments, and others are included.
Prerequisites: Registration in the Master of Biomedical Technology program or one of Medical Science 537, 609.01, 609.02, 613.05 or equivalent, and consent of the Faculty.
Prerequisite or Corequisite: Medical Science 537 (Biochemistry 537) or equivalent.

Medical Science 721 H(3-0)

*Biochemistry and Molecular Biology*
Historical and recent developments in analysis of eukaryotic genomes and control of gene expression, chromosome structure, bioinformatics, sequencing, proteomics, regulatory networks, metabolomics and related technologies and their applications to the study of human disease.

Medical Science 731 H(1S-4)

*Medical Education*
The design, planning, teaching and evaluation of courses in the health science disciplines. Practical experience in teaching methods and curriculum development. Intended for graduate students, faculty and resident physicians, and approved for study credit by the College of Family Physicians of Canada.
Prerequisite: Consent of the Faculty.

Medical Science 733 H(3-1)

*Research Design and Statistics in Medical Education*
Research design and statistical analysis including a broad overview of the variety of methods for research in medical education and related sciences. There is both a theoretical basis in lectures and seminars as well as applied approaches in laboratory exercises. A variety of research tools will be explored and utilized.
Prerequisite: Consent of the Instructor.
Note: Admission to the Medical Education specialization of the Medical Science graduate program is normally required for enrolment in this course.

Medical Science 735 H(3-0)

*Teaching Methods in the Medical Sciences*
Examines traditional and innovative methods used in medical and science education and clinical teaching to enhance student and practitioner knowledge, skills and attitudes. Discussions and presentations will focus on the role of the teacher and teaching strategies that include the lecture, small group teaching, inquiry and problem solving methods, reflective tools, simulation, surgical skills, computer based instruction, bedside learning, one on one teaching and self-directed learning. The content will be presented within the context of contemporary research, practice and educational theory. Participants will be expected to identify, critique literature, and prepare instructional activities that link research and theory to practice.
Prerequisite: Consent of Instructor.

Medical Science 737 H(3-0)

*Curriculum Design and Evaluation in the Medical Sciences*
Presents an overview of the key elements of curriculum design and evaluation within the context of contemporary medical education research, learning and teaching theory, and teaching. Through classroom and electronic discussion, reading and assignments, participants will explore learning needs, objectives, the selection of teaching methods, the identification of resources, the implementation and monitoring of curriculum and evaluation.
Prerequisite: Consent of Instructor.

Medical Science 739 H(3-0)

*Medical Education Measurement*
Focuses on the assessment issues related to the measurement of student achievement, competency, and performance in educational settings. The principles of Classical Test Theory, Item Response Theory, and Generalizability Theory will be introduced and explored through both formal lectures and computer lab activities. Specifically, the course will focus on the measurement issues and concerns related to undergraduate and post-graduate medical education programs.
Prerequisite: Consent of Instructor.

Medical Science 751 H(3-0)

*Topics in Medical Science*
751.02. Cellular and Molecular Pathogenic Mechanisms of Diabetes
751.03. Biostatistics
751.07. The Physiological Development of the Fetus and Newborn
751.09. Ion Channel Diseases
751.18. Neural Control of Posture and Movement
751.30. Transdisciplinary Bone and Joint Health
751.31. Joint Injury and Disease Biomechanical Focus
751.41. Critical Perspectives in Proteomics
Prerequisite: Consent of the Faculty.

Medical Science 755 H(1-6)

*Directed Study*
Lectures, seminars, term papers or training in theoretical and/or laboratory methods at the advanced level in the medical sciences.
Prerequisite: Consent of faculty member who will supervise the chosen study.
MAY BE REPEATED FOR CREDIT

In addition to the numbered and titled courses shown above, the department may offer advanced level graduate courses specifically designed to meet the needs of individuals or small groups of students at the advanced doctoral level. These courses are numbered in the series 800.01 to 899.99. Such offerings are, of course, conditional upon the availability of staff resources.

## MILITARY AND STRATEGIC STUDIES CMSS

Contact Info

Location: Library Tower, 7th floor
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### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Strategic Studies (MSS), course-based (including the co-operative education option) or thesis-based

Students in the Master of Military and Strategic Studies program may choose an interdisciplinary specialization in Israel Studies. For further information on the Israel Studies (Interdisciplinary) specialization, see the separate listing in this Calendar.

### 2. Admission Requirements

In addition to the requirements of the Faculties of Graduate Studies and Arts, CMSS requires:

*Master of Strategic Studies (MSS), course-based*

a) A Bachelor's degree grade point average of at least 3.4 on a 4.0 point scale
b) A writing sample
c) Agreement to supervise from a potential supervisor
d) A research proposal from applicants to the thesis-based program

*Doctor of Philosophy*

Applicants will be admitted only if the CMSS Graduate Committee is satisfied that adequate supervision is likely to be available for the duration of their studies.

Successful applicants should be aware that admission to the program does not imply a Centre commitment to provide supervision for all research interests they may have. Students are also advised to consult the Faculty of Graduate Studies Handbook of Supervision and Examination.

Prerequistes for admission to the PhD program are:

a) A completed Master's Degree.
b) A GPA of 3.7 on a four point scale over all completed graduate courses in the Master's program; 3.4 in the Undergraduate program over the last 20 half courses or two years of study.
c) A completed application to the Centre, along with supporting documentation.
d) A detailed statement of the proposed thesis research.
e) A representative piece of written work, normally a Master's Thesis chapter or major research paper.
f) The Centre requires a tentative agreement from a faculty member to supervise, so students need to contact potential supervisors at the beginning of the application process.
g) All students whose native language is one other than English are required to pass the TOEFL test with a minimum score of 600 (written), or 92 (internet-based), or 7+ on the IELTS test, or 84 on the MELAB test, or 70 on the PTE test. The test must have been taken within the last two years.
h) Two letters of reference.
i) All post-secondary transcripts.

## 3. Application Deadline

Deadlines for the submission of complete applications:

15 January for September admission and funding

15 April for September admission, admission only (funding application will not be considered after Jan 15, 2010)

## 4. Advanced Credit

In the course-based Master's program, advanced credit may be given for a maximum of two half-courses at the senior undergraduate (500) level. The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to the required level for admission.

## 5. Program/Course Requirements

*Master of Strategic Studies*

In addition to Faculties of Graduate Studies and Arts requirements, the Centre for Military and Strategic Studies requires:

a) That all Master's students take, in any sequence, the following three core area half courses:
STST/HTST 655 Classics of Strategy
POLI 681 Advanced Analysis of International Relations
POLI 685 Strategic Studies
b) That students take, in any sequence, two of the following half-courses from the listed areas of concentration:
(1) Arctic Security
STST 661 Circumpolar Security
(2) Canadian Military Studies
HTST520 Canada and the First World War; or
HTST 526 Canadian Military and the Second World War; and
STST 611 Canadian Military Studies
(3) US Security Policy
POLI 633 US Security Policy
(4) Domestic Security/Hemispheric Security
(5) Ethics and Morality in Conflict
POLI 619 War and Interpretation
PHIL 609 Topics in the History of Philosophy – Just War Theory
(6) Intelligence and Security
STST 657 Intelligence, Information Operations and Command, Control, Communications and Computers
(7) Israeli Security Studies
ISST 601 Modern Israel
(8) Military Anthropology
ANTH 641 Graduate Seminar in Civil Military Relations
(9) Sea Power
STST 659 Sea Power
(10) Unconventional Warfare
POLI 689 Unconventional Warfare
POLI 675 Special Topics in Comparative Politics
c) That all students take one elective half-course:
STST 651 Reading Seminar I
STST 653 Research Seminar I
Any other graduate course pertinent to the student's thesis topic (with the approval of the Graduate Director).
d) That in addition to the aforementioned half-courses, course-based students take seven half-course electives Consult the department website for a list of recommended elective courses. The co-operative education option is part of the course-based MSS program. Students will complete an 8-month work placement during their second year, which will replace three elective half-courses. Thesis-based MSS students will be permitted to transfer to the co-operative education option during their first year of study. For further information interested students should contact the CMSS faculty co-operative education advisor or the department website.

*Doctor of Philosophy*

a) Course Work:
Each student must normally take four half-course equivalents including three core courses:
- Political Science (POLI) 681: Advanced Analysis of International Relations
- POLI 685: Strategic Studies
- Strategic Studies (STST) 655: *Classics of Strategy*.

Students will have two major fields of study, one of these being strategic studies and the other the thesis area, and will be required to take one half-course in each, namely POLI 685 and an appropriate elective.
b) Written and oral candidacy examination
c) Doctoral thesis proposal
d) Written doctoral thesis
e) Oral thesis defence.

## 6. Additional Requirements

None.

## 7. Credit for Undergraduate Courses

Students enrolled in the thesis program may apply to take one 500-level half-course for graduate credit, but may be required to complete additional assignments for the course.

## 8. Time Limit

Expected completion time for the thesis-based and course-based Master of Strategic Studies is two years. Maximum completion time is four years for the thesis-based Master of Strategic Studies and six years for the course-based Master of Strategic Studies.

Expected completion time for the PhD in Military and Strategic Studies is four years. Maximum completion time for the PhD in Military and Strategic Studies is six years.

## 9. Supervisory Assignments

Students must contact a possible supervisor before admission. Agreement from a supervisor must be included in the application package.

## 10. Required Examinations

Students in the course-based program are required to pass an oral comprehensive examination no later than six months after the completion of the course work. This examination is designed to test the student's mastery of the core requirements of the program as well as his/her chosen area of technical or specialized expertise.

For the PhD program, all course work must be completed, the second language requirement met (if applicable), and a thesis proposal approved by the Supervisory Committee before the candidacy examination can be taken.

There will be two three-hour written examinations, one in each field, as well as the single oral examination covering the content and questions on both of the written exams. There will normally be two fields – a major field and a second field. The major field will always be strategic studies, while the second field will be in an area closely related to the student's thesis research. Military and Strategic Studies is an interdisciplinary program, and our doctoral students will draw upon a wide variety of disciplines for their second field.

A candidacy examination consists of both written and oral components. CMSS requires that the written component be taken after the completion of course work and no later than 28 months of initial registration into the program, although completion within 16-20 months is encouraged by the Centre. For CMSS purposes, this component will consist of written examinations in the two major fields of study. The oral examination will be held no later than one month after the written examination.

Final thesis oral examinations are open.

## 11. Research Proposal Requirements

The thesis proposal is submitted to the members of the student's Supervisory Committee, and the student defends the proposal in a meeting of that Committee. After the proposal is passed by the Committee, the student can go on to write his or her candidacy exams.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Not applicable.

## 14. Other Information

None.

## 15. Faculty Members/Research Interests

Faculty members and their areas of interest may be found at http://www.cmss.ucalgary.ca.

### Strategic Studies (STST)

Permission of the Graduate Director is needed for enrolment in Strategic Studies 651 653, 751 and 753.

Graduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

Strategic Studies 600 M(3-0)

*MSS Co-operative Education*
Strategic Studies Co-operative Education Work Placement
Prerequisite: Admission to the co-operative education option of the MSS program.

Strategic Studies 611 H(3-0)

*Canadian Military Studies*
Canadian military studies, excepting the two world wars. Topics will include the evolution of Canadian defence policy, past or present, the development and evolution of the Canadian Forces or any of its main elements (army, navy or air force), Canadian military operability with the military forces of Allied nations, and the relationship between Canadian foreign policy and the use of the Canadian military.

Strategic Studies 651 H(3-0)

*Reading Seminar*
Prerequisite: Permission of the Graduate Co-ordinator.
MAY BE REPEATED FOR CREDIT

Strategic Studies 653 H(3-0)

*Research Seminar*
Prerequisite: Permission of the Graduate Co-ordinator.
MAY BE REPEATED FOR CREDIT

Strategic Studies 655 H(3-0) (History 655)

*Classics of Strategy*
Strategic thought from Sun Tzu to Clausewitz, Mahan to Corbett. Analyzes the writings of classic strategic thinkers and then, by way of case studies, examines their theories as they pertain to military and political planners from the Peloponnesian War to the present.

Strategic Studies 657 H(3-0)

*Intelligence; Information Operations; and "Command, Control, Communications and Computers"*
An assessment of the history of intelligence, information operations, and command systems for military and diplomatic institutions as well as contemporary theory and practice related to these issues.

Strategic Studies 659 H(3-0)

*Sea Power*
The meaning of sea power and an assessment of how modern states use it. An analysis of the writings of major naval strategic thinkers and case-study examination of the application of those theories from Nelson to the present.

Strategic Studies 661 H(3S-0)

*Circumpolar Security*
Assessment of the security environment of the Arctic region. This seminar will assess both the differing theoretical conceptualizations of security in the Arctic and the policies of the circumpolar states as they pursue Arctic security.

Strategic Studies 751 H(3-0)

*Reading Seminar*
Prerequisite: Permission of the Graduate Director.
MAY BE REPEATED FOR CREDIT

Strategic Studies 753 H(3-0)

*Research Seminar*
Prerequisite: Permission of the Graduate Director.
MAY BE REPEATED FOR CREDIT

## MUSIC MUSI

Contact Info
Location: Craigie Hall D 100
Faculty number: (403) 220-5383
Fax : (403) 282-6925
E-mail address: julia.ross@ucalgary.ca
Web page URL:
http://music.ucalgary.ca/graduate/prospective

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD) with specialization in Musicology, Composition, or Music Education
Master of Arts (MA) thesis-based with specialization in Musicology
Master of Music (MMus) thesis-based with specializations in Performance, Conducting, Composition, or Music Education

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires that all applicants submit:

a) one-page letter detailing their specific reasons for pursuing graduate study.
b) two Reference Letters;

Other requirements are outlined below and based on the degree being pursued.

Master of Music (Performance)

A live audition or video/audio recording. Repertoire for the audition must contain representative works from a variety of historical periods and must demonstrate an advanced level of technical accomplishment. Recordings should be approximately 20-30 minutes in length.

Master of Music (Conducting)

a) A completed Bachelor of Music degree, including study in conducting
b) Demonstrated ability in an audition, which can be met in two ways:
   - A video of approximately fifteen minutes
   - A rehearsal of a University ensemble (during Fall and Winter)
c) Demonstrated competence on a major instrument or voice

Master of Music (Composition)

a) A completed Bachelor of Music degree, including study in composition
b) A portfolio of at least three recent compositions, together with recordings where available

Master of Music (Music Education)

The Department is not currently accepting applications to the Master of Music (Music Education) for the 2010-2011 academic year.

a) Normally, two years of successful teaching experience or equivalent professional involvement in music education
b) An essay on a topic in Music Education prepared during or subsequent to the applicant's undergraduate work

Master of Arts (Musicology)

A research essay or paper of approximately 10-15 pages on a topic in music history or theory prepared during or subsequent to the applicant's undergraduate course work

Doctor of Philosophy

a) A recognized Master's degree or equivalent
b) *Composition* - a portfolio of works, together with recordings, if available, and an extended research paper
c) *Musicology* - one or two extended research essays of approximately 25 pages in length
d) *Music Education* - one or two extended research essays

### 3. Application Deadline

The deadline for the submission of complete applications for both Master's and doctoral program is 15 January for September admission.

For students wishing to pursue a Master of Music in Performance, an audition of approximately thirty minutes will be arranged on an individual basis from 1 December to 15 April. Specific dates and times can be arranged by contacting the Graduate Administrator at (403) 220-5383.

For consideration for university scholarships, complete applications (including the audition and the required TOEFL score, if applicable) must be concluded by 15 January. Departmentally-administered funding (such as graduate teaching assistantships and research scholarships) will be decided after 15 April .

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department, excluding qualifying courses, requires:

Master's Degrees

*Master of Music (Music Education):* MUHL 603, MUHL 651 and three full approved graduate level courses

*Master of Music (Composition):* MUTC 671, MUHL 651, MUTC 695.01/, MUTC 691 and two full approved graduate level courses

*Master of Music (Performance):* MUHL 603, MUHL 651, MUPF 691, MUPF 693, one half-course at the graduate level in MUTC or MUHL and three other approved half course options.

*Master of Music (Conducting):* MUHL 603, MUHL 651, MUPF 632 or MUPF 634 and two full approved graduate level courses

*Master of Arts (Musicology):* MUHL 603, MUHL 651 and three full approved graduate level courses

Restrictions

No more than one full course for the Master of Music and Master of Arts degrees may be taken in an area other than Music.

Doctor of Philosophy

Students entering the PhD program will normally be required to complete at least six half-courses:

a) An interdisciplinary half-course designed by the student and supervisor
b) Five additional approved graduate level half

courses. Students in the Doctor of Philosophy (Composition) program must take MUHL 651 unless this course (or its equivalent) has been completed as part of a Master's degree.

## 6. Additional Requirements

**Diagnostic examinations in music history and theory** will be given to all entering students in order to determine if qualifying work in these areas is required.

### Language

#### Master's Programs

*Master of Arts (Musicology)*
Applicants are required to demonstrate a reading knowledge of a language other than English—normally German. In practice, this requirement and any other linguistic competence that may be deemed necessary for the student's proposed research area must be met before the thesis topic will be approved.

*Other Master's programs*
While there are no formal second-language requirements for the various programs of the Master of Music degree, students may be required to attain proficiency in a language other than English where this is deemed appropriate for the proposed thesis/project.

#### Doctor of Philosophy

*Doctor of Philosophy (Musicology)*
Candidates are required to demonstrate a reading knowledge of two languages other than English. German is recommended as one of the required languages.

*Doctor of Philosophy (Composition) and (Music Education)*
Candidates are required to demonstrate a reading knowledge of one language other than English.

### Performance

Graduate students in the MMus Performance program are required to participate in one of the large ensembles for the duration of their degree. Pianists are required to accompany two hours per week in a vocal or instrumental studio if they do not participate in an ensemble. Another option for pianists is to accompany a Junior or a Senior recital. The head of the performance area will make all ensemble or accompanying assignments. Students in graduate programs other than performance are not required to participate in an ensemble, although such participation is encouraged.

### Thesis/Recital/Project

#### Master's Programs

All Master's degree programs require a thesis or recital or project equivalent (see below), prepared under the guidance of a supervisor and approved by the Graduate Studies Committee of the Department.

*Master of Music (Performance)*
The thesis is interpreted to be two public recitals featuring solo performances and chamber music. At least one Canadian work should be included in one of the recitals. The examining committee will evaluate the candidate's performance in both of the recitals. Recital proposals are to be submitted to the Graduate Coordinator for approval by the Graduate Committee at least two months before each performance.

*Master of Music (Conducting)*
The thesis is interpreted to be two public performances, on or off campus, with University or community ensembles.

*Master of Music (Composition)*
The thesis is interpreted to be a large-scale compositional project and an accompanying descriptive essay related to the project. Normally, the project will be presented in a public recital.

#### Doctor of Philosophy

*Doctor of Philosophy (Composition)*
The thesis is interpreted to be a substantial creative project and an accompanying analytical/research paper approved by the supervisory committee.

## 7. Credit for Undergraduate Courses

Not applicable.

## 8. Time Limit

Maximum completion time is five years for the Master of Music programs and four years for the Master of Arts (Musicology). Maximum completion time is six years for the doctoral program.

## 9. Supervisory Assignments

The Graduate Coordinator will function as the interim supervisor for all newly admitted students during their first term. This arrangement will allow students to use their first term as an opportunity to meet with faculty and to secure a permanent supervisor.

## 10. Required Examinations

### Master's Degrees

*Master of Arts (Musicology), Master of Music (Music Education) and Master of Music (Composition)*
A comprehensive oral examination encompassing all areas of the chosen field is required. This examination will take place following the completion of coursework and must be satisfactorily completed before the submission of the thesis/project.

*Master of Music (Performance) and (Conducting)*
A comprehensive oral examination based upon the literature of the instrument and more extensively upon the repertoire of the approved recital programs is required. This examination must be satisfactorily completed at least four weeks before the date of the second public performance required for the degree.

### Doctor of Philosophy

This degree requires a candidacy examination with a written and an oral component upon completion of course work, but no later than 28 months after initial registration.

Questions on the research proposal will be included in the oral candidacy examination.

Final thesis oral examinations of written theses are open.

## 11. Research Proposal Requirements

Research proposals must be submitted to and approved by the Department's Graduate Studies Committee at least two months before the student intends to defend or perform.
The proposal should include:

- A detailed description of the area of investigation,
- A clear statement of the approach to be taken and the research method to be utilized,
- An account of how the work will be presented,
- An indication of how the project will make an original contribution to the student's field of study.

## 12. Special Registration Information

Students should consult the Graduate Coordinator before registering.

## 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. For scholarship applications, see Application Deadlines.

## 14. Other Information

International applications will not be considered unless the applicant has completed and passed the TOEFL examination (or equivalent) **before** the application or scholarship deadline. Students must apply for the Open Scholarship Competition by 15 January.

## 15. Faculty Members/Research Interests

Current faculty members and their areas of interest can be found at http://music.ucalgary.ca/contact-us/directory.

## Music Education (MUED)

### Graduate Courses

**Music Education 655** H(3-0)

*Independent Study*
Individual study in a selected music education area.
**Prerequisite:** Consent of the Department.
MAY BE REPEATED FOR CREDIT

**Music Education 671** H(3-0)

*Selected Topics in School Music*
Selected topics with emphasis upon practical application relevant to the field of music education. Various topics are regularly offered under this title, such as early childhood, Kodaly pedagogy, administration of school music programs and techniques of school music supervision.
**Prerequisite:** Consent of the Department.
MAY BE REPEATED FOR CREDIT

**Music Education 695** H(2-4)

*Practicum in School Music I*
Practical application of teaching techniques studied in graduate level school music courses. Will include various topics such as early childhood, Kodaly, choral and instrumental.

**Music Education 697** H(2-4)

*Practicum in School Music II*
Continuation of Music Education 695.

**Music Education 755** H(3-0)

*Independent Study*
Individual directed study in an area of Music Education (doctoral level).
**Prerequisite:** Consent of the Department.
MAY BE REPEATED FOR CREDIT

**Music Education 771** H(3-0)

*Selected Topics in Music Education*
Selected topics with emphasis upon practical application relevant to the field of Music Education. Possible topics may include early childhood musical development, Kodaly pedagogy, folk music studies, choral and instrumental pedagogy and the role of new technologies within the discipline.
**Prerequisite:** Consent of the Department.
MAY BE REPEATED FOR CREDIT

## Music History and Literature (MUHL)

### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are undergraduate courses.

Music History and Literature 573 H(3-0)

*Studies in the Music of Selected Composers*
Specific composers or groups of composers; may include Beethoven, Debussy, the Second Viennese School, etc.
Prerequisite: Music History and Literature 305 or consent of the Department.
MAY BE REPEATED FOR CREDIT

Music History and Literature 596 F(1-4)

*Honours Project*
A major project with an emphasis upon historical and/or cultural issues.
Prerequisites: Music History and Literature 305 and consent of the Department.
Note: Restricted to students in the BA Honours (Music) program.

Music History and Literature 598 F(1-4)

*Senior Project*
Major project in music history and literature.
Prerequisites: Music History and Literature 305 and consent of the Department.

Graduate Courses

Music History and Literature 603 H(3S-0)

*Pro-Seminar in Music for Graduate Students*
Selected works of music from the middle ages to the present in an analytical and historical context.
Prerequisite: Consent of the Department.
Note: Required course for all MMus and MA (Musicology) students.

Music History and Literature 651 H(3-0)

*Research Techniques and Bibliography of Music*
Exploring the basic reference materials and techniques for musical research at the graduate level.
Prerequisite: Consent of the Department.
Note: Required course for all MMus and MA (Musicology) students.

Music History and Literature 655 H(3-0)

*Independent Study*
Individual study in a selected area of musicology.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Music History and Literature 671 H(3-0)

*Selected Topics in Musicology*
Various topics such as history of music theory, analysis, notation, or performance practice may be offered. Consult the timetable for current topic.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Music History and Literature 771 H(3-0)

*Selected Topics in Musicology*
Various topics in the field of Musicology (doctoral level).
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Music Performance (MUPF)

Graduate Courses

Music Performance 632 F(2-3)

*Advanced Choral Conducting*
Prerequisite: Consent of the Department.

Music Performance 634 F(2-3)

*Advanced Instrumental Conducting*
Prerequisite: Consent of the Department.

Music Performance 641 H(0-4)

*Advanced Chamber Ensemble I*
Intensive coaching in departmental chamber ensembles.
This course meets for three hours per week over the fall and winter session.
Prerequisite: Consent of the Department.

Music Performance 643 H(0-4)

*Advanced Chamber Ensemble II*
Continuation of Music Performance 641.
This course meets for three hours per week over the fall and winter session.
Prerequisite: Music Performance 641 or consent of the Department.

Music Performance 655 H(3-0)

*Independent Study*
Individual study in a selected performance area.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Music Performance 657 H(0-3)

*Studies at the Banff Centre*
Advanced music studies. Although the Banff Centre does not provide credit course instruction, students with advanced experience in music at the Banff Centre may apply for graduate-level credit from the University of Calgary.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

Music Performance 671 H(3-0)

*Topics in Music Performance*
Various topics such as applied music literature, applied pedagogy, accompanying, phonetics and others.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Music Performance 691 H(2-3)

*Advanced Performance Practicum I*
Applied instruction in instrument or voice.
Prerequisite: Consent of the Department.

Music Performance 693 H(2-3)

*Advanced Performance Practicum II*
Continuation of Music Performance 691.
Prerequisite: Music Performance 691 or consent of the Department.

Music Theory and Composition (MUTC)

Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are undergraduate courses.

Music Theory and Composition 555 H(3-0)

*Independent Study*
Individual study in a selected theory or composition area.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Music Theory and Composition 575 H(3-0)

*Selected Topics in Theory and Composition*
Advanced topics in music theory and composition selected from such subjects as: analysis of tonal or post-tonal music, rhythmic analysis, acoustics, critical approaches to music theory, electroacoustic music, orchestration, counterpoint and fugue.
Prerequisite: One of Music Theory and Composition 471, 473, 475, 477, 479 or consent of the Department.
MAY BE REPEATED FOR CREDIT

Music Theory and Composition 577 H(3S-0)

*Seminar in Theory and Composition*
Creative and analytic approaches to the study of selected repertoire with an emphasis upon contemporary music.
Prerequisite: One 400-level Music Theory and Composition course or consent of the Department.
MAY BE REPEATED FOR CREDIT

Music Theory and Composition 581 H(3-0)

*Jazz Harmony*
Detailed study of the harmonic materials of jazz.
Prerequisite: Music Theory and Composition 303 or consent of the Department.

Music Theory and Composition 596 F(1-4)

*Honours Project*
A major project with an emphasis upon analytic or creative issues.
Prerequisites: Two half courses in Music Theory and Composition at the 400 or 500 level; or Music Theory and Composition 493; or consent of the Department.
Note: Restricted to students in the BA Honours (Music) program.

Music Theory and Composition 598 F(1-4)

*Senior Project*
Major project in theory or composition.
Prerequisites: Two half courses in Music Theory and Composition at the 400 or 500 level; or Music Theory and Composition 493; or consent of the Department.

Graduate Courses

Music Theory and Composition 655 H(3-0)

*Independent Study*
Individual study in a selected theory or composition area.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Music Theory and Composition 671 H(3S-0)

*Seminar in Theory and Composition*
Advanced creative and analytic approaches to the study of selected repertoire with an emphasis upon contemporary music.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Music Theory and Composition 673 H(3-1)

*Selected Topics in Theory and Composition*
Various topics (masters level).
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Music Theory and Composition 675 H(3-0)

*Pedagogy of Music Theory*
Refining ideas about music theory and its teaching, while developing and strengthening teaching skills.
Prerequisite: Consent of the Department.
Note: Required course for all PhD (Composition) students.

Music Theory and Composition 691 H(2S-2)

*Composition Seminar*
Prerequisite: Consent of the Department.

Music Theory and Composition 695 H(2-2)

*Composition*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Music Theory and Composition 755 H(3-0)

*Independent Study*
Individual study in a selected theory or composition area (doctoral level).
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Music Theory and Composition 775 H(3-0)

*Advanced Topics in Theory and Composition*
Various topics (doctoral level).
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Music Theory and Composition 795 H(3-0)

*Composition*
Individual study in musical composition (doctoral level).
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Fine Arts (FINA)

Graduate Courses

Fine Arts 601 H(0-3)

*Studies at the Banff Centre*
Interdisciplinary fine arts studies. Although the Banff Centre does not provide credit course instruction, students with advanced experience in art, dance, drama or music at the Banff Centre may apply for graduate-level credit from the University of Calgary.
Prerequisite: Consent of the Faculty.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

Fine Arts 603 H(3-0)

*Topics in Fine Arts: Interdisciplinary Seminar*
Interdisciplinary seminar in the advanced study and interpretation of the interrelationships between music, the fine arts, and the history of ideas, using a theme-oriented approach.
Note: This is a required course in the PhD program for Music Education, Composition and Musicology.
MAY BE REPEATED FOR CREDIT

Fine Arts 607 H(3-0)

*Topics in Multi-Media Research*
Concentrated instruction in computer applications in the Fine Arts
Prerequisite: Consent of the Faculty.
MAY BE REPEATED FOR CREDIT

## NURSING NURS

### Contact Info

Location: Professional Faculties Building, Room 2279
Faculty number: (403) 220-6241
Fax: (403) 284-4803
E-mail address: nursgrad@ucalgary.ca
Web page URL: http://nursing.ucalgary.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Nursing (MN), course-based or thesis-based
Integrated Master of Nursing/Nurse Practitioner (MN/NP), course-based
Post-Master's Nurse Practitioner Diploma (NP), course-based

The Doctor of Philosophy program is designed to educate professionals for excellence in nursing scholarship through original research related to specialized practice with identified client populations.

Master of Nursing programs prepare advanced nurse practitioners in specialized areas of practice. The course-based program prepares nurses with advanced skills; the thesis-based program offers supervised research experience.

A Post-Master's Nurse Practitioner (PMNP) diploma program, with an adult health acute care focus, is offered. The PMNP can be achieved as a Post-Master's program or through an integrated Master of Nursing/Nurse Practitioner (MN/NP) program. The Nurse Practitioner program or any of its courses will only be offered contingent on the availability of resources and a sufficient cohort of students. Further information on the integrated MN/NP program can be found at http://nursing.ucalgary.ca.

### 2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements, the Faculty of Nursing requires that an applicant must:

#### Master of Nursing

a) Be a Registered Nurse holding a baccalaureate degree, normally in nursing;
b) Be eligible for active nursing registration in Alberta (registrants in the program must provide proof of active CARNA registration or equivalent each year);
c) Hold CPR Certification at the Basic Rescuer or Basic Cardiac Life Support or "C" level;
d) Have successfully completed one undergraduate half-course in research methodology equivalent to University of Calgary Nursing 309 or 539;
e) Have successfully completed one undergraduate half-course in statistics;
f) Normally have a minimum of two years' (full-time or equivalent) clinical experience in the proposed area of study;
g) Submit two references, one from someone capable of assessing the applicant's academic and research ability, normally an academic, and one from someone who can attest to the applicant's nursing practice and expertise;
h) For applicants required to provide proof of proficiency in English submit a minimum TOEFL score of 600 (written test) or 100 (internet-based test); IELTS score of 7.0; MELAB score of 83; PTE score of 70; or Level 3 on the EAP program ;
i) Have an interview(s) with a faculty member, if requested by the Faculty;

A minimum of three years' (full-time or equivalent) Registered Nurse practice experience in the proposed area of study is required for applicants to the MN/NP or the PMNP. These applicants must also provide commitment from the Health Region for practicum placement availability for the final practicum of the NP program (Nursing 650).

Any graduate student requesting transfer to the integrated MN/NP program must consult with his/her current supervisor prior to application.

Applicants to the MN/NP can be admitted on a part-time basis up to the commencement of the first NP practicum (Nursing 641) at which time a transfer to full-time studies must occur.

#### Doctor of Philosophy

a) Normally be a Registered Nurse;
b) Normally hold CPR Certification at the Basic Rescuer or Basic Cardiac Life Support or "C" level;
c) Submit a study plan outlining the areas of proposed concentration, goals in undertaking doctoral work, initial intentions regarding course work, and a statement of the preliminary plans for thesis research;
d) Provide examples of the applicant's written scholarly work such as publications, research reports, course assignments, etc;
e) Provide a curriculum vitae;
f) Provide a letter of commitment from the identified supervisor indicating willingness to provide supervision throughout the program of studies and supporting the applicant's study plan;
g) For applicants required to provide proof of proficiency in English submit a TOEFL score of 600 (written test) or 100 (internet-based test); IELTS score of 7.0; MELAB score of 83; PTE score of 70; or Level 3 on the EAP program;
h) Have successfully completed one graduate level half-course in quantitative methods, one graduate level half-course in qualitative methods, plus one graduate level half-course in statistics. Exceptions may be considered, but the onus will be on the applicant to provide sufficient evidence to warrant exception. Deficiencies must be successfully eliminated prior to or in the first year of the Doctoral Program;
i) Submit three references, one of which must be from the applicant's supervisor of his/her master's program.

#### Academic Accommodation Policy for Students with Disabilities

It is important for students with documented disabilities, who have met the admission criteria, to note that the Academic Accommodation Policy does not require the University to lower or substantially modify standards in order to accommodate students with disabilities. Adaptive technology and/or academic accommodations are available to facilitate learning, but they do not relieve students of their responsibilities to develop the essential skills and abilities expected of all other students.

### 3. Application Deadline

There are three application deadlines for submission of complete applications:

- 1 December (early bird for the following September)
- 1 February (for the following September)
- 15 September (for the following January)

There are three application deadlines for the PMNP diploma program:

- 1 December and 1 February for admission in September if the prerequisite courses are completed
- If the prerequisite courses are not completed, applications must be submitted by 15 September

for admission to the Winter, Spring, or Summer semesters as appropriate.

Applicants are highly encouraged to begin their application process early.

### 4. Advanced Credit

Applicants must include requests for advanced credit, accompanied by a rationale, when they apply for admission. For courses taken outside the University of Calgary, applicants must provide official transcripts and a copy of the course outline detailing the course description, objectives, assignments, readings, etc.

### 5. Program/Course Requirements

In addition to the Faculty of Graduate Studies' requirements, the Faculty of Nursing requires the following:

Master of Nursing (course-based)

a) Successful completion of the following core courses: Nursing 605, Nursing 611, Nursing 621, Nursing 683, Nursing 691, Nursing 693, Nursing 695;
b) One graduate level half-course in statistics (Statistics 603 );
c) Two graduate level half-course electives related to the student's focus of study.

Master of Nursing/Nurse Practitioner

d) Successful completion of the following core courses: Nursing 605, Nursing 611, Nursing 621, Nursing 661, Nursing 663, Nursing 665, Nursing 683, Nursing 691
e) One graduate level half-course in statistics (Statistics 603 )
f) Successful completion of the following core NP courses: Nursing 641, Nursing 644, Nursing 646, Nursing 650, Nursing 667

Post Master's Nurse Practitioner Diploma

g) Successful completion of pre-requisite courses: Nursing 661, Nursing 663, Nursing 665
h) Successful completion of the following core NP courses: Nursing 641, Nursing 644, Nursing 646, Nursing 650, Nursing 667

For the Nurse Practitioner practicum component of the integrated MN/NP and for the PMNP, there are additional requirements:

Mandatory participation of NP students in all activities related to practicum courses. NP students' practicum experiences may be scheduled at various hours, including evenings, nights and weekends. Practicum experiences may also extend outside the normal academic term. Normally, a student will not be permitted to withdraw from a NP practicum course in order to avoid a failing grade in that course.

Master of Nursing (thesis-based)

a) At minimum successful completion of the following core courses: Nursing 605, Nursing 611, Nursing 621, Nursing 675, Nursing 683;
b) One graduate level half-course in statistics (Statistics 603).

Evaluation of nursing practicum will be weighted at 40% of the final grade across all of the practica in the MN course-based and MN thesis-based programs, with a weight of 60% for the seminar component..

Doctor of Philosophy

a) For students prepared at the Master's level in nursing a minimum of six half-courses is required: Nursing 705, Nursing 769, two courses in advanced research methods, and two doctoral thesis seminars (Nursing 711 and Nursing 733)
b) Students in the doctoral program normally are required to take advanced research methods courses at the 700-level in both qualitative and quantitative research approaches, one of which must be Nursing 721 or Nursing 783 .
c) After completion of the student's course work and approval of the thesis research proposal, a candidacy examination with a written and an oral component is required.

Baccalaureate and non-nursing Master's prepared applicants must complete additional coursework beyond the six core half-courses listed in (a). Applicants are individually assessed. The number and types of additional courses required will vary according to the applicant's academic, research and practice background as well as the proposed research plan.

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

Under special circumstances, with the consent of the Faculty, students may take undergraduate courses, normally at the senior or 500-level, for the Master of Nursing degree.

### 8. Time Limit

Expected completion time for full-time students in the Master of Nursing program is two years. Maximum completion time is four years for the thesis-based program and six years for the course-based program including the MN/NP. The PMNP is one year, full-time study. Expected completion time for doctoral students is four years; maximum completion time is six years.

### 9. Supervisory Assignments

a) The supervisor for an MN thesis student must be determined by the end of the student's first term in program.
b) In addition to normal regulations for assignment of supervisors in the MN program, a supervisory committee must be struck for all MN thesis students no later than three months after the appointment of supervisor.
c) Doctoral students require a Faculty of Nursing member to commit to their supervision as a condition of admission.

### 10. Required Examinations

Master of Nursing (course-based)

A final comprehensive examination consists of a take-home written exam, designed according to the student's specialization, and an oral component. The written component must be completed within one week and constitutes the basis for a final oral examination two weeks later.

For the Nurse Practitioner component of the integrated MN/NP, all courses, with the exception of Nursing 650, must be completed prior to the MN comprehensive examination.

The final exam in the MN/NP and the PMNP includes an experiential practice component and an oral examination.

Master of Nursing (thesis-based)

The final oral thesis examination is open.

Doctor of Philosophy

The doctoral candidacy examination has a written and an oral component. The written component focuses on three areas:

a) the theory that defines existing knowledge in the student's chosen area of nursing research;
b) the literature that defines existing knowledge in the student's chosen area of nursing research;
c) the proposed research method and data analysis/management strategy chosen for the thesis. The student has three weeks to complete the written component. The candidacy committee has approximately two weeks to review the written submission before the oral examination.

The student is expected to defend and extend his/her knowledge in these three areas. Questions about the student's proposed research may be asked.
The final doctoral oral thesis examination is open.

### 11. Research Proposal Requirements

Doctoral and master's thesis students must have their research proposals approved in principle by their supervisory committee. This must be done at the end of their coursework for master's students, prior to candidacy for doctoral students.. Students must receive formal approval of their research proposals from the supervisory committee before proceeding to ethical review and implementation of the project. The approved proposal will be housed in the Research Office, Faculty of Nursing.

Students whose research involves human subjects must receive ethics approval from the University of Calgary Conjoint Health Research Ethics Board.

### 12. Special Registration Information

None.

### 13. Financial Assistance

For information on awards, see the Awards and Financial Assistance section of this Calendar. Scholarship application packages will be available on the Faculty of Nursing Website prior to each competition deadline. The application deadline for internal scholarships is 1 February. Students admitted to the Doctoral Program are highly encouraged to seek external funding to support their studies and research. Please note that the deadlines for external funding applications may not coincide with the 1 February deadline.

### 14. Other Information

None

### 15. Faculty Members/Research Interests

Current faculty and their research interests can be found at http://nursing.ucalgary.ca/contact-us/directory.

Graduate Courses

Nursing 601 H(3S-0)

*Seminar on Special Topics Related to Health Care and Nursing*
Prerequisite: Consent of the Faculty.
MAY BE REPEATED FOR CREDIT

Nursing 603 H(156 hours)

*Independent Supervised Clinical Practicum*
Prerequisite: Consent of the Faculty.
MAY BE REPEATED FOR CREDIT

Nursing 605 H(3S-0)

*Philosophical Foundations for Advanced Nursing Practice*
Exploration of the philosophical foundations of advanced nursing practice. A process of critical analysis and deconstruction of the various conceptual frameworks and paradigms leading to articulation of the philosophical perspectives that guide advanced nursing practice.
Prerequisite: Consent of the Faculty.

Nursing 607 H(39 hours)

*Independent Guided Study*
Prerequisite: Consent of the Faculty.
MAY BE REPEATED FOR CREDIT

Nursing 611 H(3-0)

*Substantive Theory for Advanced Nursing Practice*
Introduction to substantive theory related to advanced nursing practice.
Prerequisite: Consent of the Faculty.

Nursing 617 H(3-0)

*Philosophy and Practice in Palliative Care*
Examination of the philosophy of palliative/hospice care, taught by faculty from many disciplines. An important focus includes the students' self-exploration of their own beliefs, values, and attitudes about life, illness, death, and dying, and how this self-exploration shapes interactions with those we care for.
Prerequisite: Consent of the Faculty.

Nursing 621 H(3S-0)

*Health Research Methods: Quantitative Designs*
Critical analysis of nursing research. Emphasis on the study of research designs appropriate to clinical nursing problems, measurement, reliability and validity issues, and critique criteria.
Prerequisite: Consent of the Faculty.

Nursing 623 H(3-0)
(formerly Nursing 601.23)

*Hermeneutic Phenomenology*
Inquiry into the philosophical and historical influences that have shaped hermeneutic phenomenology as an approach to nursing and health care research. Exploration of interpretive practices essential to the conduct of hermeneutic research.
Prerequisite: Consent of the Faculty.

Nursing 637 H(3-0)
(formerly Nursing 601.38)

*Advancing Practice Through Clinical Education*
Exploration and extension of the scholarship of teaching in clinical nursing education in practice and academic settings. Emphasis is on clinical teaching models, teaching/learning strategies, conventional and emerging pedagogies, and educational research that inform and evaluate clinical nursing teaching and learning.
Prerequisite: Consent of the Faculty.

Nursing 639 H(3-0)
(formerly Nursing 601.41)

*Advanced Critical Inquiry: Preceptoring and Leading in Practice-based Disciplines*
Focus on the exploration, critical inquiry, analysis and synthesis of the knowledge and practice in preceptoring, mentoring, and leading in clinical settings. The relationships between theory, research, social responsibility, and practice will be addressed through literature on health and education reform, human resource challenges, academic preparation, and learning in dynamic clinical environments.
Prerequisite: Consent of the Faculty.

Nursing 641 H(24S-68 within 6-week block)

*Nurse Practitioner Practicum I*
Opportunity for students to acquire advanced knowledge and skills related to clinical decision-making and client management of commonly presented health problems.
Prerequisites or Corequisites: Nursing 661, 663 and 665 or equivalent, or consent of the Faculty, registration in Post-Master's NP Diploma program or the integrated MN/NP program.
NOT INCLUDED IN GPA

Nursing 644 F(52S-180 within 6-week block)

*Nurse Practitioner Practicum II*
Diagnostic and management skills related to care of patients. Further development of skills in clinical history taking, physical assessment, and diagnostic testing.
Prerequisite: Nursing 641.
NOT INCLUDED IN GPA

Nursing 646 F(52S-180 within 6-week block)

*Nurse Practitioner Practicum III*
Learning opportunities and practice experience with emphasis on clinical diagnosis, diagnostic imaging, laboratory tests, differential diagnosis, and patient management.
Prerequisite: Nursing 644.
Note: Not open to students with credit in Nursing 648.
NOT INCLUDED IN GPA

Nursing 648 F(52S-180 within 6-week block)

*Nurse Practitioner Practicum III (Neonatal)*
Learning opportunities and practice experience in Neonatal Intensive Care and Special Care Nursery with emphasis on clinical diagnosis, diagnostic imaging, laboratory tests, differential diagnosis, and management of high-risk hospitalized infants. Open to Neonatal Nurse Practitioner students only.
Prerequisite: Nursing 644.
Note: Not open to students with credit in Nursing 646.
NOT INCLUDED IN GPA

Nursing 650 F(16S-292 within 8-week block)

*Nurse Practitioner Practicum IV*
Consolidation of components of NP role in specialty focus.
Prerequisites: Nursing 667 and one of 646 or 648.
NOT INCLUDED IN GPA

Nursing 661 H(3S-0 within 3-week block)

*Advanced Pathophysiology and Therapeutics*
Study of pathophysiological phenomena and therapeutics at an advanced level. Classes will be a combination of didactic presentations, seminars and case studies. Students are invited to explore morbidity and mortality in the Canadian population in general and in their area of focus in particular.
Prerequisite: Consent of the Faculty.

Nursing 663 H(3S-1)

*Pharmacotherapeutics in Advanced Nursing Practice*
Principles of drug action, pharmacokinetics and pharmacotherapeutics in the context of advanced nursing practice. Opportunity to investigate pharmacotherapies specific to student's individual client populations.
Prerequisite: Consent of the Faculty.

Nursing 665 H(35S-30 within 3-week block)

*Advanced Health Assessment*
Builds upon fundamental health assessment skills to provide a solid foundation for advanced assessment. Focuses on history taking physical examination, diagnostic reasoning and clinical judgement, as well as selected diagnostic skills necessary for advanced practice.
Prerequisite: Consent of the Faculty.

Nursing 667 H(3S-0 within 3-week block)

*Nurse Practitioner Practice Issues and Role Integration*
Systems aspects related to management of complex health problems in NP practice, medical-legal and role development in extended practice environment.
Prerequisite: Nursing 646 or 648.

Nursing 675 H(2S-1T-12)

*Advanced Nursing Practice: MN Thesis and MN/NP*
Application of advanced nursing knowledge to practice. Emphasis on evidence based assessment tools and intervention skills for advanced practice with individuals, families, or communities. Development of a conceptual framework that could be used to guide advanced nursing practice or the research project.
Prerequisites: Nursing 605 and 611.
Note: Not open to students with credit in Nursing 691.
Note: Open to MN Thesis and MN/NP students only.

Nursing 681 H(3S-0)

*Families and Illness*
Facilitates understanding of the reciprocity between illness and family dynamics. Emphasis is on the family dynamics when a family member is experiencing a chronic illness, life-threatening illness or a psychosocial problem.
Prerequisite: Consent of the Faculty.

Nursing 683 H(3S-0)

*Health Research Methods: Qualitative Designs and Analyses*
Exploration of research methods based primarily on inductive reasoning. Methods, issues and techniques of sampling, data collection, analysis, and interpretation will be explored. Experience will be provided in data collection, management, and analysis.
Prerequisite: Consent of the Faculty.

Nursing 691 H(2S-1T-12)

*Advanced Nursing Practice I*
Application of advanced nursing knowledge to practice in student's area of specialty. Emphasis on applying and evaluating assessment and intervention skills for advanced practice with individuals, families, or communities. Beginning development of a conceptual framework for advanced nursing practice.
Prerequisites: Nursing 605 and 611.
Note: Not open to students with credit in Nursing 675.

Nursing 693 H(2S-1T-12)

*Advanced Nursing Practice II*
Extension and application of a conceptual framework for advanced practice in student's specialty area. Further clinical practice in assessments, interventions, and evaluation with individuals, families, or communities.
Prerequisite: Nursing 691.

Nursing 695 H(2S-1T-12)

*Advanced Nursing Practice III*
Evaluation of how advanced nursing practice provides a new framework for leadership in the clinical and research areas. Development of strategies whereby advanced nursing practice enables clients, their families and communities, including organizations and regions, to design innovative responses across the continuum of care.
Prerequisite: Nursing 693.

Nursing 701 H(3-0)

*Doctoral Special Topics*
Prerequisite: Consent of the Faculty.
MAY BE REPEATED FOR CREDIT

Nursing 705 H(3-0)

*Philosophy of Science in Nursing*
Exploration of major philosophical positions and their contributions to the generation and evaluation of knowledge. Examination of the development and evolution of nursing knowledge.
Prerequisite: Consent of the Faculty.

Nursing 707 H(39 hours)

*Directed Study*
Prerequisite: Consent of the Faculty.
MAY BE REPEATED FOR CREDIT

Nursing 721 H(3-0)
(formerly Nursing 701.02)

*Advanced Quantitative Research Methods*
Opportunities for developing nurse scientists and other health professional doctoral students to increase understanding of, and ability to utilize, quantitative research methods for scientific inquiry. Focuses on identifying issues/dilemmas arising during the research process and methods to address these challenges.
Prerequisite: Nursing 621 or equivalent

Nursing 723 H(3-0)
(formerly Nursing 701.23)

*Hermeneutic Phenomenology*
Inquiry into the philosophical and historical influences that have shaped hermeneutic phenomenology as an approach to nursing and health care research. Exploration of interpretive practices essential to the conduct of hermeneutic research.
Prerequisite: Consent of the Faculty.

Nursing 733 H(2S-0)

*Doctoral Thesis Seminar*
Opportunity for students to discuss development of their thesis proposal with a focus on the question, design, ethical considerations, and funding.
Prerequisites: Nursing 705 and one graduate level advanced research course.
NOT INCLUDED IN GPA

Nursing 711 H(2S-0)
(formerly Nursing 735)

*Doctoral Scholarship in Nursing*
Focus on development of a nurse scientist. Seminar discussions will address launching a viable and fundable program of research, grantsmanship, managing multi-disciplinary research teams, and establishing a record of publication and dissemination.
Prerequisite: Consent of the Faculty.
NOT INCLUDED IN GPA

Nursing 769 H(3-0)

*Contemporary Issues in Health Care*
Theoretical examination of concepts and research for increasing the availability and accessibility of health care. Appraisal of the relationships among leadership, policy and practice issues from a multidisciplinary perspective.
Prerequisite: Consent of the Faculty.

Nursing 783 H(3-0)
(formerly Nursing 701.01)

*Advanced Qualitative Research Methods*
Exploration of the philosophical foundations and practice of qualitative research methods in health care inquiry. Emphasis on interpretive assumptions and practices relevant to the conduct of qualitative research.
Prerequisite: Nursing 683 or equivalent.

## PHILOSOPHY PHIL

### Contact Info

Location: Social Sciences Building, Room 1248
Faculty number: (403) 220-5533
Fax: (403) 289-5698
E-mail address: philgrad@ucalgary.ca
Web page URL: http://www.phil.ucalgary.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), course-based (full and part-time) and thesis-based (full-time)

The Department also offers a Master of Arts degree with a specialization in the History and Philosophy of Science and a Master of Arts degree with a specialization in the Philosophy of Religion. These two degrees are offered in cooperation with the Departments of History and Religious Studies respectively.

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires three letters of reference, and a sample of written work, such as a recent essay, written in English. Applications will not be considered without a sample of written work.

### 3. Application Deadline

The deadline for submitting complete applications is 15 January for September admission.
Candidates applying for financial assistance should ensure that all documents relevant to their scholarship application reach the Department by 15 January. The Department makes its first round of decisions for financial support by the end of March. Although most applications are for September admission, January admission is also possible.

### 4. Advanced Credit

The Department does not normally give advanced credit for courses taken previously. However, in special circumstances, a request for advanced credit may be considered if it is made as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to raise the grade point average to a level required for admission. Normally, advanced credit may be given for a maximum of three half-course equivalents.

### 5. Program/Course Requirements

*Note: Normally, in both Master's and Doctoral programs, no more than one half-course of Directed Reading can be taken to satisfy the minimum course requirement..*

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

#### Master of Arts (thesis-based)

a) A minimum of six half-course equivalents
b) In the specializations History and Philosophy of Science or Philosophy of Religion, courses taken in History or Religious Studies, may, with departmental approval, count as fulfilling course requirements for the degree

#### Master of Arts (thesis-based) with Specialization in the History and Philosophy of Science

a) Two half-course equivalents (two terms) in the philosophy of science
b) Two half-course equivalents (two terms) in the history of science
c) Two half-course equivalents (two terms) in the history and philosophy of science
d) Proficiency in a second language or logic, depending on the department of enrolment

#### Master of Arts (course-based)

a) A minimum of 10 half-courses, including at least two half-courses in the History of Philosophy and two half-courses in 20th Century or Contemporary Philosophy
b) Students to remedy background deficiencies, if any, in a certain area or areas of philosophy by taking course work below the 500 level.
c) Students must complete at least one half-course in each annual registration period.

#### Doctor of Philosophy

a) Normally, a minimum of six half-courses for students with a Master of Arts degree
b) Normally, a minimum of twelve half-courses for students entering directly from an honours undergraduate program
c) Students to show competence in logic, which may be done by achieving a grade of B or better in Philosophy 379

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

Normally, no undergraduate courses will be credited towards completion of course requirements in a graduate program.

## 8. Time Limit

Expected completion time for full-time students is two years in a Master's thesis program, three years in a Master's course-based program, and four years in a doctoral program. Maximum completion time is four years for a Master's thesis program, and six years for a Master's course-based or doctoral program.

## 9. Supervisory Assignments

Students are assigned an interim advisor until they have an opportunity to become acquainted with other members of the faculty. Each student must have a supervisor by the end of the second regular academic session after first registration (April for September registrants and December for January registrants) and well in advance of the student's determination of areas for the final examination. The choice of supervisor must be by mutual arrangement between the student and staff member concerned, and approved by the Department.

A supervisory committee at the Master's level is not normally appointed. When such a committee is deemed necessary, the Dean's approval must be obtained.

A doctoral student shall be under the general supervision of a supervisory committee. After consultation with the student, the supervisor will submit a list of possible members of the supervisory committee to the Graduate Studies Committee for approval. The supervisory committee should be established as soon as possible and no later than three months after the supervisor's appointment.

## 10. Required Examinations

### Doctor of Philosophy

*Departmental Preliminary Examinations*
Students will be required to show competence in three of the following four areas:

Area I – metaphysics and epistemology
Area II – history of philosophy
Area III – philosophy of language and logic
Area IV – moral and political philosophy

The student chooses three areas. Competence in an area is shown by submitting a satisfactory essay or passing an examination. At least one area must be passed by either a sit-down or take-home examination. Exams are administered, and essays accepted, four times yearly. All three areas must be passed within 20 months of registration. Students who have not passed three areas within 20 months of registration will not normally receive further Departmental support.

*Oral Candidacy Examination*
After completion of required course work and preliminary examinations, the doctoral student must pass an oral candidacy examination prior to beginning the doctoral thesis. Before the examination, the student must submit a thesis proposal (approximately 20 pages) that will serve as the basis of discussion at the examination. The purpose of the examination is to ascertain whether the student's academic preparation and ability is adequate to pursue profitable research on the issues proposed. Questions on the research proposal will be included in the oral candidacy examination.

### Master of Arts (course-based)

The course-based Master of Arts has a research constituent. This constituent is to be satisfied by passing all components, written and oral, of the final Master's examination.

A final Master's examination of overall competency is required after completion of all course work, consisting of written and oral components. Effective July 1, 2009, the Department of Philosophy will be monitoring and overseeing this examination.

a) Details of the written component:
   i. The written component will consist of two three-hour written examinations. The written examinations are to be completed within one week.
   ii. The written component of the examination must be judged to be either acceptable ('Pass') or unacceptable ('Fail').
b) The student shall not be permitted to proceed to the oral component if the student does not secure a 'Pass' on the written component.
c) The oral examination will be held within two weeks following the written component. The oral examination will not be limited to the questions in the written examinations but will test the student's general knowledge of the areas selected for examination.
d) Details of the oral component:
   i. The oral examination is a formal examination, not an informal discussion with the student.
   ii. All examiners must be given an opportunity to question the student early in the examination, e.g. by rounds of questioning.
   iii. The oral examination shall not exceed two hours. This does not include deliberation time of the committee.
   iv. The oral component of the examination must be judged to be either acceptable ('Pass') or unacceptable ('Fail').
e) Each examiner is required to submit a written assessment of the student's written examination performance, to be submitted to the Chair of the examination committee prior to the examination.
f) The result of the Final Master's Examination shall be either 'Pass' or 'Fail'. To secure a 'Pass', the student must obtain a 'Pass' on both the written component and the oral component of the exam. In the event of a failure, the examining committee may recommend that the student be given an opportunity to take the failed component of the examination again between two and six months from the date of the first attempt. No more than two attempts will be permitted.

### Thesis Programs

The candidacy exam has a written component, the student's research proposal. This proposal must be submitted to all members of the candidacy examining committee at least two weeks before the examination. The candidacy oral can include questions on the research proposal.
Thesis oral examinations are open.

## 11. Research Proposal Requirements

The research proposal is to be submitted in accordance with Faculty of Graduate Studies requirements.

## 12. Special Registration Information

Incoming students meet with the Department of Philosophy Graduate Director to discuss their programs and to decide which courses to take.

## 13. Financial Assistance

Most thesis students admitted to the program receive some level of financial support from the Department. Suitably qualified Master's students may be given a guarantee of financial support from September of their first year to the end of April of their second year. All doctoral students receive a guarantee of financial support for the four years of their program.
For information on awards, see the Awards and Financial Assistance section of this Calendar.
Students applying for scholarships must submit their applications to the Department by 15 January.

## 14. Other Information

None

## 15. Faculty Members/Research Interests

The faculty's main interests and specialties can be found at: http://www.phil.ucalgary.ca/people/

### Graduate Courses

Details of the specific topics to be taught in all 600-level courses in Philosophy will be announced in the Department brochure and, when possible, in the Schedule of Classes.

Philosophy 601 H(3-0)
*Seminar in Selected Problems*
MAY BE REPEATED FOR CREDIT

Philosophy 609 H(3-0)
*Topics in the History of Philosophy*
MAY BE REPEATED FOR CREDIT

Philosophy 623 H(3-0)
(formerly Philosophy 621)
*Topics in Metaphysics*
MAY BE REPEATED FOR CREDIT

Philosophy 627 H(3-0)
*Topics in the Philosophy of Religion*
MAY BE REPEATED FOR CREDIT

Philosophy 649 H(3-0)
*Topics in Ethics*
MAY BE REPEATED FOR CREDIT

Philosophy 653 H(3-0)
*Topics in Social and Political Philosophy*
MAY BE REPEATED FOR CREDIT

Philosophy 661 H(3-0)
(formerly Philosophy 663)
*Topics in Epistemology*
MAY BE REPEATED FOR CREDIT

Philosophy 667 H(3-0)
*Topics in Philosophy of Science*
MAY BE REPEATED FOR CREDIT

Philosophy 671 H(3-0)
*Topics in Philosophical Logic and the Philosophy of Language*
MAY BE REPEATED FOR CREDIT

Philosophy 679 H(3-0)

*Topics in Logic*
MAY BE REPEATED FOR CREDIT

Philosophy 683 H(3-0)
(formerly Philosophy 681)

*Topics in the Philosophy of Mind*
MAY BE REPEATED FOR CREDIT

Philosophy 691 H(3-0)

*Topics in Philosophical Analysis*
MAY BE REPEATED FOR CREDIT

## PHYSICS AND ASTRONOMY PHAS

### Contact Info

Location: Science B, Room 605
Faculty number: (403) 220-3617
Fax: (403) 289-3331
E-mail address: gradinfo@phas.ucalgary.ca
Web page URL: http://www.phas.ucalgary.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), course-based and thesis-based

Areas of specialization: Astrophysics, Medical Physics, Physics, Radiation Oncology Physics, and Space Physics

Post PhD Diploma in Radiation Oncology Physics

### 2. Admission Requirements

In addition to Faculty of Graduate Studies and Faculty of Science requirements, the Department requires:

a) a University of Calgary Honours background in Physics, Engineering Physics, Astronomy/Astrophysics, or equivalent
b) for some applicants, a satisfactory score on the Advanced Physics Graduate Record Examination
c) Two Reference Letters

#### Master of Science

Applicants to the Master of Science program, whose background does not include the equivalent of an undergraduate honours degree in the proposed area of study, may require additional make-up courses. Such applicants should consult with the department regarding their admission status.

#### Doctor of Philosophy

For the Post-PhD Diploma program, applicants must possess a PhD from a CAMPEP accredited graduate program or equivalent and an appointment as an Associate Medical Physicist by the Alberta Cancer Board

### 3. Application Deadline

Deadlines for the submission of complete applications:

1 March for September admission
1 July for January admission

Late applications will be considered if any openings remain in the graduate program.

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

### 5. Program/Course Requirements

In addition to Faculty of Graduate Studies and Faculty of Science requirements, the Department requires:

That all students, with the exception of registrants in the Post-PhD Diploma program, register in the Graduate Seminar, Physics 691, during fall and winter sessions of the first two years in program.

#### Master of Science (thesis-based)

a) For students specializing in Astrophysics, Physics, or Space Physics, four half-course equivalents, including at least two of Physics 609, Physics 611, Physics 613, and Physics 615, plus two elective courses at the 500 or 600 level, as approved by the Graduate Chair
b) For students specializing in Medical Physics, five half-course equivalents, including Medical Physics 623, Medical Physics 625, at least two of Physics 609, Physics 611, Physics 613, and Physics 615, plus one elective courses at the 500 or 600 level, as approved by the Graduate Chair
c) For students specializing in Radiation Oncology Physics, eight half-course equivalents, including Medical Physics 623, Medical Physics 625, Medical Physics 633, Medical Physics 637, Medical Physics 639, Medical Physics 689.01, and two of Physics 609, Physics 611, Physics 613, and Physics 615

#### Master of Science (course-based)

This program may be taken part time or full-time.

a) That the student choose one of the three broad areas of specialization: astrophysics, physics, or space physics. Medical physics and Radiation Oncology Physics are not available as a course-based degree
b) Ten half-course equivalents, including Physics 603, Physics 605, Physics 609, Physics 611, Physics 613, Physics 615
c) Four half-course equivalents, depending upon the area of specialization:
   *Astrophysics* – Astrophysics 699 plus three half-course equivalents labelled ASPH (two of these may be at the 500-level). Physics 629 and Space Physics 679 may be taken instead of ASPH courses
   *Physics* – Physics 699 plus two half-course equivalents labelled ASPH, PHYS, or SPPH (these may be at the 500 level) plus one half-course equivalent labelled PHYS, at the 600-level or above
   *Space Physics* – Space Physics 699 plus three half-course equivalents labelled SPPH, at the 600-level or above. Physics 509 may replace a SPPH course
d) A comprehensive examination with a written and oral component

#### Doctor of Philosophy

a) A minimum of two half-course equivalents at the 600-level or higher for students who hold a Master's degree
b) A minimum of six half-course equivalents at the 600-level or higher for those entering the doctoral program without a Master's degree
c) For students specializing in Radiation Oncology Physics who do not hold an accredited M.Sc. degree in Radiation Oncology Physics, Medical Physics 623 , Medical Physics 625 , Medical Physics 633 , Medical Physics 637 , Medical Physics 639 , and Medical Physics 689.01 , and two courses from Physics 609 , Physics 611 , Physics 613 , or Physics 615

#### Post PhD Diploma

Eight half course equivalents including MDPH 711, 712, 721, 722, 731, 741 and two of HROD 793, HROD 741 or SGMA 797.01

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

Credit for a maximum of two half-course equivalents may be given for courses taken at the 500-level.

### 8. Time Limit

Expected completion time is two years for full-time students in a thesis Master's program, three years in a course-based program, four years in a doctoral program, and two years in the Post-PhD Diploma program. Maximum completion time is four years for a thesis Master's program, and six years for a course-based Master's or a doctoral program.

### 9. Supervisory Assignments

Newly admitted students will normally be supervised by the Graduate Director or an interim supervisor in their field of interest during the first year in program. During this time students will normally complete all of the course work and have an opportunity to become acquainted with the research of potential supervisors within the department. Students are responsible for securing a permanent supervisor from among the researchers in the department within the first four months in program. Registrants in the Post-PhD Diploma program are supervised by the Director of Medical Physics or designate, Tom Baker Cancer Centre.

The MSc program has a supervisory committee requirement which follows the same requirements and rules as the PhD.

### 10. Required Examinations

#### Master of Science (course-based)

Two weeks before the comprehensive oral examination, students must write a three-hour, closed-book comprehensive examination, prepared by the Departmental Graduate Affairs Committee in collaboration with the supervisor.

#### Doctor of Philosophy

Students are required to write a qualifying examination within their first year in program. This uniform examination, taken by all students, examines the student's background in undergraduate physics at the honours level. The examination will normally be conducted during May or June, and again in December. Students who fail the examination the first time will retake it during the next sitting of the examination. A second failure will result in the withdrawal of the student from the doctoral program.

Students are required to complete the oral candidacy exam. This exam may include questions on the written examination, general research knowledge and thesis proposal.

Final thesis defence is required. The oral thesis defence is open.

### 11. Research Proposal Requirements

Students entering a doctoral program with a completed Master's degree must submit a written thesis proposal within 24 months of initial registration. Students entering a doctoral program with a Bachelor's degree, or who have transferred into the doctoral program from a Master's program, must submit a written thesis proposal within 28 months.

## 12. Special Registration Information

Registration in the Post-PhD Diploma program is contingent upon employment by the Alberta Cancer Board as an Associate Medical Physicist.

## 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, please see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships must submit their applications to the Department by February 1. Registrants in the Post-PhD Diploma program must hold an Associate Medical Physicist position, which is a paid appointment

## 14. Other Information

See the Department website.

## 15. Faculty Members/Research Interests

The active research interests of the staff can be found at http://www.ucalgary.ca/phas/research/

Astronomy and Astrophysics:
http://courses.phas.ucalgary.ca/astro/

Environmental Physics:
http://courses.phas.ucalgary.ca/~annlisen/

Complexity Science:
http://www.ucalgary.ca/complexity/

General Relativity:
http://courses.phas.ucalgary.ca/astro/

Isotope Science:
http://www.ucalgary.ca/uofcisl/

Medical Physics:
http://www.cancerboard.ab.ca/tbccmedphys/
http://www.med.ucalgary.ca/mrcentre

Quantum Optics:
http://iqis.org/; and
http://qis.ucalgary.ca/QO/

Space and Plasma Physics:
http://www.phys.ucalgary.ca/

### Astrophysics (ASPH)

#### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are undergraduate courses.

**Astrophysics 503** H(3-0)

*The Interstellar Medium*
Multiwavelength observations of gas and dust in our Galaxy; distribution and physics of neutral atomic hydrogen and molecules; interstellar chemistry; physics of dust grains; HII regions; interstellar shocks; gas dynamics; star formation.
Prerequisite: Astrophysics 403.

**Astrophysics 507** H(1-6)

*Senior Astrophysics Laboratory*
Lectures and laboratory sessions in observational astronomy. Modern methods of observation, data reduction, and analysis. Observations will be carried out at the Rothney Astrophysical Observatory and/or the main campus.
Prerequisite: Astronomy 213 or Astrophysics 213.
Prerequisite or Corequisite: Any 400-level Astrophysics course.

**Astrophysics 509** H(3-0)

*High Energy Astrophysics and Cosmology*
Clusters of galaxies; microwave and X-ray background radiation; dark matter and dark energy; overview of cosmology; general relativistic considerations; large-scale structure and expansion of the universe; nucleosynthesis; gamma ray bursts and cosmic rays.
Prerequisite: Astrophysics 503.

#### Graduate Courses

**Astrophysics 607** H(3-3)

*Advanced Observational Astrophysics*
Principles and tools of modern ground-based and space astronomy emphasising ultraviolet, optical, infrared, and radio radiation. Data acquisition and reduction techniques for astrometry, photometry, spectroscopy, imaging, and interferometry. Use of astronomical data analysis software.

**Astrophysics 611** H(3-0)

*Radio Astronomy*
Wave propagation, antennas, interferometry, aperture synthesis, radio receivers, and spectrometers. Applications to continuum and line radiation in stars, interstellar medium and extragalactic objects.

**Astrophysics 621** H(3-0)

*High Energy Astrophysics*
Interaction of high energy particles with matter, propagation and origin of cosmic rays; structure of white dwarfs and neutron stars; the physics of jets and the accretion process onto compact objects; supernovae and supernova remnants; active galactic nuclei.

**Astrophysics 699** H(0-9)

*Projects in Astrophysics*
Each student will select a project in consultation with a staff member. The project may be experimental or theoretical in nature. A written report and an oral presentation are required.

### Medical Physics (MDPH)

#### Graduate Courses

**Medical Physics 623** H(3-0)

*Radiological Physics and Radiation Dosimetry*
Photon and electron interactions, charged particle and radiation equilibrium, cavity theory, absolute and relative dosimetry, calibration protocols.
Prerequisite: Consent of the Department.

**Medical Physics 625** H(3-0)

*Radiation Oncology Physics*
Clinical photon and electron beams, brachytherapy, treatment planning, radiation therapy devices, special techniques.
Prerequisites: Medical Physics 623 and consent of the Department.

**Medical Physics 633** H(1-3)

*Radiation Oncology Physics Laboratory*
Absorption dose determination, dose descriptors, photon beam modelling, quality control.
Prerequisites: Medical Physics 625 and consent of the Department.

**Medical Physics 637** H(3-0)

*Anatomy and Statistics for Medical Physicists*
Anatomy, physiology, probability, statistical inference, hypothesis testing, regression models, clinical trials, survival analysis.
Prerequisites: Medical Physics 623 and consent of the Department.

**Medical Physics 639** H(3-0)

*Radiobiology and Radiation Safety for Medical Physicists*
Cell kinetics, cell survival curves, radiation pathology, fractionation, radiation safety, shielding calculations.
Prerequisites: Medical Physics 625 and consent of the Department.

**Medical Physics 711** H(0-8)

*Clinical Competency 1*
This three credit hour course extends over the first year of the diploma program and consists of rotations through areas of clinical physics under the supervision of adjunct faculty. Objectives are set, in conjunction with the student, at the commencement of the three rotations comprising this course. Student performance is evaluated by the course mentors at the conclusion of each rotation and by a final oral examination.

**Medical Physics 712** H(0-8)

*Clinical Competency 2*
This three credit hour course extends over the second year of the diploma program and consists of rotations through more complex areas of clinical physics under the supervision of adjunct faculty. Objectives are set, in conjunction with the student, at the commencement of the three rotations comprising this course. Student performance is evaluated by the course mentors at the conclusion of each rotation and by a final oral examination.
Prerequisite: Medical Physics 711.

**Medical Physics 721** H(0-8)

*Clinical Projects 1*
Two to three clinical projects are completed during this three credit hour course extending over the first year of the program. Projects have clearly defined objectives established by mutual agreement between the student and project supervisor. The project culminates in a written report. Student performance is evaluated against the objectives established at the commencement of the project.

**Medical Physics 722** H(0-8)

*Clinical Projects 2*
Two to three clinical projects are completed during this three credit hour course extending over the second year of the program. Projects have clearly defined objectives established by mutual agreement between the student and project supervisor. The project culminates in a written report. Student performance is evaluated against the objectives established at the commencement of the project.
Prerequisite: Medical Physics 721.

Medical Physics 731 H(2T-0)

*Radiation Oncology Physics Tutorials*
This three credit hour course requires the student to prepare written answers to 120 pre-set questions published by the Canadian College of Physicists in Medicine as part of the certification process in Radiation Oncology Physics. The course is conducted in a tutorial setting and the students are evaluated on the basis of their answers to a subset of the questions.

Medical Physics 741 H(0-4)

*Treatment Planning*
This three credit hour course has three components and will be spread over the two years of the program to ensure that the student's increasing knowledge can be consolidated into a thorough understanding of radiation oncology physics. The first component is the observation of simulation and localization under the supervision of a radiation oncologist. The second component is an in-depth study of the physics behind the treatment planning of the main tumour sites. This component utilizes a web based tool and is led by adjunct faculty. The final component involves following ten patients through the entire radiation therapy process from immobilization through localization, treatment planning, treatment delivery to verification. The students' progress will be evaluated throughout the course with regular feedback to the student.

## Physics (PHYS)

### Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are undergraduate courses.

Physics 501 H(3-0)

*Special Relativity*
Lorentz transformations in classical mechanics; relativistic kinematics; spacetime diagrams; relativistic energy and momentum conservation; Geometrical interpretation; applications of relativistic kinematics; four-vector formalism and tensors; applications, primarily to relativistic electrodynamics.
Prerequisites: Physics 325, 457; Mathematics 353 or Applied Mathematics 309.

Physics 507 H(3-0)

*Solid State Physics*
Crystal structure. Classification of solids and their bonding. Fermi surface. Elastic, electric and magnetic properties of solids.
Prerequisites: Physics 443 or Chemistry 373; Physics 449, 455.

Physics 509 H(3-0)

*Plasma Physics*
Occurrence of plasmas in nature, single particle motion, plasmas as fluids, waves in plasmas, diffusion, resistivity, equilibrium and stability, kinetic theory of plasmas, non-linear effects.
Prerequisites: Physics 343 or 433; 455.

Physics 521 H(3-0)

*Nonlinear Dynamics*
Topics: Introduction to nonlinear dynamical systems: Phase space representation, nonlinear oscillators, bifurcations, normal forms, pattern formation, amplitude equations, deterministic chaos, attractors, fractals, synchronization
Prerequisites: Applied Mathematics 433; Physics 381; and Physics 449; or consent of the Department

Physics 533 H(3-0)

*Advanced Mathematical Methods of Physics*
Hilbert space. Complete orthonormal sets of functions. Sturm-Liouville theory. Green functions. Integral equations.
Prerequisites: Physics 443 or Chemistry 373; Physics 455.

Physics 543 H(3-0)

*Quantum Mechanics II*
Theory of angular momentum and applications, perturbation theory and applications. Identical particles. Introduction to relativistic wave equations.
Prerequisite: Physics 443 or Chemistry 373.

Physics 561 H(2-1)

*Stable and Radioactive Isotope Studies, Fundamentals*
A multidisciplinary course. Topics include nucleosynthesis, radioactive decay, isotope exchange phenomena, kinetic isotope effects, tracer techniques, molecular spectra and instrumentation.
Prerequisite: Consent of the Department.

Physics 571 H(3-0)

*Laser Physics*
Theoretical aspects of lasing and lasers. Principles of operation of solid-state, liquid, and gas lasers. Applications of laser systems to research, medical, and industrial projects.
Prerequisites: Physics 443, 455.
Note: Physics 449 is suggested but not required.

Physics 573 H(3-0)

*Atmospheric and Environmental Physics*
Quasi-static uniform atmosphere. Atmospheric optics. Scattering in the atmosphere. Atmospheric visibility and aerosols. Cloud physics. Atmospheric electricity. Radiative transfer. Atmospheric circulation. Hydrological cycling. Stable isotopic techniques. Pollutants. Energy transfer. Turbulence. Sky shortwave and visible radiation distribution. Near infrared sky radiation, cloud detection and estimation.
Prerequisite: One of Physics 347 or 447 or 449 or Chemistry 371 or consent of the Department.
Note: Credit for both Physics 573 and Applied Physics 573 will not be allowed.

Physics 575 H(3-3)

*Optics*
Geometrical Optics: lenses, mirrors, and other basic optical components. Matrix Methods. Physical Optics: Interference, Diffraction, and Polarization. Fourier Optics. Modern Optics: Lasers and Fibre Optics.
Prerequisites: Physics 325, 457, Applied Mathematics433.
Note: Credit will not be allowed for both Physics 575 and 471.

Physics 581 H(3-3)

*Computational Physics III*
Solution of problems associated with the analysis of physical systems, using digital computers, high level programming languages, and mathematical computation systems (e.g., Maple, Macsyma).
Prerequisites: Physics 443 or Chemistry 373, Physics 455 and 499 or 381.
Note: A knowledge of a high level programming language (C, C++, Fortran or Pascal) is highly recommended.

Physics 597 H(1-6)

*Senior Physics Laboratory*
Selected advanced experiments. Where possible, students may choose those experiments most suited to their interests. Development of technical and computer-based skills, technical writing and presentation skills.
Prerequisite: Physics 497 or Physics 325, 355, and 407.

Physics 598 F(0-6)

*Research in Physics*
Research project in Physics.
Prerequisites: Physics 443, 449, 455 and consent of the Department.

Physics 599 H(0-9)

*Independent Study*
Each student will be assigned a project in consultation with a tutor. A written report and oral presentation are required.
Prerequisite: Consent of the Department.
Note: This course may be repeated once for credit.

### Graduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

Physics 603 H(3-0)

*Experimental Methods of Physics*
Instrumentation for physical experiments. General philosophy of experimentation; signal processes; signal processing methods; instrument design and control; data acquisition and storage; specific detection methods.

Physics 605 H(3-0)

*Advanced Data Analysis*
Methods of extraction of significant information from experimental data degraded by noise. Parametric and non-parametric statistical methods; curve fitting; spectral analysis; filtering, sampling, convolution and deconvolution techniques.

Physics 609 H(3-0)

*Advanced Classical Mechanics*
Variational principles, Lagrange's equations, Noether's theorem. Hamilton's equations and canonical transformations. Hamilton-Jacobi theory, action-angle variables. Perturbation theory.
Note: It is expected that a student's background will include Physics 343 or equivalent.

Physics 611 H(3-0)

*Statistical Physics*
Classical and quantum ensemble theory applied to interacting systems: real gases, spin lattices, phase transitions. Kinetic theory: Boltzmann equation, transport processes, irreversible processes and fluctuations.
Note: It is expected that a student's background will include Physics 449 or equivalent.

Physics 613 H(3-0)

*Electrodynamics*
Interaction between charged particles and the electromagnetic field in relativistic formulation. Scattering and energy losses of charged particles. Radiation by charged particles.
Note: It is expected that a student's background will include Physics 457 and 501 or equivalents.

Physics 615 H(3-0)

*Advanced Quantum Mechanics I*
Basic formalism of the theory and its interpretation, symmetry generators. Scattering theory. Bound states. Charged particles in electric and magnetic fields. Approximation methods.
Note: It is expected that a student's background will include Physics 543 or equivalent.

Physics 617 H(3-0)

*Advanced Quantum Mechanics II*
Second quantized description of N-particle systems. Quantum theory of the electromagnetic field, coherent states. Relativistic quantum mechanics.
Note: It is expected that a student's background will include Physics 543 or equivalent.

Physics 619 H(3-0)

*Statistical Physics II*
Topics Theories of equilibrium and nonequilibrium critical phenomena and methods to study fluctuating systems selected from the following list of topics: Percolation, scaling theory, phase transitions, Landau-Ginzburg theory, lattice models, Monte Carlo methods, renormalization group, self-organized criticality, theory of random graphs; Brownian motion, random walks and diffusion, Fokker-Planck-Equation, Markov processes, stochastic differential equations, first passage times.
Prerequisite: Physics 611.
Note: It is expected that a student's background will include Physics 481 or its equivalent.

Physics 621 H(3-0)

*Nonlinear Dynamics and Pattern Formation*
Topics: Introduction to pattern formation and self-organization in nature: Reaction-diffusion systems, hydrodynamical systems, bistable media, excitable and oscillatory media, stability analysis, bifurcations, pattern selection, amplitude equations and normal forms, fronts, traveling waves, topological defects, spiral waves, spatiotemporal chaos, defect-mediated turbulence, spatiotemporal point processes
Note: It is expected that a student's background will include Physics 521, Physics 451 and Physics 481 or equivalents.

Physics 629 H(3-0)

*Gravitation*
An introduction to Einstein's theory of gravitation. Applications to the solar system, black holes, and cosmology.
Note: It is expected that a student's background will include Physics 501 or equivalent.

Physics 663 H(2-1)
(Geology 663)

*Applications of Stable Isotopes*
Applications in archaeology, biology, chemistry, engineering, geography, geology, medicine, meteorology, paleontology, physics and space sciences. Topics include hydrology, paleoclimates, ore deposits, geothermometry, fossil fuels exploration and recovery, pollutant tracing, food webs and forensic investigations.
Prerequisite: Consent of the Department.

Physics 671 H(3-0)

*Atomic and Molecular Spectroscopy*
Atomic structure and spectra. Rotational, vibrational and electronic spectra of diatomic molecules, including microwave, infrared, Raman and visible/ultraviolet spectroscopic techniques. Hund's coupling cases. Polyatomic molecular spectroscopy. Examples from astronomy and upper atmosphere/space physics.

Physics 673 H(3-0)

*Quantum and Nonlinear Optics*
Fundamentals of quantum and nonlinear optics including atom-photon interactions, coherence, electromagnetically induced transparency, open systems and decoherence, and applications to quantum information technology.

Physics 675 H(3-0)

*Special Topics in Laser and Optical Sciences*
Lectures by Physics and Astronomy, Chemistry, Engineering, and/or Medicine staff on current research topics in laser science and modern optical techniques.
MAY BE REPEATED FOR CREDIT

Physics 677 H(3-0)

*Implementations of Quantum Information*
Proposals and realizations of quantum information tasks including quantum computation, quantum communication, and quantum cryptography in optical, atomic, molecular, and solid state systems.
Prerequisite: Consent of the Department.

Physics 691 Q(2S-0)

*Scientific Communication Skills (formerly Graduate Seminar)*
Required, multi-component, program of courses for all graduate students in the Department of Physics and Astronomy designed to assist students in improving their scientific oral and written communication skills. Each student must complete a minimum of 3 terms of Physics 691 during each graduate course, although the normal load is 4 terms, and additional terms may be required of students on an as need basis. The components of Physics 691 are:
691.11 Effective Scientific Speaking for MSc Students Physics
691.12 Graduate Seminar for MSc Students I Physics
691.13 Effective Scientific Writing for MSc Students Physics
691.14 Graduate Seminar for MSc Students II Physics
691.16 Graduate Seminar for MSc Students III Physics
691.18 Graduate Seminar for MSc Students IV Physics
691.21 Effective Scientific Speaking for PhD Students Physics
691.22 Graduate Seminar for PhD Students I Physics
691.23 Effective Scientific Writing for PhD Students Physics
691.24 Graduate Seminar for PhD Students II Physics
691.26 Graduate Seminar for PhD Students III Physics
691.28 Graduate Seminar for PhD Students IV
Effective Scientific Speaking courses provide instruction on preparing and presenting quality scientific oral presentations, including discussions of the aspects of quality presentations and exercises aimed at improving student speaking skills, and will be taken by graduate students in their first fall terms in program. Effective Scientific Writing courses provide students with instruction on preparing quality scientific papers, as well as exercises aimed at improving students' writing skills, and will be taken during students' send fall term in program. The Graduate Seminar courses will be run each winter, and provide all students enrolled in each course the opportunity to present one or two scientific talks, as well as to provide peer feedback to other students in the course. At the end of each Graduate Seminar term, the course instructor(s) will identify those students who have reached an acceptable level of scientific speaking competency and exempt these students from any further Physics 691 Graduate Seminar courses for their current degrees.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

Physics 697 H(3-0)

*Topics in Contemporary Physics*
Topics will be from the research areas of staff members.
MAY BE REPEATED FOR CREDIT

Physics 699 H(0-9)

*Project in Physics*
Each student will select a project in consultation with a staff member. The project may be experimental or theoretical in nature. A written report and an oral presentation are required.

Physics 701 H(0-9)

*Independent Study*
Each student will select a topic of study in consultation with a staff member. The topic will be in the research area of the staff member. This course may not be used to meet the regular course requirements in the MSc and PhD programs.
MAY BE REPEATED FOR CREDIT

## Space Physics (SPPH)

### Graduate Courses

**Space Physics 671** H(3-0)

*Physics of the Magnetosphere*
Physics of the interaction between the earth's magnetic field and the fields and plasmas of the surrounding interplanetary environment. Topics include magnetic field models and coordinate systems, reconnection, current flow in the magnetosphere, substorms, and particle acceleration. Note: It is expected that a student's background will include Physics 509 and 555 or equivalent.

# POLITICAL SCIENCE POLI

### Contact Info

Location: Social Sciences Building, Room 756
Faculty number: (403) 220-5921
Fax: (403) 282-4773
E-mail address: poligrad@ucalgary.ca
Web page URL: http://poli.ucalgary.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), thesis-based

Students in the Department of Political Science may choose an interdisciplinary specialization in Israel Studies. For further information on the Israel Studies (Interdisciplinary) specialization, see the separate listing in this Calendar.

The MA and PhD programs in Political Science are offered as full-time programs only.

### 2. Admission Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the Department requires:

#### Master of Arts

a) A minimum grade point average of 3.4 on a four-point scale over the last ten full-course equivalents taken in the applicant's undergraduate program.
b) Normally a BA in Political Science or a strong background in Political Science of at least 5 full-course equivalents in Political Science. Special consideration may be given to those who have not achieved this background.
c) All students whose native language is other than English are required to pass the TOEFL with a minimum score of 620 (paper-based), or 105 (internet-based), or 7+ on the IELTS, or 87 on the MELAB, or 75 on the PTE.
d) Two Reference Letters.
e) One page research proposal with one page bibliography showing area of research including rationale, objectives and methodology.
f) Sample of written work, preferably a paper submitted for a Political Science course.
g) Email confirmation from a potential supervisor who is interested in supervising your work.

#### Doctor of Philosophy

a) A minimum grade point average of 3.7 on a four-point scale over completed graduate courses.
b) Normally a Master of Arts in Political Science or a strong background in Political Science. Special consideration may be given to those who have not achieved this background.
c) All students whose native language is other than English are required to pass the TOEFL with a minimum score of 620 (paper-based), or 105 (internet-based), or 7+ on the IELTS, or 87 on the MELAB, or 75 on the PTE.
d) Two Reference Letters.
e) One page research proposal with one page bibliography showing area of research including rationale, objectives and methodology.
f) Sample of written work, preferably a paper submitted for a Political Science course.
g) Email confirmation from a potential supervisor who is interested in supervising your work.

### 3. Application Deadline

Deadline for the submission of completed applications is 15 January.

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not normally be given for course work taken as part of another completed degree/diploma. If graduate-level courses are taken as post-BA courses, the Department will allow the student to claim up to two half-courses at our graduate level towards the MA requirements should the student be admitted into our MA program.

### 5. Program/Course Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the Department normally requires that all students complete POLI 691. In addition:

#### Master of Arts

a) Master of Arts students must complete a minimum of five half-courses:
   - At least two half-courses must be taken in the Political Science Department at the University of Calgary
   - A maximum of one half-course can be a reading course
b) Master of Arts students must demonstrate a basic knowledge of research methods equivalent to POLI 691. If students are required to take POLI 691, it will be included in these five half-courses. Students who have an equivalent of POLI 691 will still be required to take five half-courses.

#### Doctor of Philosophy

a) Doctoral students must complete a minimum of six half-courses:
   - At least four half-courses must be taken in the Political Science Department at the University of Calgary
   - A maximum of two half-courses may be reading courses
b) Language courses will not be considered part of the six half course requirement.
c) PhD Students must demonstrate a basic knowledge of research methods equivalent to POLI 691. If students are required to take POLI 691 it will not be considered part of the six half-course equivalent.
d) A candidacy examination with a written and oral component, normally completed within sixteen months of first registration.
e) A thesis proposal, normally defended within four months of the oral candidacy exam.
f) A demonstration of reading proficiency in a language other than English, as determined by the supervisory committee. Normally students without prior reading proficiency will be required to achieve a grade of at least B in one full-course equivalent in a second language.

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

The department does not give graduate credit for courses taken below the 600-level, except in special cases.

### 8. Time Limit

Maximum completion time is four years for a Master's program and six years for a doctoral program.

### 9. Supervisory Assignments

#### Master of Arts

Wherever possible, an incoming student should have a specific supervisor in mind when applying for the program and should initiate supervisory arrangements with this faculty member. A supervisor is determined as a result of consultations involving the student and the Graduate Director (and/or Department Head), normally within the first term of the student's program, but the supervisor must be appointed within 12 months of initial registration

#### Doctor of Philosophy

Wherever possible, an incoming student should have a specific supervisor in mind when applying for the program and should initiate supervisory arrangements with this faculty member. Supervisory arrangements are normally completed within the first six months of the doctoral program, but the supervisor must be appointed within 12 months of initial registration. Where the matter of supervision is still under consideration, the Graduate Director usually serves as interim supervisor until a final decision is made.

Supervisory committees for doctoral students are struck as the result of consultations amongst the student, supervisor, and Graduate Director (and/or Head) and must be established as soon as possible and no later than three months after the supervisor's appointment.

### 10. Required Examinations

The doctoral candidacy examination has a written and an oral component. The Department requires two written candidacy examinations, one in the student's field of thesis research and the other in the student's second chosen field of study. The examinations test the student's general knowledge of the fields as well as specific topics within these fields. Examinations are usually three hours long and are scheduled in each of the fall and winter terms at suitably arranged times.

### 11. Research Proposal Requirements

Doctoral students must submit a written thesis proposal (no more than 20 pages in length) for approval by the supervisory committee.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Doctoral students applying for scholarships must submit their applications to the Department by 15 January.

### 14. Other Information

None.

## 15. Faculty Members/Research Interests

Current departmental research interests can be found at: http://poli.ucalgary.ca/graduate.
Individual faculty members' areas of research can be found at: http://poli.ucalgary.ca/research

### Graduate Courses

Courses numbered 600-799 are offered either as special reading courses or as seminars, as required. Students should consult the Department regarding enrollment in these courses.

Political Science 615 H(3S-0)

*Advanced History of Political Thought*
An intensive study of selected major political thinkers within the history of political thought.

Political Science 617 H(3-0)

*Advanced Political Theory*
Discussion of contemporary topics in political thought. Emphasis on analysis of problems rather than history of ideas.

Political Science 619 H(3-0)

*War and Interpretation*
An examination of the philosophical justifications offered to defend the use of military force, based particularly on the analysis of texts in the history of Western political philosophy.

Political Science 621 H(3-0)

*Canadian Political Institutions*
Examination of the structure and operation of the central institutions of the Canadian state, including the constitution, federalism, parliamentary government, and political parties.

Political Science 623 H(3-0)

*Canadian Political Process*
Examination of Canadian political behaviour within its institutional context, including political parties, interest groups, voting and socialization. Computer use is optional.

Political Science 631 H(3-0)

*Parties, Elections and Representation*
An examination of political parties and elections in both established and emerging democracies as a means of understanding the nature of political representation in modern representative democracies.

Political Science 633 H(3S-0)

*US Security Policy*
An examination of US security policy, with an emphasis both on how US security policy is made and on the main contemporary security issues the US faces today.

Political Science 641 H(3-0)

*Selected Topics in Public Law*
Examination of the political, philosophical, and institutional dimensions of selected public law issues, with particular reference to judicial and quasi-judicial tribunals as policy-making institutions. Consult the Department for information on choice of topics.

Political Science 651 H(3-0)

*Policy Studies*
Critical review of major themes, issues, and approaches in the study and evaluation of public policy.

Political Science 653 H(3-0)

*Gender and Public Policy*
Explores the gendered impact of a range of public policies and also explores the influence of gender norms and ideas on the formulation of public policy. Topics covered include gender-based policy analysis, gender and the welfare state, family and child-care policies, policies to address gender inequalities in the labour market and workplace, and reproductive rights policies.

Political Science 671 H(3-0)

*Advanced Comparative Politics: Political Development*
Analysis of comparative methods and paradigms of political development.

Political Science 673 H(3-0)

*Advanced Comparative Politics: Institutions and Systems*
Comparative analysis of political institutions and systems.

Political Science 675 H(3-0)

*Selected Topics in Advanced Comparative Politics*
Selected regions and topics in Comparative Politics.
MAY BE REPEATED FOR CREDIT

Political Science 681 H(3-0)

*Advanced Analysis of International Relations*
Selected issues and approaches in the analysis of world politics.

Political Science 683 H(3-0)

*Advanced Studies in Foreign Policy*
Selected themes in the formation and implementation of foreign policies.

Political Science 685 H(3-0)

*Strategic Studies*
Advanced seminar in major topics in strategic studies, such as arms control, deterrence, and other military doctrines.

Political Science 689 H(3-0)

*Unconventional Warfare*
Analysis of warfare conducted by, or against, sub-state groups. This may include in-depth studies of guerrilla warfare, asymmetric conflict, or terrorism.

Political Science 691 H(3-0)

*Quantitative Analysis in Political Science*
Examination of empirical research methods and techniques of quantitative analysis in the study of political phenomena. Computer use is required.

Political Science 693 H(3-0)

*Advanced Quantitative Analysis in Political Science*
Examination of empirical research methods and techniques of multivariate quantitative analysis in the study of political phenomena.
Prerequisite: Political Science 691 or consent of the Department.

Political Science 699 H(3-0)

*Qualitative Analysis in Political Science*
An introduction to qualitative research methods in Political Science. Topics may include qualitative methodology, elite interviewing, focus groups, content analysis, case studies and qualitative data analysis.
Prerequisite: Political Science 691 or consent of the Department.

Political Science 715 H(3-0)

*Special Topics in Political Theory*
MAY BE REPEATED FOR CREDIT

Political Science 721 H(3-0)

*Special Topics in Canadian Politics*
MAY BE REPEATED FOR CREDIT

Political Science 723 H(3-0)

*Special Topics in Political Science*
MAY BE REPEATED FOR CREDIT

Political Science 725 H(3-0)

*Special Topics in Public Administration*
MAY BE REPEATED FOR CREDIT

Political Science 741 H(3-0)

*Special Topics in Public Law*
MAY BE REPEATED FOR CREDIT

Political Science 755 H(3-0)

*Special Topics in Public Policy*
MAY BE REPEATED FOR CREDIT

Political Science 781 H(3-0)

*Special Topics in International Relations*
MAY BE REPEATED FOR CREDIT

Political Science 791 H(3-0)

*Scope and Methods in Political Science*
Advanced seminar covering various approaches, topics, methods and theories employed in the discipline of political science.

# PUBLIC POLICY PPOL

### Contact Info

Location: School of Public Policy
Room 926, Earth Sciences Bldg
Faculty number: (403) 210-6112
Fax: (403) 210-6939
E-mail address: mpp@ucalgary.ca
Web page URL: www.policyschool.ca

## 1. Degrees and Specializations Offered

Master of Public Policy (MPP), course-based
The MPP is a 12-month program offered for full-time study.

## 2. Admission Requirements

### Master of Public Policy

In addition to the Faculty of Graduate Studies requirements, the School requires:
a) A minimum 3.3 grade point average (on the four point scale) in the last two years of program or over the last ten full course equivalents
b) A current resume
c) A personal statement outlining the applicant's career goals and how the applied-for program would help achieve those goals

d) For students required to prove proficiency in English, a minimum TOEFL score of 600 (written test), 250 (computer-based test) or 100 (internet-based test) or a score of 7.0 on the IELTS

Doctor of Philosophy (PhD)

Applicants wishing to undertake a doctoral program on a special case basis should contact the School of Public Policy.

## 3. Application Deadline

Deadline for the submission of completed applications is 15 April for Canadians and Permanent Residents of Canada and 1 March for International Students. .

## 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not normally be given for course work taken as part of another completed degree/diploma. If graduate-level courses are taken as post-BA courses and not used as credit towards another degree, the School may allow the student to claim up to two half-courses at our graduate level towards the MPP requirements should the student be admitted into the MPP program.

## 5. Program/Course Requirements

In addition to the Faculty requirements, the School requires that all students complete the following:

Master of Public Policy

c) Two preparatory/foundation courses (Public Policy 601 and 603) during the last two weeks of August and during Fall Block Week prior to the start of the Fall term. Satisfactory performance in these courses is required for continuation in the MPP program. Exemptions will normally be given for these two preparatory/foundation courses to those who have completed courses with a grade of B or better in economics, mathematics, and statistics offered by a recognized undergraduate program within the past 5 years.
d) An effective writing and research course (Public Policy 613) during the January Block Week.
e) The following eight core courses::
   - Public Policy 605: Markets and Public Policy
   - Public Policy 607: Politics and Collective Choice
   - Public Policy 609: Decision Analysis
   - Public Policy 615: Public Finances
   - Public Policy 617: Regulation and the Law
   - Public Policy 619: Governance, Institutions and Public Policy
   - Public Policy 621: Communicating Policy
   - Public Policy 623: Capstone Project

f) Two elective courses:
The elective courses must be selected from graduate-level courses offered at the University of Calgary. In selecting electives students need to be aware that they must satisfy the prerequisites for those courses. The two elective courses should be related in such a way that they form a concentration in an area of public policy. See "Approved Graduate Elective Courses" below for suggested electives. The choice of elective courses must in all cases be approved by the Academic Director.

## 6. Additional Requirements

None.

## 7. Credit for Undergraduate Courses

The School does not give graduate credit for courses taken below the 600-level, except in special cases.

## 8. Time Limit

Maximum completion time for the MPP is four years.

## 9. Supervisory Assignments

Master of Public Policy

All students in the program will be guided by faculty holding appointments to the School.

## 10. Required Examinations

No additional examinations outside of the courses are required.

## 11. Research Proposal Requirements

No additional research requirements outside of the courses are required.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Students admitted to the program will automatically be considered for financial awards from the School of up to $10,000 per student. Other financial assistance may be available to qualified students. For information on awards, see the website for the School and the Awards and Financial Assistance section of this Calendar.

## 14. Other Information

None.

## 15. Faculty Members/Research Interests

Current research interests in the School can be found at: http://www.policyschool.ca

Graduate Courses

Public Policy 601 H(3-0)

*Foundations I*
This preparatory course covers the foundations necessary to understand and apply economic analysis and it covers selected topics relevant to the core courses listed above.
Not included in GPA

Public Policy 603 H(3-0)

*Foundations II*

This preparatory course covers the foundations of basic empirical analysis, including quantitative and qualitative research methods.
Not included in GPA

Public Policy 605 H(3-0)

*Markets and Public Policy*
The role of markets in the allocation of resources and the determination of income. Sources of market failure, and the appropriate public policy response to those failures, are examined. Students learn how private firms make decisions, and how they respond to policy initiatives.

Public Policy 607 H(3-0)

*Politics and Collective Choice*
How public policy issues emerge and how they are developed, refined, and influenced by the political process. The roles and influences of NGOs, interest groups, the media, political parties, and social protest on the development of new public policies are examined from the perspective of several disciplines. The importance of agenda setting, management and planning, policy reform and the organizational resistance to change is examined. Models of rational actors and bureaucratic behaviour are explored.

Public Policy 609 H(3-0)

*Decision Analysis*
Students learn to apply quantitative methods including cost-benefit analysis, statistical and econometric analysis of policy-relevant data, survey design and interpretation, and formal policy models based on decision theory.

Public Policy 611 H(3-0)

*Independent Study*
*Supervised individual study in a selected public policy area.*
MAY BE REPEATED FOR CREDIT

Public Policy 613 H(3-0)

*Effective Writing and Research Skills*
Development of skills for writing high quality documents in a professional setting. Defining, designing and executing applied, policy-oriented research.

Public Policy 615 H(3-0)

*Public Finances*
An overview of government finances and the restrictions on policy choices resulting from the need for governments to satisfy a budget constraint. Tax policy, the appropriate design of expenditure policies, policies with respect to deficits and debt, and issues of intergovernmental relations will be examined.

Public Policy 617 H(3-0)

*Regulation and the Law*
The role of international and national legal institutions in determining public policy choices. Legal research and interpretation skills are developed through specific public policy issues such as the design of market regulation in telecommunications, energy and various utility markets.

Public Policy 619 H(3-0)

*Governance, Institutions and Public Policy*
An examination of the rules and informal relationships among those determining public policy outcomes. Alternative institutional relationships and the evolution of those relationships are studied. The ever-changing dynamic of multi-level governance and court versus legislative public policy making are explored.

Public Policy 621 H(3-0)

*Communicating Policy*
Examines all aspects of communication in the context of policy, including the impact of new modes of communication on the development and dissemination of public policy. The new role of blogs, on-line communities, and web-based media at marshalling and influencing public opinion and the changing role of print media are discussed and evaluated. Implications for copyright policies, media concentration, privacy, and advertising are among the issues examined.

Public Policy 623 H(9-0)

*Capstone Project.*

Students learn methods by which research contributes to the design and development of policy outcomes. Students are required to apply the skills they have learned to the completion of a capstone project which investigates a well-defined issue of public policy. The final product of the capstone project is expected to be a substantive, well-researched, focused and highly professional document. Work on the capstone project will be guided by a School of Public Policy faculty member with input provided by an expert from the private sector or public sector.

### Samples of Graduate Elective Courses for the MPP

Note: not all elective courses may be available in all years and availability may depend on student's undergraduate program. Other elective courses not listed here may be considered. In all cases the choice of elective courses must be approved by the Academic Director.

Courses offered by the Department of Communication & Culture
- COMS 605: Organizational Communication
- COMS 619: Communication Policy and Regulation
- COMS: 623: Social and Economic Impacts of Communication and Information Technology
- COMS 627: Mass Media and Democracy
- COMS 641: International and Intercultural Communication

Courses offered by the Department of Economics
- Economics 619, Economics of International Commercial Policy
- Economics 621, International Trade
- Economics 625, The Economics of the Petroleum Industry
- Economics 627, Energy in the Production Sector of the Economy
- Economics 635, Regulatory Economics
- Economics 653, Public Revenue Analysis
- Economics 655, Cost/Benefit Analysis
- Economics 667, Seminar in Industrial Organization
- Economics 675, Advanced Topics in Natural Resource Economics
- Economics 677, Seminar in Economics of the Environment
- Economics 679, Health Economics I (this course is cross-listed as MDSC 679)
- Economics 681, Health Economics II

Courses offered by the Department of Political Science
- Political Science 617: Advanced Political Theory
- Political Science 619: War and Interpretation
- Political Science 631: Parties Elections and Representation
- Political Science 641: Selected Topics in Public Law
- Political Science 651: Policy Studies
- Political Science 653: Gender and Public Policy
- Political Science 683: Advanced Studies in Foreign Policy
- Political Science 685: Strategic Studies
- Political Science 689: Unconventional Warfare

Courses offered by the Department of Sociology
- Sociology 603, Seminar in Sociology of Health and Illness
- Sociology 653, Seminar on Urban Sociology
- Sociology 665, Seminar on Social Stratification and Inequality
- Sociology 667, Seminar on Ethnic Relations
- Sociology 671, Seminar on the Sociology of Families
- Sociology 677, Seminar in Sociology of Gender Relations

Courses offered by the Faculty of Social Work
- SOWK 632, Social Policy and Social Justice
- SOWK 665, Policy
- SOWK 679, Special Topics Seminar I (Interested students should contact the Faculty of Social Work for a list of topics to be examined)

Courses offered by the Faculty of Law
- Securities Law
- Tax Policy
- International Petroleum Transactions
- Environmental Law and Ethics

Courses offered by Haskayne School of BusinessHROD 601, Managing Human Resources
- HROD 691, Project Team Building and Interpersonal Skills
- HROD 721, Advanced Leadership and Technical Skills
- HROD 745, Cross Cultural Leadership and Human Resources Management
- SGMA 701, Strategic Management

Courses offered by Faculty of Medicine: Department of Community Health Sciences
- MDSC 679, Health Economics (cross-listed as Economics 679)
- MDSC 659.06, Decision Analysis in Health Care Economics

## PSYCHOLOGY PSYC

#### Contact Info

Location: Administration Building, Room 274
Faculty number: (403) 220-5659
Fax: (403) 282-8249
E-mail address: psycgrad@ucalgary.ca
Web page URL: http://psychology.ucalgary.ca/

The Department of Psychology offers graduate work leading to the Master of Science and Doctor of Philosophy degrees in psychology and in clinical psychology. These degree programs are described separately below.

### Psychology (PSYC)

#### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based

#### 2. Admission Requirements

The Department accepts applicants who plan to remain full-time to the completion of their degree. The program does not offer a part-time option.

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

a) A four-year undergraduate degree in Psychology or related discipline.
b) A minimum admission grade point average of 3.40 on a four-point scale over the last 20 half-courses
c) An undergraduate course in statistics/experimental design.
d) An acceptable score on the Graduate Record Examination (Verbal, Quantitative, and Analytical) for students with an undergraduate degree in Psychology. Students not having an undergraduate degree in Psychology must also write the Advanced Subtest.
e) For applicants required to provide proof of proficiency in English, a TOEFL score of 600 (written test), or 100 (internet-based test), an IELTS score of 7.5, a MELAB score of 84, or a PTE score of 70.
f) Two Reference Letters.

#### 3. Application Deadline

Deadlines for the submission of completed applications:
15 January for May or September admission
1 October for January admission

#### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

#### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

##### Master of Science

Master's students must take no fewer than six half-courses, two of which must come from Psychology 607, Psychology 611, Psychology 613, Psychology 615, Psychology 617, or Psychology 619; and two of which must come from Psychology 620, Psychology 630, Psychology 700, Psychology 710, Psychology 720, Psychology 730, or Psychology 739 (these courses may be repeated for credit), over their 24-month program.

##### Doctor of Philosophy

Doctoral students shall take no fewer than six half-courses while in the program. The Supervisor and the Director of Graduate Studies, Department of Psychology, must approve all courses. Incoming doctoral students must demonstrate that they have an adequate background in statistics and methodology (including computer applications). Those needing remedial work may be required by the Department of Psychology to take particular courses.

#### 6. Additional Requirements

None.

#### 7. Credit for Undergraduate Courses

Credit may be given for 500-level undergraduate courses.

#### 8. Time Limit

Expected completion time is two years for the Master of Science program and three years for the doctoral program. (Particular circumstances can be taken in to account.)

#### 9. Supervisory Assignments

An interim supervisor is assigned to each student at the time of admission. In no case will a student be admitted if an appropriate supervisor is not expected to be available. The shift from interim to permanent supervisor formally takes place at the end of the first year. The Director of Graduate Studies, Department of Psychology, must approve the permanent supervisor.

#### 10. Required Examinations

A doctoral student will normally be required to take the candidacy examination within the first 17 - 20 months of the program. The candidacy examination has both written and an oral components. The written

component consists of 1-3 questions assigned by the examination committee. The combined length of all the written answers can be no longer than 30 double-spaced, typewritten pages (12 pt font, reference list extra). The oral examination questions will be based on the written answers, the thesis research proposal and the candidacy reading list. Students must consult with their supervisors.

Final thesis oral examinations are open.

### 11. Research Proposal Requirements

Students whose research involves human subjects must receive approval from the appropriate departmental or University Ethics Review Committee before beginning data collection.

All Master of Science students must formally present a thesis proposal not more than 14 months after admission to the program. The proposal must be typed and 10 to 30 double-spaced pages (12 pt font, reference list extra). Students must consult with their supervisors. The supervisory committee must approve the thesis proposal.

All Doctor of Philosophy students must formally present a thesis proposal not more than 16 months after admission to the program. The proposal must be typed and 10 to 30 double-spaced pages (12 pt font, reference list extra). Students must consult with their supervisors. The supervisory committee must approve the thesis proposal.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships are advised to submit their applications to the Department by 15 January.

### 14. Other Information

Initial inquiries may be made to the Director of Graduate Studies, Department of Psychology.

### 15. Faculty Members/Research Interests

The active research interests of the faculty can be found at http://www.psychology.ucalgary.ca.

## Clinical Psychology (CPSY)

### Contact Info

Location: Administration, Room 274
Faculty number: (403) 220-5659
Fax: (403) 282-8249
E-mail address: psycgrad@ucalgary.ca
Web page URL: http://www.psychology.ucalgary.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based

The purpose of the graduate program in Clinical Psychology is to prepare students for careers as doctoral-level clinical psychologists in research, academic, and applied settings. In the course of doctoral training students also are required to complete the Master of Science (MSc) degree. However, consistent with its goal of doctoral training, the program only admits students who wish to pursue the doctoral degree.

Students registered in Master's thesis-based and doctoral programs will be considered full-time. The program does not offer a part-time option.

### 2. Admission Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the program requires:

a) An honour's degree in psychology (or equivalent) with a minimum grade point average of 3.6 on a four-point scale in the last 10 full courses to be considered for entry, although competition for the program is such that higher grade point averages are typical of students who are admitted.
b) Scores on the Aptitude (Verbal/Quantitative) dimensions of the Graduate Record Examinations (GRE). Please note that students with scores less than the 50th percentile on the Verbal and Quantitative subtests will not normally be admitted.
c) A statement of research and professional interests, including the specification of prospective research supervisors from among current Program faculty.
d) For applicants required to provide proof of proficiency in English, a TOEFL score of 600 (written test), or 100 (internet-based) test, or an IELTS score of 7.5, or a MELAB score of 84, or a PTE score of 70.
e) Two Reference Letters.

### 3. Application Deadline

The deadline for complete applications is 7January for September admission.

### 4. Advanced Credit

Advanced credit may be given for up to two full-course equivalents of graduate work, if this work is consistent with the program's requirements.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

The Program outline is as follows:

Year 1
Psychology 650, Psychology 651, Psychology 653, Psychology 659, Psychology 660, Psychology 671, Psychology 673, Psychology 615, thesis work

Year 2
Psychology 601, Psychology 650, Psychology 681, Psychology 683, plus a graduate-level Psychology Statistics course or Methodology course (Psychology 617 or equivalent), completion of the thesis

Year 3
Psychology 750, Psychology 760, a graduate-level breadth course, elective, the Candidacy Examination, thesis work

Year 4
Psychology 750, Psychology 762, thesis work

Year 5
Pre-Doctoral Clinical Internship Psychology 798, and completion of thesis oral and written requirements

Breadth course requirements may be satisfied through Psychology 750 and courses offered by the Department of Psychology. A list of approved breadth courses is available through the Graduate Psychology Program Office.

The prerequisite for all Clinical Program courses (unless otherwise noted) is consent of the Program. Successful completion of years one and two, plus the Master of Science thesis, constitute the requirements of the Master of Science degree. Program students must formally apply and be approved by the program and the Faculty of Graduate Studies for admission to the doctoral program upon completion of Master of Science requirements.

### 6. Additional Requirements

Clinical suitability and professional conduct.

### 7. Credit for Undergraduate Courses

Credit for one breadth course may be given if the applicant has two senior undergraduate courses in that area. Credit for Psychology 601 may be given if the applicant has a senior undergraduate course in History and Systems of Psychology.

### 8. Time Limit

It is expected that students will complete the MSc thesis within two years. Students in the MSc program must complete all requirements within four registration years. Students who have taken three years to complete all requirements for the Master's degree will normally not be admitted into the doctoral program. It is expected that students will complete the Doctoral Program within 5 years. Maximum time to completion for the MSc is 4 years and for the Doctoral program is 6 years.

### 9. Supervisory Assignments

Program students must have a research supervisor at all times. Supervisors are arranged by mutual consent of student and faculty member, and are consistent with the focus of the student's research work. Master's level students must have a supervisory committee consisting of at least three members, with at least one who is a member of the core clinical faculty. Doctoral candidates must have a supervisory committee of at least three members.

### 10. Required Examinations

In addition to course-specific written requirements, students must sit a written and oral doctoral candidacy examination in the third year of their program (i.e., the first year of doctoral studies).

The oral candidacy exam will focus on questions on general clinical psychology and research knowledge. Questions on the research proposal will not be included in the oral candidacy examination.

Final thesis oral examinations are open.

A thesis final defence is also required.

### 11. Research Proposal Requirements

Students in the program must complete both a Master's thesis and doctoral thesis, according to the criteria set by the Faculty of Graduate Studies. These research projects typically involve the design of a research question and research project, the collection, analysis and interpretation of original data, and the preparation of a written document consistent with good scholarship. Students whose research involves human subjects must receive approval from the appropriate departmental or University Ethics Review Committee before beginning data collection.

### 12. Special Registration Information

Admission to this Program is normally only available in September of each year.

### 13. Financial Assistance

Financial assistance may be available to qualified students. Applicants and program students are strongly encouraged to apply for internal and external awards. For information on Awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to the Department by 15 January.

### 14. Other Information

The program subscribes to the scientist-practitioner model of clinical training as described in the Canadian Psychological Association's requirements for program

accreditation, and emphasizes the integration of course work, research, and clinical training. The program has been fully accredited by CPA for seven years (2004-2011).

## 15. Faculty Members/Research Interests

Research and clinical interests of the Program faculty can be found at http://psychology.ucalgary.ca/research/groups

### Graduate Courses

**Psychology 601** H(3-0)

*History and Systems of Psychology*
History of psychological concepts in Western culture, major theoretical systems of twentieth century psychology, foundational assumptions of theories in contemporary psychology.
Prerequisite: Consent of the Department.

**Psychology 607** H(3-0)

*Advanced Research Design and Methodology in Psychology*
Survey of advanced topics in the conduct of psychological research including issues in philosophy of science; origins of research ideas; validity and reliability; measurement; experimental, quasi-experimental, and non-experimental designs; survey research; specialized methods such as computer simulation, psychophysiological methods, event-sampling, online data collection, and cognitive procedures; and ethics. Prerequisite: Consent of the Department.

**Psychology 611** H(3-3)

*Advanced Qualitative Inquiry in Psychology*
Qualitative Research Designs and Historical Research in Psychology. Advanced study of selected qualitative approaches in psychology to include research design, methods, and analysis. Specific topics covered include foundations of qualitative research, evaluation, and practical techniques including computerized analysis.
Prerequisite: Consent of the Department.

**Psychology 613** H(3-3)

*Signal and Systems Analysis in Behavioural Research*
Application of signal and systems analysis to behavioural neuroscience and psychophysics.
Prerequisite: Consent of the Department.

**Psychology 615** H(3-3)

*Advanced Research Design and Analysis I*
Applications of the general linear model to research design and analysis. Topics include analysis of variance, regression, and analysis of covariance.
Prerequisite: Consent of the Department.

**Psychology 617** H(3-3)

*Advanced Research Design and Analysis II*
Multivariate techniques and design issues, including canonical correlation, discriminant analysis, multivariate analysis of variance, multivariate regression, principal components analysis and factor analysis.
Prerequisite: Psychology 615, or consent of the Department.

**Psychology 619** H(3-3)

*Special Topics in the Design of Psychological Research*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

**Psychology 620** H(3-0)

*Advanced Topics in Brain and Cognitive Sciences*
An advanced survey of some of the fundamental issues and recent developments in the Brain and/or Cognitive Sciences. Topics will vary.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

**Psychology 630** H(3-0)

*Advanced Topics in Social and Theoretical Psychology*
An advanced survey of some of the fundamental issues and recent developments in Social and/or Theoretical Psychology. Topics will vary.
Prerequisites: Consent of the Department.
MAY BE REPEATED FOR CREDIT

**Psychology 639** H(3-0)

*Advanced Industrial and Organizational Psychology*
Application of psychological principles, research and methods relating to human interactions and performance in work settings.
Prerequisite: Consent of the Department.

**Psychology 641** H(3-0)

*Advanced Topics in Health Psychology*
Introduces students to current research issues in health psychology. Focuses primarily on issues related to the study of chronic illnesses and evaluates the role of psychological/behavioural factors in: the etiology of disease, disease prevention, adaptation to illness, and disease progression.
MAY BE REPEATED FOR CREDIT

**Psychology 650** F(1S-0)

*Research Seminar in Clinical Psychology*
An introduction to research and design issues in clinical psychology.
Note: Open only to students enrolled in the Clinical Psychology program.
MAY BE REPEATED FOR CREDIT

**Psychology 651** H(3-0)

*Adult Psychopathology*
Current theory, issues, and research regarding the epidemiology, etiology, diagnosis, and prognosis of adult psychopathology. Implications for assessment and treatment.

**Psychology 653** H(3-0)

*Child Psychopathology*
Current theory, issues, and research regarding the epidemiology, etiology, diagnosis, and prognosis of child psychopathology. Implications for assessment and treatment. Topics include internalizing and externalizing disorders, risk and protective factors, and developmental continuities and discontinuities in psychopathology.

**Psychology 659** H(3-0)

*Ethics and Professional Issues in Clinical Psychology*
Ethical and legal standards for clinical psychologists. An introduction to professional issues in contemporary clinical practice.
Note: Open only to students enrolled in the Clinical Psychology program.

**Psychology 660** F(0-14)

*Summer Practicum in Clinical Psychology*
Supervised training experience in an approved clinical setting. Provides exposure to basic issues and techniques in the practice of psychological assessment.
Note: Open only to students enrolled in the Clinical Psychology program.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

**Psychology 671** H(3-3)

*Psychological Assessment of Adults*
An overview of theoretical, professional, and ethical issues in the psychological assessment of adult clinical populations. Instruction in the administration and interpretation of assessment procedures for adults including interviews, behavioural assessments, and selected intellectual and personality tests. Supervised practical experience in the application of adult assessments in a relevant clinical setting.
Note: Open only to students enrolled in the Clinical Psychology program.

**Psychology 673** H(3-3)

*Psychological Assessment of Children*
An overview of theoretical, professional and ethical issues in the psychological assessment of child clinical populations. Instruction in the administration and interpretation of child and family assessment procedures including interviews, behavioural assessments, and selected psychological tests. Supervised practical experience in the application of child and family assessments in a relevant clinical setting.
Note: Open only to students enrolled in the Clinical Psychology program.

**Psychology 681** H(3-3)

*Adult Psychotherapy*
Theory, research, and practice in adult psychotherapy and behaviour change. Supervised exposure to the practice of adult psychotherapy in a relevant clinical setting.
Note: Open only to students enrolled in the Clinical Psychology program.

**Psychology 683** H(3-3)

*Child Psychotherapy*
Theory, research, and practice in child and family psychotherapy and behaviour change. Supervised exposure to the practice of child and family psychotherapy in a relevant clinical setting.
Note: Open only to students enrolled in the Clinical Psychology program.

**Psychology 700** H(3S-0)

*Integrative Seminar in Psychology*
Selected interdisciplinary topics in Psychology.. Topics will vary.
Prerequisite: Consent of the Department
MAY BE REPEATED FOR CREDIT.

**Psychology 702** H(0-3)

*Research in Brain and Cognitive Sciences*
Completion of a research project in Brain and/or Cognitive Sciences conducted under the supervision of a faculty member. Topics may vary.
Prerequisite: Consent of the Department
MAY BE REPEATED FOR CREDIT.

Psychology 703 H(0-3)

*Research in Social and Theoretical Psychology*
Completion of a research project in the areas of Social and/or Theoretical Psychology conducted under the supervision of a faculty member. Topics may vary.
Prerequisite: Consent of the Department
MAY BE REPEATED FOR CREDIT.

Psychology 709 H(0-3)

*Research in Industrial/Organizational Psychology*
Completion of a research project in Industrial/Organizational Psychology conducted under the supervision of a faculty member.Topics may vary.
Prerequisite: Consent of the Department
MAY BE REPEATED FOR CREDIT.

Psychology 710 F(3S-0)

*Integrative Seminar in Psychology*
Selected interdisciplinary topics in Psychology. Topics may vary
Prerequisite: Consent of the Department
MAY BE REPEATED FOR CREDIT.

Psychology 712 F(0-3)

*Research in Brain and Cognitive Sciences*
Completion of a research project in Brain and/or Cognitive Sciences conducted under the supervision of a faculty member. Topics may vary.
Prerequisite: Consent of the Department
MAY BE REPEATED FOR CREDIT.

Psychology 713 F(0-3)

*Research in Social and Theoretical Psychology*
Completion of a research project in the areas of Social and/or Theoretical Psychology conducted under the supervision of a faculty member. Topics may vary.
Prerequisite: Consent of the Department
MAY BE REPEATED FOR CREDIT.

Psychology 720 H(3S-0)

*Seminar in Brain and Cognitive Sciences*
Selected topics in Brain and/or Cognitive Sciences. Topics may vary.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT.

Psychology 730 H(3S-0)

*Seminar in Social and Theoretical Psychology*
Selected topics in Social and/or Theoretical Psychology. Topics may vary.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Psychology 739 H(3S-0)

*Seminar in Industrial/Organizational Psychology*
Application of psychological principles and methods to business, industry and other organizational settings.
Prerequisites: Psychology 639 or consent of the Department.
MAY BE REPEATED FOR CREDIT

Psychology 750 Q(3S-0)

*Advanced Seminar in Clinical Psychology*
A doctoral level seminar in advanced topics in the practice of clinical psychology.
750.01. Psychopharmacology/Consultation
750.02. Neuropsychology
750.03. Family Therapy
750.04. Group Therapy
750.05. Diversity Issues in Clinical Psychology
750.06. Clinical Geropsychology
750.07. Couple and Sex Therapy
750.08. Forensic Psychology
750.09. Addictions
Note: Open only to students enrolled in the Clinical Psychology program.
NOT INCLUDED IN GPA

Psychology 751 H(3-0)

*Special Topics in Adult Psychopathology*
A specialized topic course in the area of adult psychopathology. Course offerings will vary from year to year and may include such topics as: schizophrenia, substance abuse, suicide, mental health delivery systems, or computer applications in clinical psychology.
MAY BE REPEATED FOR CREDIT

Psychology 760 F(1-7)

*Specialty Practicum in Clinical Psychology I*
Supervised training experience in an approved clinical setting. Provides in-depth exposure to specific clinical populations and to the application of various psychological assessment and intervention strategies and techniques.
Note: Open only to students enrolled in the Clinical Psychology program.
NOT INCLUDED IN GPA

Psychology 762 F(1-7)

*Specialty Practicum in Clinical Psychology II*
Supervised training experience in an approved clinical setting. Provides advanced in-depth exposure to specific clinical populations and to the application of various psychological assessment and intervention strategies and techniques.
Note: Open only to students enrolled in the Clinical Psychology program.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

Psychology 765 H(1-7)

*Practicum in Clinical Psychology*
Supervised training experience in an approved clinical setting. Provides exposure to specific clinical populations and to the application of various psychological assessment and intervention strategies and techniques.
Note: Open only to students enrolled in the Clinical Psychology program.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

Psychology 798

*Pre-Doctoral Internship in Clinical Psychology*
A full calendar year, full-time (or two-years, half-time) supervised training experience in an approved clinical setting. Intensive exposure to various professional issues, the opportunity to work with a diverse range of clinical populations and problems, and advanced training in the use of specific psychological assessment and intervention strategies.
Note: Open only to students enrolled in the Clinical Psychology program.
NOT INCLUDED IN GPA

In addition to the numbered and titled courses shown above, the department offers a selection of advanced level graduate courses specifically designed to meet the needs of individuals or small groups of students at the advanced doctoral level. These courses are numbered in the series 800.01 to 899.99. Such offerings are, of course, conditional upon the availability of staff resources.

## RELIGIOUS STUDIES RELS

### Contact Info

Location: Social Sciences Building, Room 1301
Faculty number: (403) 220-6988
Fax: (403) 210-9191
E-mail address: relsgrad@ucalgary.ca
Web page URL: http://www.ucalgary.ca/rels/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), thesis-based

The three study streams at the graduate level are Eastern Religions, Nature of Religion, and Western Religions. Feasibility of programs within these streams depends on available research resources and faculty expertise.

Research is supported in the following areas:
*Eastern Religions* – Buddhist Studies; east Asian Religions; Hinduism; Indian philosophy

*Nature of Religion* – Comparative religion; African religions; new religious movements; science and religion; women and religion; philosophy and religion; comparative philosophy of religion; hermeneutics; theory and method in the study of religion

*Western Religions* – Ancient Israel; Hebrew Bible; Bible, myth, and literature; Second Temple Judaism; rabbinic Judaism; early Christianity; Islamic and Jewish philosophy; medieval Jewish-Islamic studies; radical Protestant groups (Anabaptism, German Pietism)

### 2. Admission Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the Department requires:

#### Master of Arts

a) An admission grade point average of 3.3 or higher on a four-point scale and a minimum of six full-course equivalents in Religious Studies (or their equivalents), usually including at least one full-course equivalent from each of the three streams (Eastern, Western, Nature), as determined by the graduate committee
b) A reading knowledge of a modern language other than English or of a classical language appropriate to the thesis research. The language requirement normally should be met before admission to the Master's program
c) Two Reference Letters

#### Doctor of Philosophy

a) A degree comparable to the University of Calgary Religious Studies Master of Arts with a minimum grade point average of 3.5 on a four-point scale
b) Two Reference Letters

Students with an Honours Bachelor of Arts degree in Religious Studies, a grade point average of 3.7 or higher, and evidence of competence in the required languages may be admitted directly into the doctoral program or may be considered for transfer to the doctoral program after the first year of the Master's program. Such applicants must include in their

application package a substantial piece of written work and a detailed statement (10 pages) of the purpose, field, and course of study to be pursued in the program.

### 3. Application Deadline

Deadline for the submission of complete applications is 7 January for September admission.

### 4. Advanced Credit

Applicants must make advanced credit requests when applying for admission. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Graduate course work completed before admission and not counted toward satisfying undergraduate degree requirements will be assessed by the Departmental Graduate Committee to determine course requirements.

### 5. Program/Course Requirements

Note*: The Departmental Graduate Committee will determine the exact number and kinds of courses in each student's program.*

In addition to Faculties of Graduate Studies and Arts requirements, the Department normally requires:

#### Master of Arts (thesis-based)

a) Two and a half full-course equivalents, including RELS 609 and at least one half-course in each of the three streams of study, in addition to individualized requirements set by the Departmental Graduate Committee at the time of admission.
b) A thesis proposal to be presented to the Graduate Studies Committee for evaluation and approval before the second annual registration.

#### Doctor of Philosophy

a) For students with a Master of Arts in Religious Studies, five half-courses are required in addition to individualized requirements set by the Departmental Graduate Committee at the time of admission:
   - Religious Studies 701 – Studies in Western Religions
   - Religious Studies 703 – Studies in Eastern Religions
   - Religious Studies 705 – Studies in the Nature of Religion
   - Religious Studies 707 – Topics in the Study of Religion
   - Religious Studies 709 - Advanced Critical Discourses in the Study of Religion
b) For students with a BA Honours or for students transferring from the Master's program, eight half-courses are required in addition to individualized requirements set by the Departmental Graduate Committee at the time of admission:
   - Religious Studies 601 – Studies in Western Religions
   - Religious Studies 603 – Studies in Eastern Religions
   - Religious Studies 605 – Studies in the Nature of Religion
   - Religious Studies 701 – Studies in Western Religions
   - Religious Studies 703 – Studies in Eastern Religions
   - Religious Studies 705 – Studies in the Nature of Religion
   - Religious Studies 707 – Topics in the Study of Religion
   - Religious Studies 709 - Advanced Critical Discourses in the Study of Religion

### 6. Additional Requirements

#### PhD Language Requirements

Before the written candidacy examination, doctoral students must demonstrate a reading knowledge of at least two languages other than English. At the discretion of the Department and upon recommendation of the Graduate Director, competency in additional languages may be required. The foreign language requirement may be satisfied in two ways:

a) Successful completion (final grade of B or higher) at some stage of the student's university program of at least two full-course equivalents in a first language other than English, and one full-course equivalent in a second language; or
b) Successful completion (grade of B or higher) of a language examination administered by the Department of Religious Studies or by another department on behalf of the Department of Religious Studies. When the test is administered by another department, it will consist of a passage or passages selected by the supervisor and/or any requirements that the other department may deem necessary; the test will be graded by the examiner(s) of the other department. When members of the Department of Religious Studies administer the test, the examination questions will be determined, administered, and graded by two members of the Department (one of whom normally will be the supervisor) who have expertise in the language under consideration. In the event that a second person with expertise in the required language is not available, the Department Head may seek an expert from outside the department.

### 7. Credit for Undergraduate Courses

Credit for undergraduate courses will be given only upon approval of the Departmental Graduate Committee.

### 8. Time Limit

Expected completion time for full-time students is two years in the Master's program and four years in the PhD program. Maximum completion time is four years in the Master's program and six years in the doctoral program.

### 9. Supervisory Assignments

The Departmental Graduate Committee makes interim supervisory assignments when applicants are recommended for admission to the Faculty of Graduate Studies. A regular supervisor must be assigned by the beginning of the second registration year.

### 10. Required Examinations

The doctoral candidacy examination includes two written components and one oral component. Each written candidacy examination focuses on one aspect of the student's doctoral research in Religious Studies:

Examination A – theory and method in the study of religion
Examination B – religious beliefs and practices in context

The written examinations are based on a bibliography established by the candidate in consultation with the supervisory committee and must be taken no later than 26 months after admission to the program. The oral examination is based on the bibliography, the written examinations. Questions on the research proposal will not be included in the oral candidacy examination.

Final thesis oral examinations are open.

### 11. Research Proposal Requirements

The thesis proposal must be approved by each member of the student's supervisory committee, acknowledged by individual signature and date on the front cover, and by the Departmental Graduate Committee, no later than 24 months after admission to the program with a completed Master's degree. The proposal should be no more than 20 pages in length and must obtain all required approvals before the student is allowed to take the candidacy examination.

An approved thesis proposal is the basis of consensus on a candidate's research program. When, as sometimes happens in the course of a research project, the research focus or methodology shifts markedly:

a) The candidate shall forward a letter to the supervisory committee to document the shift and the reason for the shift. The student also shall compose an addendum, to be appended to the initial proposal, detailing the new direction and supplying any necessary additions to the bibliography.
b) The supervisor, on behalf of the supervisory committee, will reply to the revised proposal indicating acceptability and/or required revisions.

Students should be aware that such shifts may entail revision of the supervisory committee structure.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar or inquire of the Department.

Students applying for scholarships must submit their applications to the Department by 1 February.

### 14. Other Information

None.

### 15. Faculty Members/Research Interests

Current faculty research areas can be found at http://rels.ucalgary.ca/research/interests

#### Graduate Courses

| | |
|---|---|
| Religious Studies 601 | H(3-0) |
| *Studies in Western Religions*<br>MAY BE REPEATED FOR CREDIT | |
| Religious Studies 603 | H(3-0) |
| *Studies in Eastern Religions*<br>MAY BE REPEATED FOR CREDIT | |
| Religious Studies 605 | H(3-0) |
| *Studies in the Nature of Religion*<br>MAY BE REPEATED FOR CREDIT | |
| Religious Studies 607 | H(0-3T) |
| *Supervised Master's Thesis Inquiry* | |
| Religious Studies 609 | H(3-0) |
| *Critical Discourses in the Study of Religion*<br>MAY BE REPEATED FOR CREDIT | |

| | |
|---|---|
| Religious Studies 681 | H(3-0) |
| *Specialized Studies in Western Religions*<br>MAY BE REPEATED FOR CREDIT | |
| Religious Studies 683 | H(3-0) |
| *Specialized Studies in Eastern Religions*<br>MAY BE REPEATED FOR CREDIT | |
| Religious Studies 685 | H(3-0) |
| *Specialized Studies in the Nature of Religion*<br>MAY BE REPEATED FOR CREDIT | |
| Religious Studies 701 | H(3-0) |
| *Studies in Western Religions*<br>MAY BE REPEATED FOR CREDIT | |
| Religious Studies 703 | H(3-0) |
| *Studies in Eastern Religions*<br>MAY BE REPEATED FOR CREDIT | |
| Religious Studies 705 | H(3-0) |
| *Studies in the Nature of Religion*<br>MAY BE REPEATED FOR CREDIT | |
| Religious Studies 707 | H(3-0) |
| *Topics in the Study of Religion*<br>MAY BE REPEATED FOR CREDIT | |
| Religious Studies 709 | H(3-0) |
| *Advanced Critical Discourses in the Study of Religion*<br>MAY BE REPEATED FOR CREDIT | |

## SOCIAL WORK SOWK

Contact Info

Web page URL: http://fsw.ucalgary.ca

Locations

Calgary:
Professional Faculties Building, Room 3270
Faculty number: (403) 220-6945
Fax: (403) 282-7269
E-mail address: fswgrad@ucalgary.ca

Edmonton:
#444, 11044-82 Avenue
Faculty number : (780) 492-3888
Fax : (780) 492-5774
E-mail address : fswcnar@ucalgary.ca
URL: http://www.ucalgary.ca/fswcentralandnorth

Lethbridge :
4401 University Drive
Faculty number : (403) 329-2794
Fax : (403) 329-2787
E-mail address : aiken@uleth.ca

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
MBA/MSW (full-time; course--based)
Master of Social Work (MSW), course-based (full-time and part-time) and thesis-based; programs available for both BSW graduates and graduates from other disciplines.

PhD

The PhD is a research-based degree and is intended to produce highly qualified social work researchers and teachers. The aim of developing such advanced scholarly and research skills is to equip doctoral students for future roles as leaders of the social work profession. Students complete 9 courses, a candidacy exam, and a thesis.

The Faculty of Social Work also offers a Post-Master's Diploma in Advanced Studies in Social Work (PMD). For information on the Post-Master's Diploma in Advanced Studies in Social Work, consult the Student Services Office (Calgary location) in the Faculty of Social Work.

MBA/MSW

The Faculty of Social Work and the Haskayne School of Business offer a combined program leading to the Master of Business Administration/Master of Social Work (MBA/MSW) degree.

MSW

The objective of the MSW program is to prepare students for advanced professional practice in social work. The Faculty of Social Work offers MSW programs in Calgary, Edmonton and Lethbridge. In all locations, students are required to choose a course-based or thesis route to the degree. The thesis route is appropriate for students who intend to proceed to doctoral studies and/or anticipate a career requiring advanced program evaluation or research skills.

In Calgary, MSW students are admitted annually and choose one of three specializations: Clinical Social Work Practice, Leadership in the Human Services, or International and Community Development. Students without an undergraduate degree in social work are admitted to an extended two-year program, while BSW graduates are admitted directly into a one-year Specialization program.

Also offered from the Calgary location, the Master of Business Administration/Master of Social Work (MBA/MSW) program is designed to prepare students for business-related social work careers. This program is available only to full-time MSW students.

In Edmonton, the Faculty of Social Work offers the Clinical Social Work Practice specialization. Program delivery blends web-based and on-site formats. On-site courses are offered on Friday evenings and Saturdays, four times per term, and occasional week-long intensives, allowing students from Edmonton and throughout central and northern Alberta to continue working while pursuing graduate education. Students with a BSW complete the Clinical Specialization program in 2 years. Students with an undergraduate degree in other disciplines complete a Foundation program followed by the Clinical program, requiring a total of 4 years of study. Admission occurs in odd-numbered years (i.e., 2009, 2011, 2013, etc.).

In Lethbridge, the Faculty of Social Work offers the Clinical Social Work Practice specialization to students with a BSW. Program delivery blends web-based and on-site formats, allowing students from Lethbridge and southern Alberta to continue working while pursuing graduate education. Students complete the program in 2 years. Admission occurs in odd-numbered years (i.e., 2009, 2011, 2013, etc.).

The MSW course-based specialization in Leadership in the Human Services is administered through Calgary as a distance program and is accessible to students regardless of home location. Please consult the Faculty of Social Work website: http://fsw.ucalgary.ca/. One course is offered on campus for one week in July in both the first and second years of the program. Other courses are offered via distance delivery. The program is designed to be completed in two years of full-time study. For information, consult the website or contact the Student Services Office in the Faculty of Social Work.

### 2. Admission Requirements

Students are responsible for meeting the admission requirements as established by the Faculty of Graduate Studies. In addition to Faculty of Graduate Studies requirements, the Faculty of Social Work requires the following:

For PhD,

a) A Master of Social Work or equivalent graduate degree with a minimum grade point average of 3.50 on a four-point scale;
b) A study plan outlining the applicant's educational goals, career expectations, and research interests;
c) Substantial professional experience;
d) Samples of written work including, for example, published and/or unpublished scholarly papers and/or professional reports; and
e) Two reference letters.

For MSW course-based,
In Calgary and Edmonton,

a) a Bachelor of Social Work degree, or a four-year Bachelor's degree from another discipline
b) the equivalent of two years of full-time paid or volunteer work in the human services field;
c) A study plan outlining the applicant's educational goals and career expectations. (If applying to the Calgary program, the study plan must indicate the applicant's intended area of specialization: Clinical Social Work Practice, Leadership in the Human Services, or International and Community Development.); and
d) Two reference letters

In Lethbridge, only BSW graduates can apply:

a) A Bachelor of Social Work degree
b) A study plan outlining the applicant's educational goals and career expectations; and
c) Two reference letters

For MSW thesis-based,
In Calgary and Edmonton,

a) A Bachelor of Social Work degree, or a four-year Bachelor's degree from another discipline *and*
b) The equivalent of two years of full-time paid or volunteer work in the human services field.
c) A study plan outlining the applicant's educational goals and career expectations. (If applying to the Calgary program, the study plan must indicate the applicant's intended area of specialization: Clinical Social Work Practice, Leadership in the Human Services, or International and Community Development.);
d) An additional statement providing a rationale for selecting the thesis route and describing the applicant's area of research interest. Students considering applying to the thesis route are strongly encouraged to discuss this option with a Faculty member prior to completing the application process; and
e) Two reference letters.

In Lethbridge, only BSW graduates can apply:

a) A Bachelor of Social Work degree
b) A study plan outlining the applicant's educational goals and career expectations;
c) An additional statement providing a rationale for selecting the thesis route and describing the applicant's area of research interest. Students considering applying to the thesis route are strongly encouraged to discuss this option with a Faculty member prior to completing the application process; and
d) Two reference letters.

MBA/MSW (Calgary only)

a) A Bachelor of Social Work degree or completion of the MSW Foundation courses (described in Section 5 below). Applicants demonstrating academic excellence and prior human services experience may be considered for admission to the Foundation year;
b) A study plan outlining the applicant's educational goals and career expectations;
c) Admission into the Haskayne School of Business; and
d) Two reference letters

## 3. Application Deadline

Final submission deadlines are as follows:
PhD program: 31 January for September admission (in exceptional cases, applicants may be accepted for alternative admission dates).

Calgary MSW Programs: 1 December for: September admission to the Clinical Social Work Practice and International and Community Development Specializations

The Calgary MSW Program uses a rolling admission policy; that is, qualified applicants may be offered a space in a program prior to final application submission deadlines.

MBA/MSW; July admission to the Leadership in the Human Services Specialization (distance delivery).

Edmonton and Lethbridge MSW programs:
31 January for September admission in odd-numbered years (2009, 2011, 2013, etc.).

## 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for coursework taken as part of another completed degree/diploma or for courses taken to raise the grade point average for admission purposes. For all Faculty of Social Work graduate programs, advanced credit may be granted for not more than the equivalent of three half-courses.

Approval of advanced credit will be based on an evaluation of the student applicant's particular circumstances and the fit between the prior coursework and the applicant's program of study in the MSW. Students exploring the possibility of Advanced Credit should contact the Student Advisor in the program location to which they are applying (Calgary, Edmonton, or Lethbridge).

## 5. Program/Course Requirements

*Please note that not all programs/courses are offered every semester. Students should consult the timetables available on the web and the Master Timetable and program curriculum plans for sequences and availability of courses.*

In addition to Faculty of Graduate Studies requirements, the Faculty of Social Work requires:
MSW for students with a BSW:

Course-based students complete ten Specialization half-course equivalents as follows:
a) 5 core courses (see specific courses listed by Specialization, below);
b) 3 option courses (option course requirements and offerings vary by year and region program); and
c) Social Work 696: Advanced Practicum (525 hours; one full-course).

Thesis-based students complete nine Specialization half-course equivalents as follows:
a) 5 core courses (see specific courses listed by Specialization, below);
b) 2 option courses (option course requirements vary by region; option course offerings vary by year and region);
c) and Social Work 696 Advanced Practicum (one full-course; in order to accommodate thesis requirements, students in the thesis route may complete a minimum of 300 hours).

MSW for students with a Bachelor's degree in a discipline other than social work:
a) Nine Foundation half-course equivalents, as follows: (note that Foundation courses must be complete before students progress to Specialization courses)

- Social Work 637: Human Behaviour in the Environment
- Social Work 621: History and Foundation of the Profession
- Social Work 632: Social Policy and Social Justice
- Social Work 629: Professional Communication and Interviewing
- Social Work 641: Models of Practice
- Social Work 645: Issues in Social Work Research
- Social Work 625: Practice with Individuals, Families and Groups
- Social Work 627: Practice with Organizations and Communities
- Social Work 633: Foundational Field Practicum (426 hours)

And

Ten Specialization half-course equivalents for Course-based students as follows:
a) 5 core courses (see specific courses listed by Specialization, below);
b) 3 option courses (option course requirements vary by region; option course offerings vary by year and region); and
c) Social Work 696: Advanced Practicum (525 hours; one full-course ).

Nine Specialization half-course equivalents for Thesis-based students as follows:
a) 5 core courses (see specific courses listed by Specialization, below);
b) 2 option courses (option course requirements vary by region; option course offerings vary by year and region);
c) and Social Work 696: Advanced Practicum (one full-course; in order to accommodate thesis requirements, students in the thesis route may complete a minimum of 300 hours).

*Clinical Social Work Practice Specialization (offered in Calgary, Edmonton and Lethbridge)*
Required core courses:
- Social Work 655: Research I
- Social Work 665: Influencing Policy Development
- Social Work 667: Theory & Methods I
- Social Work 669: Theory & Methods II
- Social Work 696: Advanced Practicum (525 hours; one full-course)
- Social Work 697: Diversity, Oppression, and Social Justice

*Leadership in the Human Services (LHS) Specialization (distance delivery)*
Required core courses:
- Social Work 655: Research I
- Social Work 665: Policy
- Social Work 667: Theory & Methods I
- Social Work 669: Theory & Methods II
- Social Work 697: Diversity, Oppression, and Social Justice
- Social Work 696: Practicum (525 hours; (one full-course)

In the LHS Specialization, option courses are predetermined, as follows:
- Social Work 695: Becoming an Evidence-Based Leader
- Social Work 679.63: Management and Supervision in Human Service Organizations
- Social Work 679.10: Maximizing Staff Performance through Supervision

*International & Community Development*
Required core courses:
Social Work 665: Social Policy
Social Work 655: Research
Social Work 679.05: Special Topics Seminar I or 699.02: Special Topics Seminar II
SOWK 682: Special Seminar II (four one-eighth courses) or 699.09 Advanced Practice in International & Community Development
Social Work 697: Diversity, Oppression, and Social Justice
Social Work 696: Advanced Practicum (525 hours, usually completed outside of Canada in the Spring/Summer semester following completion of core courses; one full-course).

MBA/MSW
A minimum of eight half-course equivalents in the MSW Specialization year required (5 core specialization courses, 1 option, and Social Work 696 for 525 hours--one full-course), and
A minimum of sixteen half-course equivalents in the MBA program
Required MBA half-courses include:
- Accounting 601: Financial Accounting
- Accounting 603: Management Accounting
- Finance 601: Managerial Finance
- Human Resources and Organizational Dynamics 601: Managing Human Resources
- Marketing 601: Marketing Management
- Management Information Systems 601: Management Information Systems
- Management Studies 611: Managerial Economics
- Management Studies 613: Managerial Decision Modeling
- Management Studies 715: Strategic Business Analysis
- Operations Management 601: Operations Management
- Strategic and Global Management 601: Strategic Management I
- Business and Environment 777: Global

Environment of Business
- Management Studies 790: Seminar (one quarter-course)
- Management Studies 789.02: Leadership Capstone (one quarter-course)
- and 3 elective courses in the student's area of interest.

PhD
A minimum of nine half-course equivalents;
Required core courses include:
∗Social Work 741: Research Foundations: Epistemology and Professional Knowledge-Building
Social Work 743: Social Work Theory, History, and Philosophy: Values, Ethics and Professional Beliefs
∗Social Work 745: Research Methods I: Quantitative
∗Social Work 747: Research Methods II: Qualitative
Social Work 721: Integrative Research Colloquia

Equivalent courses may be taken outside the Faculty with the approval of the Faculty of Social Work.

Four half-course options relevant to the student's area of specialization. Option courses may be taken outside of the Faculty of Social Work, depending on the student's needs and course availability. All courses taken external to the Faculty of Social Work must have prior approval from the Faculty of Social Work.

A thesis research proposal.

## 6. Additional Requirements

Participation in Orientation Sessions held prior to the start of the Fall semester is strongly recommended for incoming students.

## 7. Credit for Undergraduate Courses

Credit for undergraduate courses will not be awarded.

## 8. Time Limit

As established by the Faculty of Graduate Studies, maximum completion time is four years for a thesis-based Master's program, six years for a doctoral program or a course-based Master's, and seven years for the MBA/MSW program.

Expected completion times in the Calgary programs are:
- one 12-month year for full-time course-based MSW students with a BSW
- two 12-month years for full-time course-based MSW students without a BSW
- 26 -months for the MBA/MSW (minimum)
- two 12-month years for a thesis-based MSW
- six 12-month years for a PhD
- two 12-month years for a part-time MSW with a BSW
- four 12-month years for a part-time MSW without a BSW

In the Edmonton and Lethbridge MSW programs, students are admitted as cohorts and are therefore required to complete courses as they are scheduled.

In Edmonton, course-based students admitted without a BSW complete the Foundation program component in the initial 2 years and the Clinical Specialization component in the subsequent 2 years.

In Edmonton and Lethbridge, course-based students admitted with a BSW complete the MSW Clinical Specialization in 2 years. Typically, thesis students require one additional 12-month year to complete their programs. Courses are scheduled on weekends, in week-long intensives and/or in on-line format for accessibility by rural and employed students. For the purposes of government grants and loans, students are classified as full-time.

## 9. Supervisory Assignments

Course-based MSW and MBA/ MSW students are assigned a faculty advisor upon entry into the program. A change of advisor, initiated by the student or the faculty member, can occur at any time during the student's enrolment in the program.

PhD, PMD and thesis-based MSW students are initially assigned an interim faculty advisor. Before the end of the first year, each student must designate a faculty member as permanent supervisor. In the doctoral program, the supervisor and student must then select a supervisory committee within three months of the appointment of the permanent supervisor. Supervisory committees typically consist of the supervisor and two other members, one of whom may be external to the Faculty of Social Work.

## 10. Required Examinations

PhD
The doctoral candidacy examinations are taken within 28 months of the student's admission to the program and after all required course work has been completed. The examinations include a written and an oral component, both of which the student must complete to the satisfaction of his or her examining committee. Students must similarly defend their dissertation to the satisfaction of the examining committee. Students should consult the FSW candidacy examination guidelines for further detail.

MSW (thesis)
The final examination for the thesis-based MSW involves an oral defence of the thesis. The thesis examination is conducted by the student's examining committee, which must be designated at least one month before the oral examination.

MSW (course-based)
Course based students are required to complete a capstone experience at the end of their coursework and practicum. Each student will meet this requirement according to the structure within his/her region (Calgary, Edmonton, Lethbridge).

## 11. Research Proposal Requirements

MSW (thesis) and PhD students whose research involves human subjects must receive approval from the University of Calgary Conjoint Faculties Research Ethics Board before beginning data collection. A copy of the proposal becomes part of the student's record within the Faculty of Social Work.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this calendar, and consult with the Student Services Office in the Faculty of Social Work.

## 14. Other Information

All students in the Faculty of Social Work are expected to be proficient in and have access to email, internet searching, and word processing computer programs. Students may be expected to use technology in courses; video-conferencing, web-based tools, discussion boards, and chat rooms may be used in addition to or in lieu of class time.
The Master of Social Work program is accredited by the Canadian Association of Social Work Education.
Information on the Faculty of Social Work and its programs is available on-line at http://www.fsw.ucalgary.ca.
Requests for information should be directed as follows:
Calgary: 1-877-220-6945
Edmonton: - 1-888-492-2083
Lethbridge: 1-866-329-2794. Faculty
15. Faculty Members/Research Interests
Current faculty members and their research interests can be found at http://fsw.ucalgary.ca/

## Graduate Courses

*Note: Not all options are offered every academic year. The number of options will vary across the program locations.*

Social Work 621 H(3S-0)

*History and Foundation of the Profession*
An examination of the relationship between knowledge, values, ethics and power and how they shape interventions in social work.
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 625 H(3S-0)

*Practice with Individuals, Families and Groups*
A basic understanding of social work practice theory with respect to work with individuals, families and groups.
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 627 H(3S-0)

*Practice with Organizations and Communities*
A basic understanding of social work practice theory with respect to work with organizations and communities.
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 629 H(3S-0)

*Professional Communication and Interviewing*
Offers experiential learning aimed at developing basic professional competencies and practice skills along with critical self-reflection.
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 632 H(3S-0)

*Social Policy and Social Justice*
An exploration of the social, political and economic forces, social movements and social structures that are transforming the Canadian welfare state and the practice of social work.
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 633 H(426 hours)

*Foundational Field Practicum*
Direct and indirect social work practice opportunities with professional supervision.
Note: Restricted to Social Work MSW students or consent of the Faculty.
NOT INCLUDED IN GPA

Social Work 637 H(3S-0)

*Human Behaviour in the Environment*
Human development and diversity within a social work context.
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 641 H(3S-0)

*Models of Practice*
Provides the conceptual and theoretical foundation for students to acquire the skills to practice in Social Work.
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 645 H(3S-0)

*Issues in Social Work Research*
An overview of social work research topics and issues.Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 655 H(3S-0)

*Research I*
Conceptualization of social work research problems, research design, data collection and analysis within a chosen specialization.
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 665 H(3S-0)

*Influencing Policy Development*
The focus of this course is leadership in policy practice and in particular policy advocacy at all levels of policy (i.e. organizational, community, and provincial or national levels).
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 667 H(3S-0)

*Theory and Methods I*
An in-depth and advanced understanding of social work theory and practice within a chosen specialization.
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 669 H(3S-0)

*Theory and Methods II*
Application of theories learned in Social Work 667 to various problems and diversity issues encountered by social workers within a chosen specialization.
Prerequisites: Social Work 667.
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 679 H(3S-0)

*Special Topics Seminar I*
Selected topics related to area of specialization or concentration.
Note: Restricted to Social Work MSW students or consent of the Faculty.
MAY BE REPEATED FOR CREDIT

Social Work 682 E(3S-0)

*Special Topics Seminar II*
Selected topics related to area of specialization or concentration.
Note: Restricted to Social Work MSW students or consent of the Faculty.
MAY BE REPEATED FOR CREDIT

Social Work 695 H(3S-0)

Becoming an Evidence-Based Leader
This course extends students' abilities to identify, assess, and utilize research knowledge as a problem-solving tool in social work.
Prerequisites: Social Work 655.
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 696 F(525 hours within two consecutive sessions)

*Advanced Practicum*
Direct and indirect Social Work practice opportunities with professional supervision in student's area of specialization or concentration.
Prerequisite or Corequisite: Social Work 667 and 669 or consent of the Faculty.
Note: Not open to students with credit in Social Work 687, 688 or 689. Restricted to Social Work MSW students or consent of the Faculty.
NOT INCLUDED IN GPA

Social Work 697 H(3S-0)

*Diversity, Oppression and Social Justice*
Critical examination of the issues of diversity and the power relations that form common links among the experiences of oppression and marginalization in Canadian society.
Note: Restricted to Social Work MSW students or consent of the Faculty.

Social Work 699 H(3S-0)

*Special Topics Seminar II*
Advanced selected topics related to area of specialization or concentration.
Note: Restricted to Social Work MSW students or consent of the Faculty.
MAY BE REPEATED FOR CREDIT

Social Work 721 H(2S-0)

*Integrative Research Colloquia*
A concluding course offered as final component of student's course work. Allows doctoral students and the instructor to engage in a series of research colloquia, thereby facilitating critical analysis, feedback and synthesis of materials covered and skills learned in other course work. This process will help students to develop conceptual and methodological skills.
Note: Restricted to Social Work PhD students.

Social Work 741 H(2S-0)

*Research Foundations: Epistemology and Professional Knowledge-Building*
An exploration of major philosophical issues that have shaped social work's diverse approaches to knowledge building and research methods. The relevance of this exploration to the student's area of interest is emphasized.
Note: Restricted to Social Work PhD students only or consent of the Faculty.

Social Work 743 H(2S-0)

*Theory, History and Philosophy: Values, Ethics and Professional Beliefs*
An exploration of the philosophical and ideological issues that have been historically important to the profession with respect to its conception of its ethics, mandate and practices. The relevance of this exploration to the student's area of interest in emphasized.
Note: Restricted to Social Work PhD students only or consent of the Faculty.

Social Work 745 H(2S-0)

*Research Methods I: Quantitative*
Quantitative methodological and design options in social work research.
Note: Restricted to Social Work PhD students only or consent of the Faculty.

Social Work 747 H(2S-0)

*Research Methods II: Qualitative*
Qualitative methodological and design options in social work research.
Note: Restricted to Social Work PhD students only or consent of the Faculty.

Social Work 749 H(2S-0)

*Quantitative Data Analysis*
Statistical analysis of quantitative data.
Note: Restricted to Social Work PhD students only or consent of the Faculty.

## SOCIOLOGY SOCI

### Contact Info

Location: Social Sciences Building, Room 956
Faculty number: (403) 220-6759
Fax: (403) 282-9298
E-mail address: vhansen@ucalgary.ca
Web page URL: http://soci.ucalgary.ca/

### 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Arts (MA), thesis-based

### 2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

#### Master of Arts

a) Demonstrated competence, normally through course work, in classical and contemporary theory, research methods, and statistics
b) A written statement of intent
c) A sample of written work
d) Two Reference Letters

#### Doctor of Philosophy

a) A grade point average of 3.50 on a four-point scale over a Master's program
b) Demonstrated competence in theory, methodology, and statistics, in addition to a substantive interest
c) A written statement of intent
d) A sample of written work
e) Two Reference Letters

### 3. Application Deadline

Deadlines for the submission of complete applications:

1 February for September admission

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

Master of Arts – Credit may be allowed for up to two 600-level Sociology half-courses.

Doctor of Philosophy – Credit may be allowed for up to three 600-level or 700-level half-courses.

### 5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts

a) Competence in sociological statistics, methods of sociological research, and sociological theory demonstrated by completing Sociology 611; Sociology 613 or 615; and Sociology 631.
b) Completion of two half-course equivalent electives at the 600- or 700-level; at least one half-course equivalent elective must be a Sociology Department offering in a substantive area.
c) Completion of Sociology 602 -Training in Professional Sociology and successful preparation and completion of a thesis prospectus, achieved through Sociology 613 or 615.

Doctor of Philosophy

a) Sociology 611; Sociology 702; Sociology 731; two half-course equivalent methodology courses at the 700 level, selected from decimalized sections of Sociology 705Q, 711Q, or 715Q; two half-course equivalent electives at the 600- or 700-level selected from Sociology Department offerings on substantive topics. Students who have taken one of the required courses in a previous degree may substitute any other 600- or 700-level course.
b) Successful completion of a thesis prospectus, normally within twenty months of initial registration in the doctoral program. Successful completion of the prospectus means that the Supervisory Committee has approved the thesis project, and a written copy of the prospectus is filed with the Sociology Department Graduate Administrator.
c) A candidacy examination with a written and an oral component.

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

None.

### 8. Time Limit

Expected completion time is 20-24 months for the Master of Arts and four years for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Arts and six years for the doctoral program.

### 9. Supervisory Assignments

An interim advisor is assigned to incoming students who have not already selected a supervisor. After one term in the program a master student will make supervisory arrangements with a faculty member in the chosen area of research. After two terms in the program, a doctoral student will make supervisory arrangements with a faculty member in the chosen area of research. In the case of doctoral students, the supervisor and student will select two other faculty members to serve on the student's supervisory committee.

### 10. Required Examinations

*Candidacy Examinations*

The candidacy examination has a written and an oral component. A final reading list is prepared by the student's supervisory committee and given to the student at least three months before the written examination. The written candidacy examination in the student's substantive area is written within one month of the oral candidacy examination. The written candidacy is normally a seven-day take-home or seven-hour closed-book examination. Both the written and oral candidacy examinations are graded together.

Questions on the research proposal will not be included in the oral candidacy examination.

*Thesis Oral Examinations*

Final thesis oral examinations are open.

### 11. Research Proposal Requirements

Students whose research involves human subjects must receive approval from the departmental Ethics Review Committee and the University of Calgary Conjoint Faculties Research Ethics Board before beginning data collection.

Master of Arts students are required to prepare a thesis prospectus.

Doctoral students are required to prepare a thesis prospectus for approval by their supervisory committee within twenty months of the date of entry into the program.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. Information on departmental funding is available in the on-line Sociology Graduate Student Handbook at http://soci.ucalgary.ca/graduate . For further information on awards, please see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships through the Faculty of Graduate Studies must submit their applications to the Department by 1 February.

### 14. Other Information

Students should refer to the Department's on-line information and the Sociology Graduate Student Handbook at http://soci.ucalgary.ca/graduate for further clarification and explanation of these regulations.

### 15. Faculty Members/Research Interests

The active research interests of the faculty can be found at http://soci.ucalgary.ca/people/faculty.

### Graduate Courses

**Sociology 601** H(3-0)

*Conference Course in Sociology*
Arranged for various topics of Sociology on the basis of special interest and need.
Prerequisite: Consult Department for assignment to Faculty member.
MAY BE REPEATED FOR CREDIT

**Sociology 602** F(3/2S-0)

*Master's Seminar in Professional Sociology*
NOT INCLUDED IN GPA

**Sociology 603** H(3S-0)

*Seminar in Sociology of Health and Illness*
Prerequisite: Consent of the Department.

**Sociology 611** H(3S-3)

*Social Statistics: The General Linear Model*
Multiple regression and correlation with applications to sociological research; regression diagnostics; extensions of linear regression such as nonlinear models, analysis of variance, analysis of covariance, and causal modelling.
Prerequisite: Consent of the Department. (Sociology 311 and 315 normally required.)

**Sociology 613** H(3S-2)

*Seminar in Quantitative Research Methods*
Prerequisite: Sociology 313 or consent of the Department.

**Sociology 615** H(3S-0

*Seminar in Qualitative Research Methods*
Advanced study in the theory and practice of qualitative research methods. Topics may include participant observation, in-depth interviews, narrative analysis, conversation and discourse analysis, autoethnography, archival research, and feminist research methods.
Prerequisite: Sociology 313 or consent of the Department. Sociology 413 is recommended.

**Sociology 625** H(3S-0)

*Seminar on Deviant Behaviour*
Prerequisite: Sociology 325 or consent of the Department.

**Sociology 631** H(3S-0)

*Seminar in Sociological Theory*
Prerequisites: Sociology 331 and 333 or equivalents; or consent of the Department.

**Sociology 653** H(3S-0)

*Seminar on Urban Sociology*
Prerequisite: Sociology 353 or consent of the Department.

**Sociology 665** H(3S-0)

*Seminar on Social Stratification and Inequality*
Prerequisite: Consent of the Department.

**Sociology 667** H(3S-0)

*Seminar on Ethnic Relations*
Prerequisite: Sociology 375 or consent of the Department.

**Sociology 671** H(3S-0)

*Seminar on the Sociology of Families*
Prerequisite: Sociology 471 or consent of the Department.

**Sociology 677** H(3S-0)

*Seminar in Sociology of Gender Relations*
Prerequisite: Consent of the Department.

**Sociology 695** H(3S-0)

*Seminar in Work*
Prerequisite: Consent of the Department.

Sociology 699 Q(0-3)

*Special Topics in Sociology*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Sociology 701 H(3S-0)

*Doctoral Seminar in Sociology*
Seminar on selected topics. Consult Department for details.
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Sociology 702 F(3/2S-0)

*Doctoral Seminar in Professional Sociology*
Prerequisite: Consent of the Department.
NOT INCLUDED IN GPA

Sociology 705 Q(3S-0)

*Selected Topics in Advanced Methodological Issues*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Sociology 711 Q(3S-3)

*Selected Topics in Advanced Quantitative Methods*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Sociology 715 Q(3S-0)

*Selected Topics in Advanced Qualitative Methods*
Prerequisite: Consent of the Department.
MAY BE REPEATED FOR CREDIT

Sociology 731 H(3S-0)

*Doctoral Seminar in Sociological Theory*
Prerequisite: Consent of the Department.

## SUSTAINABLE ENERGY DEVELOPMENT SEDV

### Contact Info

Location: Haskayne School of Business, Room 453
Faculty number: (403) 220-2013
Fax: (403) 282-0095
E-mail address:
CALGARY: sed@ucalgary.ca
QUITO: sed@usfq.edu.ec
Web page URL:
http://www.ucalgary.ca/sustainableenergy/
and http://www.usfq.edu.ec/

### 1. Degrees and Specializations Offered

Master of Science (MSc) with a specialization in Sustainable Energy Development, course-based

Part-time status is available.

The Master of Science in Sustainable Energy Development Program is an interdisciplinary program for professional individuals seeking a broad-based education in energy and sustainable development.

Instruction is offered by members of the Faculties of Environmental Design, Law, the Schulich School of Engineering and the Haskayne School of Business of the University of Calgary and from the Universidad San Francisco de Quito.

The Program is for high potential professionals who have demonstrated the ability to produce results, communicate effectively, and who have an interest in sustainable development. They will have an undergraduate degree from an internationally recognized university in any discipline (engineering, management, law, architecture, etc.) and preferably three years of work experience. Students enter with a broad range of educational and experience backgrounds, many from energy and environment organizations, including government agencies.

The objective of the Program is to provide students with a background in energy/environmental management such that they will be able to ensure sustainable energy development and minimize the impact of development on the environment.

CALGARY, Alberta, Canada: The program is offered at the University of Calgary campus over a period of 16 months beginning in May of each year.

QUITO, Ecuador, South America: In partnership with the Universidad San Francisco de Quito (USFQ) and the Latin American Energy Organization (OLADE), the program is offered at USFQ campus over a period of 16 months beginning in August of each year.

### 2. Admission Requirements

In addition to Faculty of Graduate Studies and Haskayne School of Business requirements, the Program requires:

a) Letter of intent outlining background, research interest and goal for the Program.
b) In exceptional circumstances, students who do not meet the Faculty of Graduate Studies minimum gpa requirement of 3.0 may be considered for admission after upgrading requirements have been met. These include a minimum of 6 make-up half courses, or 3 make-up half courses if they have relevant experience, with a minimum grade of 3.00 out of four point scale in each course. The make-up courses must be senior undergraduate level courses or higher.
c) Curriculum Vitae.
d) Work experience (to be assessed by the Program director)
e) Certificate of proficiency in the English language or TOEFL, IELTS, MELAB or PTE (refer to the Admissions section of this calendar for minimum English language proficiency score requirements.)
f) Two Reference Letters.

### 3. Application Deadline

CALGARY:
Canadian Citizens and Permanent Residents:
31 March for May admission
International Students:
31 December for May admission

QUITO:
Residents not requiring a study permit:
30 June for August admission
Canadian/International students:
30 April for August admission

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process.

### 5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and Haskayne School of Business requirements, the Program requires:

CALGARY and QUITO:
a) Successful completion of 14 graduate-level courses
b) Attendance and participation in seminars, upgrade courses and field trips
c) Attendance and participation in Recapitulation session

QUITO only:
Completion of English upgrading course (2-3 week duration) for non-native English students *subject to the discretion of the program directors.*

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

The Program does not accept undergraduate courses for credit toward the graduate degree.

### 8. Time Limit

Expected completion time is 16 months. Maximum completion time is six years.

### 9. Supervisory Assignments

Not applicable.

### 10. Required Examinations

A final comprehensive oral examination is required upon completion of all course work. The purpose of the examination is to determine the student's ability to integrate and apply all interdisciplinary aspects of the Program. The examination will be based on content from the 14 courses and seminars. All students must successfully complete all course and seminar requirements before the comprehensive examination.

### 11. Research Proposal Requirements

Please refer to SEDV 625 course requirements.

### 12. Special Registration Information

Admission to the Program delivered in Calgary is only available in May of each year.
Admission to the Program delivered in Quito, Ecuador is only available in August of each year.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

### 14. Other Information

CALGARY and QUITO:

All courses are instructed in English.

QUITO only:

Students are not required to speak Spanish for admission to the Program at USFQ. However it is strongly recommended that non-native Spanish speakers take the preliminary Spanish upgrade course that is part of the USFQ Program offering.

### 15. Faculty Members/Research Interests

See the website of the home department and home institution of the Faculty member.

### Graduate Courses

Sustainable Energy Development 601 H(3-0)
(formerly Energy and the Environment 601)

*Energy Systems I: Non-Renewable Energy*
Explore the interaction between non-renewable resources (petroleum, natural gas, coal, thermal stations, hydro) and the environment. Consider the technical and environmental aspects within the energy and environment cycle for evaluation and management.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 603 H(3-0)
(formerly Energy and the Environment 603)

*Energy Systems II: Renewable Energy*
Study renewable energy sources as prospective energy suppliers for the future, along with conditions for sustained implementation of renewable energy technologies (biomass, solar, wind, geothermal, co-generation).
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 605 H(3-0)
(formerly Energy and the Environment 605)

*Ecology, Sustainable Development and Indigenous Cultures*
Examines the inter-relationships between ecological systems, indigenous cultures and sustainable global development. Provides a case based analysis of selected issues and strategic management mechanisms for dealing with these issues in the energy project development and approval process.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 607 H(3-0)
(formerly Energy and the Environment 607)

*Water Pollution and its Impact on the Energy Sector*
Causes and consequences of water pollution and management practices and technologies for prevention, mitigation and control of pollutant effluents water usage and management in energy development.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 609 H(3-0)
(formerly Energy and the Environment 609)

*Air Pollution and its Impact on the Energy Sector*
Causes and consequences of air pollution and management practices and technologies for prevention, mitigation and control of pollutant emissions.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 611 H(3-0)
(formerly Energy and the Environment 611)

*Land Pollution and Waste Management in the Energy Sector*
Causes and consequences of land pollution and management practices and technologies for prevention, mitigation and control of pollution. Waste management principles and effective practices in the development of energy projects.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 613 H(3-0)
(formerly Energy and the Environment 613)

*Energy Systems III: Planning and Energy Economics*
Financial principles and evaluation techniques and their application to energy investment planning and to assessment of foundations in energy economics and policies.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 615 H(3-0)
(formerly Energy and the Environment 615)

*Environmental Impact Assessment in the Energy Sector*
Principles and professional practices of environmental impact assessment, with application to energy development projects.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 617 H(3-0)
(formerly Energy and the Environment 617)

*Human Resource and Management in the Energy Sector*
The major concepts and theories of management and organizational dynamics as they impact on the energy sector: interpersonal effectiveness and self awareness, motivation, group dynamics, project teams, supportive communication, stress, leadership, power, influence and conflict, organizational culture, processes of change. An application, skill development, managerial issues, and workplace trends focus.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 619 H(3-0)
(formerly Energy and the Environment 619)

*Environmental Law in the Energy Sector*
Legal systems, nature and sources; international environmental law and its implementation; fundamental legal concepts including jurisdiction, procedural fairness, liability, property and contract; environmental regulatory systems and alternative instruments; judicial review; enforcement and compliance; non-judicial dispute resolution.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 621 H(3-0)
(formerly Energy and the Environment 621)

*Environmental Management Tools in the Energy Sector*
Environmental management tools including strategic policies; structures; impact and production assessment; audits; indicators and reporting; life cycle assessment; risk management; and economic instruments.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 623 H(3-0)
(formerly Energy and the Environment 623)

*Strategic Environmental Planning for Energy Organizations*
A strategic approach to managing environmental and social issues facing energy organizations and its economic rationale in a competitive global market place.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 625 H(3-0)
(formerly Energy and the Environment 625)

*Research Project*
An introduction to research methodology and to energy environmental issues. Knowledge and skill are demonstrated through the completion of an interdisciplinary project.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 627 H(3-0)
(formerly Energy and the Environment 627)

*Group Research Project*
Completion and presentation of a group project that is related to a current environmental issue or problem.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.

Sustainable Energy Development 629 H(3-0)
(formerly Energy and the Environment 629)

*Advanced Seminars*
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

Sustainable Energy Development 699 H(3-0)
(formerly Energy and the Environment 699)

*Topics in Energy and the Environment*
Intensive study of selected topics in energy and the environment and related subjects. Course will reflect changing content needs and faculty interests.
Prerequisite: Admission to the Sustainable Energy Development Program or consent of the Program Director.
MAY BE REPEATED FOR CREDIT

# VETERINARY MEDICAL SCIENCES VMS

## Contact Info

Location: Teaching Research and Wellness (TRW) Building, Room 2D09
Faculty number: (403) 210-6628
Fax: (403) 210-8121
E-mail address: vmgrad@ucalgary.ca
Web page URL: http://vet.ucalgary.ca/graduate

## 1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based

* All Students are registered full-time

## 2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements, the Faculty of Veterinary Medicine requires:

a) A Baccalaureate degree ** or its equivalent from a recognized institution with a minimum admission grade point average of 3.0 on a 4.0 grade point scale or equivalent, and a minimum of 3.0 during the last two years (60 credit hours) of undergraduate study.
b) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (written test), or 92 (internet-based test), a minimum IELTS score of 7.0, or a minimum MELAB score of 82
c) Two Reference Letters.

***Note that a Doctor of Veterinary Medicine (DVM) degree is not a requirement for entry into the MSc or PhD programs. Applicants who do not meet the above requirements will be considered only under exceptional circumstances.*

## 3. Application Deadline

Applications will be considered for the September, January, and May terms and will only be reviewed upon submission of on-line application and receipt of ALL required supporting documents by the following deadlines:

| Admission Term | Canadian and US Admission Deadline | International Admission Deadline |
|---|---|---|
| September | 1 June | 1 March |
| January | 1 November | 1 June |
| May | 1 March | 1 November |

## 4. Advanced Credit

Advanced credit may be given for course work completed prior to entry into the program. The applicant must make requests for advanced credit as part of his or her application for admission.

## 5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements, all MSc and PhD students must take:

a) VETM 600 - *Seminars in Veterinary Medical Sciences.* Presentation of an annual seminar to the Faculty and a final seminar that precedes the thesis defence;
b) VETM 601 - *Professional Skills in Health Science Research*. Series of one-day workshops focusing on skills essential for success in health science research - Research Integrity, Grants and Grant Writing, Verbal and Written Communication of Research Findings, Career Development, and Career Options in the Health Sciences;
c) VETM 605 – *Introduction to Research Methods*. This is an introductory course in research design geared to first year graduate students. A suitable entry-level biostatistics course may be taken as an alternative with permission from the Graduate Program Coordinator; and
d) MSc students must take at least one additional and PhD students must take at least two additional graduate level half-courses appropriate to their field of study and approved by their Supervisory Committee.

## 6. Additional Requirements

All Graduate Students will meet with the Graduate Training Manager at least once per year to review their research and scholarly progress.

Contributions to the published research literature and presentations at scientific conferences are encouraged.

## 7. Credit for Undergraduate Courses

The student's Supervisory Committee may recommend credit for undergraduate courses provided they are relevant to the area of study.

## 8. Time Limit

Expected completion time for an MSc is two years with a maximum time of four years, for students in full-time study; students in PhD programs are expected to complete in four years but not longer than six years.

## 9. Supervisory Assignments

Students will normally have identified a permanent supervisor at the time of admission. Alternatively, the VMS Graduate Program has an optional rotation program that may last up to six months. This program will only be available for the September admission term. The rotation program allows each student to sample different research areas and thus to make a highly-educated choice of research topic, supervisor, and their research team. Rotations are 8 weeks in duration during which the student works closely with the supervisor or member of the research team as part of an ongoing study, as well as focusing on their course work. Students will be paid the standard stipend by the Program during the rotation period (prorated from $20,000 per year = $10,000 for six months or less if the student chooses a permanent supervisor early). After the rotation program, the student will select a permanent supervisor and is encouraged to apply for further funding. For further details, please contact vmgrad@ucalgary.ca.
In consultation with their supervisor(s), a Supervisory Committee will be selected which includes a minimum of two additional faculty members (MSc) or three additional faculty members (PhD). In the case of the PhD, one member should come from outside the Veterinary Medical Sciences graduate program. The Graduate Program Coordinator will approve the composition of the committee within 3 months of appointment of supervisor.

## 10. Required Examinations

The candidacy exam for VMS PhD students will consist of a written and oral component. The student's research proposal serves as the basis for the written component of the candidacy exam. In the Veterinary Medical Sciences Graduate Program, the oral part of the exam is based both on the written proposal and all relevant related topics assigned by the exam committee. Therefore, it is required that the candidacy is completed early in the student's program, at the latest by 18 months. The written component shall consist of maximum 20 page (double-spaced) document, excluding references and figures, and will include a relevant literature summary of the student's field of study and description of proposed research. The oral exam should be scheduled one week after submission of the written proposal to the exam committee. The supervisor/co-supervisor will attend the exam as non-voting members.

The final thesis defence for MSc and PhD degrees will consist of a public seminar followed by an open oral examination.

## 11. Research Proposal Requirements

The VMS Graduate Program requires all Masters and PhD students to defend a Research Proposal to their supervisory committee. A copy of the final version of the proposal will be kept in the student's file. For VMS Masters students, this must happen no later than 12 months after initial registration in the program. For VMS PhD students the defense of the proposal is part of the candidacy exam. All components of the candidacy exam must be completed within 18 months of first registration. All Masters students who transfer to a PhD must present and defend a revised proposal to their Supervisory Committee within six months of program transfer as a component of their candidacy exam.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Full time graduate students in the VMS Graduate Program will be offered a stipend of at least $20,000 per year (normally two years for MSc and four to five years for PhD students). Funding, secured by the student and or supervisor, may come from a variety of sources, including grants, external salary awards, and UCVM Entrance Awards ($18,000). Students who hold relevant professional degrees (e.g. DVM, MD) are also eligible to apply for generous post-professional awards of up to $40,000 per year for two years through the UCVM Entrance Awards. Admission to the Program is conditional on demonstration of internal or external studentship support.
Although initially required to pay a differential tuition fees, International students registered in the VMS Graduate Program will be reimbursed the full value of their differential fee each year.
Further information on funding opportunities can be found at http://vet.ucalgary.ca/awards_amp_scholarships.

## 14. Other Information

Outstanding students enrolled in the MSc program may request a change of registration status and transfer to the PhD program. The request must be done within the first 18 months of the program and supported in writing by the supervisor and formally recommended by the Supervisory Committee to the Graduate Program Coordinator. The student will be required to defend their thesis proposal, appropriate for a PhD project, within six months of transferring to complete the requirements of the PhD candidacy exam.

## 15. Faculty Members/Research Interests

Faculty members and their research interests may be found at: http://vet.ucalgary.ca/research_areas. Additional information can be obtained by calling the contact number listed for the VMS program or from the Administrative Office of the Faculty of Graduate Studies.

## Graduate Courses

VETERINARY MEDICINE 600 F(0-1S-0)

Seminars in Veterinary Medical Sciences
The course will teach effective oral presentation and provide feedback on annual seminars to the Faculty and a final seminar that precedes the thesis defense.

VETERINARY MEDICINE 601 H(3-0)

Professional Skills in Health Science Research
Series of workshops focusing on skills essential for success in health science research - Research Integrity, Grants and Grant Writing, Verbal and Written Communication of Research Findings, Effective Career Development, and Career Options in the Health Sciences.

VETERINARY MEDICINE 603 H(3-0)
(Biology 603)

Biology of Laboratory Animals
Based on the Canadian Council of Animal Care syllabus "Basic Principles of Laboratory Animal Science for Research Scientists" covering common laboratory, farm and exotic species. Topics include ethical considerations, regulations and legislation, animal models, facilities and husbandry, hazard control, surgery, anaesthesia, euthanasia and post-mortem examination.

VETERINARY MEDICINE 605 H(3-0)

Introduction to Research Methods
Introductory course on how to design, analyze, and fund health science research. Various study types will be explored including observational studies, medical tests, clinical and experimental trials. Students whose project is epidemiological in nature are encouraged to take Veterinary Medicine 643/Medical Science 643 as an alternative.
Prerequisite: Consent of the Faculty.

VETERINARY MEDICINE 643 H(3-0)
(Medical Science 643)

Biostatistics
Fundamental principles and methods for analyzing data arising from the life sciences. Topics include one and two sample methods for continuous, categorical and survival data; design and analysis of randomized experiments; regression, including multiple linear and logistic regression.

VETERINARY MEDICINE 690 H(3-0)

Directed Study
Lectures, seminars, term papers and/or other training directed to one or only a few students in theoretical and/or laboratory methods at the advanced level in veterinary medical sciences.

VETERINARY MEDICINE 701 H(3-0)
(Medical Science 701)

Advanced Topics in Reproductive Health
A series of topics, ranging from basic sciences to clinical topics (including ethical issues) to increase awareness and comprehension regarding current issues in reproductive health. Also offered as MDSC 701.
Prerequisite(s): Research interest in reproductive health/reproductive biology. Consent of course coordinator and student's supervisor, if applicable.
Also known as: (Medical Science 701)

VETERINARY MEDICINE 702 H(3-0)

Advanced Topics in Stem Cell Biology and Regenerative Medicine
The course will provide a comprehensive overview of stem cell biology in the context of embryonic development and adult tissue maintenance. Students will gain an appreciation for embryonic versus adult stem cells and how these pluripotent or multipotent cells may be utilized in regenerative medicine (i.e. treatment of congenital defects, diseases or injury).

VETERINARY MEDICINE 721 H(3-0)
(Biology 703.86)

Wildlife Parasitology: Principles and Techniques
Students will learn about the ecology of parasites in wildlife populations with emphasis on impacts of parasitism, invasive species, and conservation issues. This is taught through a series of seminars, critical evaluation and discussion of the literature, and independent and group projects. Laboratory sessions include on parasitology techniques for surveillance and research.
Antirequisites: Not for credit with Biology 703.86.

# INTERDISCIPLINARY SPECIALIZATIONS

## BIOLOGICAL ANTHROPOLOGY, INTERDISCIPLINARY SPECIALIZATION BANT

### Contact Info

Location: Earth Sciences 852
Faculty number: 403-220-2665
Fax: 403-282-9562
E-mail address: wwilson@ucalgary.ca
Web page URL: http://www.fp.ucalgary.ca/bioanth

### 1. Degrees and Specializations Offered

The University offers an interdisciplinary specialization in Biological Anthropology to students registered in an existing graduate program. The student will receive the degree offered by the home program:

Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based
Master of Arts (MA), thesis-based
Specialization: Biological Anthropology (Interdisciplinary)

### 2. Admission Requirements

In addition to Faculty of Graduate Studies requirements, all applicants must meet the minimum standards of the home program. Admission to the specialization requires:

a) A Bachelor of Arts or Bachelor of Science degree (and Master of Arts degree for admission to the PhD program) in Anthropology, Archaeology, Biology, Zoology, Ecology, or Health Sciences with a GPA of at least 3.3 on a 4.0 point scale in the last two years of program or over the last ten full course equivalents.
b) An example of the applicant's written work: a term paper, research paper, Master of Arts, or honours thesis that the applicant considers representative of his or her best work. Published work authored by the applicant is also acceptable provided the applicant is the sole or senior author.
c) A concise statement setting forth the applicant's academic interests and reasons for wishing to pursue graduate work in the specialization. The area of thesis research should also be specified.
d) An up-to-date curriculum vitae.

### 3. Application Deadline

The deadlines for the submission of complete application is:

15 January for September admission and funding

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

### 5. Program/Course Requirements

In addition to Faculty of Graduate Studies and the home program requirements, the Specialization requires:

#### Master of Arts / Master of Science

1. Five half-course equivalents, which shall include:

a) Archaeology 617 (Theory and its Application in Biological Anthropology).
b) Anthropology 603 (Thesis Development).
c) Any two of the following: Medical Science 755 (Human Gross Anatomy), Archaeology 613 (Analysis of Human Skeletal Remains), Anthropology 635 (Primatological Theory), or Anthropology 605 (Professional Skills for Anthropologists), Anthropology 613 (Current Issues in Methodology in Primatology).
d) One optional course relevant to the proposed research topic.
e) All students are expected to have proficiency in statistics. The supervisor and two other faculty members of the specialization, in concert with the applicant, will determine if additional course work is needed in statistics, depending upon the applicant's background and proposed research area.

2. A season of fieldwork offering appropriate experience for the proposed research (for example, primate field study, archaeological excavation, or field research in human biology), to be approved by the supervisor. However, students specializing in laboratory-based topics (for example, morphological studies or bone chemistry) may substitute an approved program of laboratory work for the fieldwork requirement.

#### Doctor of Philosophy

1. Course Requirements:

If students entering the PhD specialization have completed the Master's specialization in Biological Anthropology, or if they have completed equivalent courses in another Master's program, they will not be required to repeat those courses. Rather, additional courses will be determined at the discretion of the student's supervisory committee.
Normally, six half-course equivalents which shall include (unless completed previously):

a) Archaeology 617 (Theory and its Application in Biological Anthropology).
b) Anthropology 701 (Independent Studies).
c) Any two of the following: Medical Science 755 (Human Gross Anatomy), Archaeology 613 (Analysis of Human Skeletal Remains), Anthropology 635 (Primatological Theory) or Anthropology 605 (Professional Skills for Anthropologists), Anthropology 613 (Current Issues in Methodology in Primatology).
d) Two courses relevant to the proposed research topic.

The number of courses required of each student may vary according to his or her particular needs as determined by the Supervisory Committee. Statistics will be required in the event the student's committee deems it necessary. The courses will be selected based on the student's previous statistics training and the type of data analyses to be conducted in the research.

2. Two seasons of fieldwork offering appropriate experience for the proposed research topic (for example, primate field study, archaeological excavation, or field research in human biology), to be approved by the supervisor. Fieldwork may have been undertaken before entry into the specialization and may be counted toward the fieldwork requirement. Students specializing in laboratory-based topics (for example, morphological studies or bone chemistry), may substitute an approved specialization of laboratory work for the fieldwork requirement.

3. Submission to the supervisory committee of a paper that demonstrates an ability to research and write a paper at a professional level.

4. Proficiency in a second language

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

Students may apply for no more than one 500-level course for graduate credit, subject to the approval of the Program Director. Graduate students taking a 500-level course for graduate credit will be required to complete additional assignments.

### 8. Time Limit

Expected completion time for the MA and MSc is two years and maximum completion time is four years. Expected completion time for the PhD is four years and maximum completion time is six years.

### 9. Supervisory Assignments

Students will be assigned a supervisor upon admission.

### 10. Required Examinations

Final thesis oral examinations are open.

*Oral Candidacy Examinations*
Following the completion of all course work, the research paper and the language requirement, doctoral students sit the Candidacy Examination. In the Biological Anthropology Graduate Specialization, the Candidacy Examination consists of two parts in sequence, as follows: (1) a written component and (2) an oral component.

The oral candidacy examination is required by University regulations and must be held no later than twenty-eight months following initial registration as a full-time graduate student in a Ph.D. program. Students entering the doctoral program with a Bachelor's degree, or transferring into a doctoral program from a Master's program before the Master's program is completed, must attempt the candidacy examinations no later than 36 months after initial registration in the Faculty of Graduate Studies.

The Candidacy Examination in the Biological Anthropology Graduate Specialization consists of a written plus an oral examination administered by the Candidacy Examination Committee, composed of the Supervisory Committee plus two additional members, one of whom must be external to the Specialization if the External is not already a member of the Supervisory Committee.

The Candidacy Examination is an examination of the student's knowledge and abilities to reason, utilize the relevant literature, and to solve problems within the three fields or areas which have been set out.
In consultation with the student, the Supervisory Committee will determine three areas of knowledge for which the student will be responsible in his or her Candidacy Examination. These topics will be communicated {in writing} to the student, with copies to other members of the Supervisory Committee.

These topics will also be communicated to the two other members of the Candidacy Examination Committee, who must be selected no later than eight weeks prior to the oral examination.

Members of the Candidacy Examination Committee will each submit one or two questions, so that there are at least two questions within each of the three areas. The supervisor will select six questions from those submitted, and provide them to the student at least five weeks prior to the Oral Candidacy Examination. The student will select one question from each of the three areas for a total of three questions. The student will have two weeks in which to prepare answers to these questions as a take-home, open-book exam. Each answer should be

approximately 6000 words. Copies of the completed examination will be distributed to all members of the Examination Committee. The Committee will assess the written exam on a Pass/ Fail basis. The oral examination is conducted in accordance with Faculty of Graduate Studies regulations.

In the oral component of the Candidacy Examination, the written examinations will serve as the basis from which the examination shall proceed, but examiners are not limited to the written component in framing the questions asked, and questioning may range into cognate areas, at the discretion of the Neutral Chair.

Students must pass both the written and oral exams in order to pass the candidacy exam.

### 11. Research Proposal Requirements

Within twenty months of entering the program, the student, with the supervisor's advice, develops a thesis research proposal. This is then transmitted to the student's supervisory committee for agreement and to the Program Director for approval and placed on file.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to the home program by 2 January.

### 14. Other Information

Given the limited resources, the specialization may, in any year, admit fewer applicants than those who are qualified to undertake graduate studies.

### 15. Faculty Members/Research Interests

See the website of the home department of the faculty member.

## CLINICAL RESEARCH, INTERDISCIPLINARY SPECIALIZATION CRES

Applications for this interdisciplinary specialization are not currently being accepted.

## COMPUTATIONAL MEDIA DESIGN CMD INTERDISCIPLINARY SPECIALIZATION

### Contact Info

Location: Information and Communications Technology Building, Room 602
Faculty number: (403) 220-6015
Fax: (403) 284-4707
E-mail address: gradapps@cmd.ucalgary.ca
Web page URL: http://www.cmd.ucalgary.ca

### 1. Degrees and Specializations Offered

The University offers an interdisciplinary specialization in Computational Media Design to students registered in an existing graduate program in the Department of Computer Science, the Faculty of Environmental Design and the Departments of Art, Drama or Music. The student will receive the degree offered by the home program.
Master of Arts (MA), thesis-based
Master of Environmental Design, thesis-based
Master of Fine Arts (MFA), thesis-based
Master of Music (MMUS), thesis-based
Master of Science (MSC), thesis-based
Doctor of Philosophy (PhD),
Specialization: Computational Media Design (Interdisciplinary)

These degrees are offered jointly through the Department of Computer Science, Faculty of Science; Faculty of Environmental Design; and Departments of Art, Drama, and Music, Faculty of Arts.

Students may register in the above degree programs as part-time students where part-time enrolment is offered and only with permission from the Director of the CMD interdisciplinary specialization.

### 2. Admission Requirements

In addition to the Faculty of Graduate Studies and the home program requirements, the Specialization requires:

a) Admission to a Master's or PhD home program that offers the CMD specialization (See list of degrees offered in article 1 above.)
b) Single page statement of interest. This is not a proposal but a declaration of interest in the interdisciplinary research in arts, design and computer science.
c) Portfolios can be provided but are not required. A portfolio of up to 10 recent works presented in CD/DVD format, or made accessible on-line, is optional but strongly recommended. This is particularly true for students applying with an arts or design background
d) Two Reference Letters

Master's Degree.

a) An undergraduate background that includes a four-year Bachelor's degree or equivalent. While applicants from any discipline will be considered, undergraduate degrees in Computer Science, Fine Arts, or Design are normal entry backgrounds. Starting the CMD interdisciplinary specialization with a background in one of these areas is possible, but a background in two areas is favoured.
b) Admission to a Master's degree program that includes the CMD specialization

Doctor of Philosophy

a) A curriculum vitae
b) A Masters degree from a recognized institution, or for exceptional students applying directly to the PhD program with a Bachelors degree, all the requirements for a Master's degree (above) apply, plus demonstrated exceptional research and/or creative ability. These direct entry students will be considered on a case-by-case basis.

### 3. Application Deadline

The deadlines for the submission of complete applications correspond to the home program through which applicants have applied.

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

### 5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and the home program requirements, the Specialization requires:

Master's programs:

5 half-course equivalents beyond the undergraduate degree level plus thesis or an installation/body of work

Master's courses include:

a) One graduate level course in either Design or Art
b) One graduate level course in Computer Science
c) On e graduate level research methodology course
d) 2 other graduate level courses
e) Additional courses may be required on a case-by-case basis as determined by the CMD Supervisor in the student's first year of the interdisciplinary specialization.
f) A research / creative practice seminar.
g) CMD thesis and thesis defence (see section 10 and 11 below).

Doctor of Philosophy

8 half-course equivalents beyond the undergraduate degree plus thesis or an installation/body of work

PhD courses include:

a) The 5 courses required for Master's programs with a specialization in CMD (advanced credit provided for these courses if a Master's degree with a specialization in CMD has been done)
b) One graduate level course in either Environmental Design or Art
c) One graduate level course in Computer Science
d) One other graduate level course
e) Additional courses may be required on a case-by-case basis as determined by the CMD Supervisor in the student's first year of the interdisciplinary specialization.
f) CMD PhD Candidacy Examination (see section 11)
g) A research / creative practice seminar.
h) CMD PhD thesis and CMD PhD thesis defence (see section 11).

### 6. Additional Requirements

A thesis component that describes research conducted and/or body of creative work must be completed during the CMD interdisciplinary specialization.

### 7. Credit for Undergraduate Courses

At most, one half-course at the 500-level may be included as part of the course work requirement. This must be recommended by the supervisor(s) and approved by the Director of the CMD interdisciplinary specialization on the appropriate form.

### 8. Time Limit

For the Master of Science with a specialization in CMD, the expected completion time is 2 years and the maximum completion time is 4 years. For the Doctor of Philosophy with a specialization in CMD, the expected completion time is 4 years and the maximum completion time is 6 years.

### 9. Supervisory Assignments

For simplifying the explanations in this document and for the purposes of CMD requirements, Fines Arts and Environmental Design are considered as one scholarly unit and referred to as Art & Design.

Generally, students are admitted to a specific research area and supervisor. Sometimes students are admitted to a specific lab or research area only, and are assigned an interim advisor.

Appointment of Supervisor(s): students will have an interim supervisor and co-supervisor appointed on their acceptance letter. Between the supervisor and the co-supervisor the disciplines of Computer Science, Arts and Design will be covered.

Students may seek a change in research area or supervisor after admission. The student must find permanent supervisors within six months of the start of the program. Such a change must be satisfactory to the student, and supported by the new supervisors and must be approved by the Director of the CMD interdisciplinary specialization. The role of the supervisor is to take responsibility for over all guidance, instruction, and research/creative practice supervision. The role of the co-supervisor in this case is to provide supplementary guidance, instruction and research stimulation on a regular or extensive basis.

Doctoral Supervisory Committee: The Doctoral Supervisory Committee should be constituted by the supervisor in consultation with the student and must be approved by the Director of the CMD interdisciplinary specialization and sent to the Faculty of Graduate Studies. It will consist of the supervisor and co-supervisor, and two additional members. The two additional committee members may be external to the student's program. Exceptions to this will be considered on an individual basis. At least one of the members of the Supervisory Committee should have had supervisory experience at the doctoral level.

### 10. Required Examinations

Final thesis oral examinations are open.

#### Master's Thesis Oral Examination:

This exam will be conducted as specified by the Faculty of Graduate Studies. A thesis component that describes research conducted and/or body of creative work completed is required to complete the Master's program. Graduating students will have to demonstrate skills and expertise in Computer Science and Arts & Design. CMD wants to encourage research and creative work that incorporates aspects of both Computer Science and Art & Design, thus there is recognition for and appreciation of a thesis that represents an interdisciplinary balance between the fields. The student's Internal Examiner will be a member of the alternate discipline to the primary Supervisor. For example with a Computer Science primary supervisor, the Internal Examiner will be from Art & Design. The student's External Examiner will be from outside the CMD membership. Exceptions to this rule will be considered on an individual basis. At least one of the members of the Supervisory Committee should have had supervisory experience at the Master's level. Normal Faculty of Graduate Studies rules about conflicts apply.

#### Ph.D. Candidacy Exam:

The candidacy exam is composed of:
a) A reading list: The scope of the candidacy exam is defined by a reading list. This reading list is prepared by the student and the student's supervisors in consultation with the student's supervisory committee. This reading list must be approved at least two months before the written and oral candidacy examinations.
b) A research proposal (see Section 11)
c) A written exam: The written examinations are taken by the candidate after course work is completed, and after approval of the doctoral proposal, and before the oral candidacy examination. The CMD written exam must be approved by the Director of the CMD interdisciplinary specialization, and consists of a take-home examination (normally 6-10 days).
d) A candidacy oral exam: The candidate's reading list, completed written exam, together with the research proposal, must be submitted to the examination committee at least 10 working days in advance of the candidacy oral exam. These documents form the basis for the candidacy oral exam.

#### PhD Thesis Oral Examination:

This exam will be conducted as specified by the Faculty of Graduate Studies. A thesis that describes the research conducted and/or the body of creative work completed is required to complete the PhD program. The thesis will set the research/work in its literary and new media context and present evidence that the work is worthy of either publication or external recognition. Graduating students must have demonstrated skills and expertise in Computer Science and Arts & Design. CMD encourages research and creative work that incorporates aspects of both Computer Science and Art & Design; thus there is recognition for and appreciation of a thesis that represents an interdisciplinary balance between the fields. The student's Internal Examiner will be a Faculty member from the University of Calgary but outside of the CMD membership. The student's External Examiner will be an internationally recognized expert in the research/creative practice area of the student's research. Normal Faculty of Graduate Studies rules about conflicts apply.

### 11. Research Proposal Requirements

Research proposal requirements are determined by the supervisor at the Master's level.

At the Doctoral level, a research proposal, approved by the student's supervisory committee, must be submitted to the Director of the CMD interdisciplinary specialization at least two weeks before the departmental written exam begins. The research proposal will contain an abstract, a literature survey (including an analysis of the literature), an overview of the proposed research, a plan for completing the proposed research, and references.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards see the Awards and Financial Assistance section of the calendar.

Successful applicants may be offered departmental teaching assistantships and/or research assistantships in their letter of offer.

Students applying for scholarships must submit their application as appropriate, according to the requirements of the scholarship.

### 14. Other Information

None.

### 15. Faculty Members/Research Interests

Information on faculty research interests may be found at: http://www.cmd.ucalgary.ca/Research/

Registration in all graduate courses requires the approval of Computational Media Design. CMD students are eligible to take any course in Computer Science, Fine Arts, and Environmental Design, provided they have the necessary prerequisites.

## ENERGY & ENVIRONMENTAL SYSTEMS INTERDISCIPLINARY SPECIALIZATION EESS

#### Contact Info

Location: Earth Sciences Building, Room 602
Faculty number: (403) 220-8872
Fax: (403) 210-3894
E-mail address: eespinfo@ucalgary.ca
Web page URL: http://www.ucalgary.ca/ees

### 1. Degrees and Specializations Offered

The University offers an interdisciplinary specialization in Energy and Environmental Systems to students registered in an existing graduate program currently offered through one of the following Faculties that are affiliated with the Institute for Sustainable Energy, Environment and Economy (ISEEE):

- Schulich School of Engineering
- Faculty of Environmental Design
- Haskayne School of Business
- Faculty of Law
- Faculty of Science
- Faculty of Social Sciences

The student will receive the degree offered by the home graduate program:

- Doctor of Philosophy (PhD)
- Master of Arts (MA), thesis-based
- Master of Laws (LLM), thesis-based
- Master of Science (MSc), thesis-based
- Master of Geographic Information Systems (MGIS), course-based
- Specialization: Energy and Environmental Systems (Interdisciplinary)

In cases where the student's proposed research area cannot be supported through a single academic program, and which would necessitate the combination of at least three academic areas, they may seek admission and earn the EES specialization through the Interdisciplinary Graduate Program (IGP) of the Faculty of Graduate Studies.

## 2. Admission Requirements

In addition to the Faculty of Graduate Studies' requirements, all applicants must meet the minimum admission requirements of the home graduate program. Admission to the specialization itself requires:

a) A sample of the applicant's written work: a term paper, research paper, or a Master's / honours thesis, that the applicant considers representative of his or her best work.
b) A concise statement (500 words maximum) of the applicant's academic interests and reasons for wishing to pursue graduate work in the EES specialization. A proposed area of thesis research should also be discussed.
c) A current curriculum vitae.
d) For students required to provide proof of English proficiency, a TOEFL score of at least 550 (written) or 80 (internet based), or an IELTS score of 7.0, or a MELAB score of 80, or a PTE score of 59. However, if the graduate program to which the student is applying requires higher scores, then these must be met.

Submission of GRE scores are strongly encouraged but not required. Applicants must indicate their intention of applying for the EES specialization to the home graduate program, and likewise inform the EES Program Office of their application status as per the instructions on the EES Web site.

Note that successful candidates must be approved for admission by both the home graduate program as well as by EES. Admission to a degree program does not guarantee entrance to the specialization.

## 3. Application Deadline

The deadlines for the submission of complete applications correspond to those of the respective home graduate program to which students are applying.

## 4. Advanced Credit

Requests for advanced credit must be made at the time of application. Credit will not be granted for course work taken as part of another completed degree / diploma or for courses taken to bring the admission GPA to the required level.

## 5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and the home graduate program's requirements, students undertaking the EES specialization must successfully complete the following:

### EES Specialization at the Master's Level (thesis-based)

Required core courses:

- EES 601: Introduction to Energy and Environmental Systems
- EES 603: Project Course
- EES 605: Graduate Seminar
- EES 607: Tools for System Analysis (block week course)

Depending on their home program and area of study, students may take additional EES related courses in consultation with their research supervisor.

NOTE: In accordance with Faculty of Graduate Studies' regulations, students in thesis-based programs may obtain a reduction in course load. This may be appropriate in cases where there is overlap between EES courses and the home graduate program's course requirements. Such requests may be agreed to by the student's supervisor, and be submitted to and approved by the Graduate Coordinator of the home graduate program and the EES Program Director or designated EES Committee Member.

### EES Specialization with MGIS Degree (course-based)

Students enrolled in the Master of Geographic Information Systems degree program who wish to earn the EES specialization will need to take three of the EES Core Courses (EES 601, EES 603, and EES 605). Students are not required to take GEOG 683, but must take the other core courses in the MGIS program (GEOG 647, GEOG 633, GEOG 639, and GEOG 681). Finally, students will still be required to fulfill the 10-half course requirement of the MGIS program, and can select the remaining three courses from GEOG optional courses or EES related courses. It is not recommended that students required to complete the MGIS upgrade courses undertake the EES specialization.

### EES Specialization at the Doctoral Level

Doctoral students are required to take the same EES core courses that are required at the Master's level, if they have not previously completed the EES specialization. Doctoral students must also comply with requirements of their home graduate program. Students who have previously earned a Master's degree with the EES specialization have no other required EES courses. However, they may need to take courses relevant to their area of study as recommended by their thesis supervisor. Doctoral students may seek a reduction in course load as per the rules for thesis-based Master's students shown above.

### EES Specialization with the Interdisciplinary Graduate Program (IGP)

The course curriculum for IGP students will be determined at the IGP admission seminar. Course requirements will normally include the EES core courses, but may also include other courses to ensure adequate coverage of the relevant disciplines involved. Changes to the student's curriculum after the admission seminar will require the approval of the Supervisory Committee, IGP Director, and the Faculty of Graduate Studies.

## 6. Additional Requirements

None.

## 7. Credit for Undergraduate Courses

Students are allowed to take only one 500-level course for graduate credit, subject to the approval of the EES Program Director. Graduate students taking a 500-level course for graduate credit will be required to complete additional assignments.

## 8. Time Limit

Expected completion time for a Master's degree is two years and the maximum completion time is four years.

Expected completion time for the PhD degree is four years and the maximum completion time is six years.

## 9. Supervisory Assignments

Students must have a formal supervisor appointed to them within twelve months of beginning the EES specialization. Supervisory arrangements must be approved by the EES Program Director.

## 10. Required Examinations

Final thesis orals follow the requirements of the Faculty of Graduate Studies and the home graduate program.

Students in doctoral programs must fulfill the written candidacy examination requirement of the home graduate program. All doctoral students must complete the candidacy oral examination in accordance with Faculty of Graduate Studies' regulations.

## 11. Research Proposal Requirements

Doctoral students and thesis-based Master's students must present a written and oral research proposal to their supervisory committees no later than twelve (Master's) and twenty (PhD) months after initial registration. The research proposal must be submitted to the EES Program Director for approval and placed on file.

This requirement of research proposal approval does not apply to students pursuing the EES specialization through the Interdisciplinary Graduate Program, since the research proposal must be approved as part of IGP's admission process.

## 12. Special Registration Information

None.

## 13. Financial Assistance

Financial assistance will be available to all qualified full-time graduate students. Students are also encouraged to seek funding opportunities through the Faculty of Graduate Studies' Open Scholarship Competition (contact the home program for application deadlines), as well as external funding agencies.

## 14. Other Information

Given limited resources, the specialization may, in any year, admit fewer applicants than those who are qualified to undertake graduate studies.

## 15. Faculty Members/Research Interests

See the Web site of the home department of the faculty member.

For bios and research interests of those faculty directly associated with the Energy and Environmental Systems Group, visit http://www.ucalgary.ca/EES/People.

Graduate Courses

Energy and Environmental Systems 601 H(3-1T)

*Introduction to Energy and Environmental Systems*
The course provides a structured overview to the interactions of energy systems and the environment. The lectures are taught collaboratively by several EES faculty. The course aims to foster a unified, scientific understanding of energy flows and transformations in industrial society and the natural world; a scientific overview of some of the most important links between energy and environmental systems; and an introduction to the business, legal and regulatory systems that shape the interactions between energy and environment.

Prerequisite: Graduate standing in EES specialization or instructor permission.

Energy and Environmental Systems 603 H(1-3T)

*Project Course*
Projects are applied interdisciplinary problem-solving courses in which students work as leaders or as members of project teams. Most course time is devoted to project management and presentations from students. The project course gives students experience working on weakly-structured, real-world problems that require teamwork and contributions from diverse disciplines. They are co-managed by students and faculty advisors and should be responsive to an external "client" or expert panel. Problem areas are abstracted from local, provincial and national situations and involve the interaction of energy systems, the environment and public policy. Oral and written presentations concerning the results of project studies are required.
Prerequisite: Graduate standing in EES specialization or instructor permission.

Energy and Environmental Systems 606 H(0-2S)

*Graduate Seminar*
The graduate research seminar fosters the development of presentation and communication skills as well as engagement in critical analysis and debate. Course time is primarily research presentations by faculty, research staff and students. All students must present their work.
Prerequisite: Graduate standing in the EES specialization or instructor permission
NOT INCLUDED IN GPA

Energy and Environmental Systems 607 H(3-0)

*Tools for System Analysis*
This intensive block week course provides an introduction to analytical methods and software tools that are most frequently used for research in energy and environmental systems. Analytical methods include, risk, uncertainty and decision analysis; an introduction to engineering economics; and an introduction to tools for environmental modeling. Software tools include Excel, and extensions such as Crystalball, general purpose systems such as Matlab and Mathematica; and GIS tools for non-specialists.
Prerequisite: Graduate standing in the EES specialization or instructor permission.

Energy and Environmental Systems 619 H(3-0)

*Special Topics*
Students will be provided with the opportunity to focus on advanced studies in specialized topics pertaining to energy system engineering, law, public policy or economics, or a combination of these issues.
Prerequisite: Graduate standing in the EES specialization or instructor permission
MAY BE REPEATED FOR CREDIT

## ENGINEERING, ENERGY & ENVIRONMENT, INTERDISCIPLINARY SPECIALIZATION ENEE

### Contact Info

Location: Information & Communications Technology Building, Room ICT248
Faculty number: (403) 210-9892
Fax: (403) 210-9892
E-mail address: ceere@ucalgary.ca
Web page URL:
http://www.schulich.ucalgary.ca/CEERE/

The Centre for Environmental Engineering Research and Education (CEERE) in the Schulich School of Engineering (SSE) has the overall responsibility for the coordination and delivery of a comprehensive postgraduate program specialization in the multi-disciplinary field of energy & environment. All five engineering departments participate in delivering this SSE-wide specialization.

Applications for admission to the Faculty of Graduate Studies should be submitted to the engineering department that best matches the applicant's undergraduate and/or postgraduate academic training.

### 1. Degrees and Specializations Offered

Degrees with an interdisciplinary specialization in Energy & Environment:
Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based
Master of Engineering (MEng), thesis-based and course-based

### 2. Admission Requirements

In addition to the Faculty of Graduate Studies, SSE, and home department requirements, the Energy & Environment specialization requires:

#### Master of Engineering and Master of Science

A Bachelor's degree in engineering
*Note: Applicants with applied science degrees may be considered, but additional undergraduate engineering courses may be required.*

#### Doctor of Philosophy

A Master's degree in engineering
*Note: Transfer to the doctoral program without completing the Master's degree may be approved for exceptional students.*

### 3. Application Deadline

See departmental and program sections in this Calendar for deadlines regarding submission of complete applications for students with international transcripts or with Canadian and US transcripts.

### 4. Advanced Credit

See "Engineering Programs" in this Calendar.

### 5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements and to the course requirements described below, students should consult their "home" department in the Schulich School of Engineering for any additional program or course requirement(s).

#### Master of Engineering (Course-based Route)

10 half-courses of which a minimum of six must be graduate half-courses. At least four courses must be selected from a list of courses related to Energy & Environment available from CEERE.

Students with non-engineering undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

#### Master of Engineering (Thesis-based Route)

A minimum of four graduate half-courses. At least two courses must be selected from a list of courses related to Energy & Environment available from CEERE.

Students with non-engineering undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

#### Master of Science

A minimum of four graduate half-courses. At least two courses must be selected from a list of courses related to Energy & Environment available from CEERE.

Students with non-engineering undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

#### Doctor of Philosophy

For applicants with Bachelor of Science and Master of Science degrees in Engineering:

A minimum of two graduate half-courses. At least one course must be selected from a list of courses related to Energy & Environment available from CEERE.

For applicants with a Bachelor's degree in Engineering, but without a completed Master's degree:

A minimum of six graduate half-courses. At least three courses must be selected from a list of courses related to Energy & Environment available from CEERE.

Students with non-engineering undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

### 6. Additional Requirements

Not applicable.

### 7. Credit for Undergraduate Courses

Not applicable.

### 8. Time Limit

Expected completion time is two years for the Master of Science degree, and three years for the Doctor of Philosophy. Maximum completion time is four years for the Master of Science and Master of Engineering (thesis-based ) degrees and six years for the Master of Engineering (course-based) and Doctor of Philosophy degrees.

### 9. Supervisory Assignments

All students are required to have a thesis supervisor before the second annual registration. For students in the Master of Science and Doctor of Philosophy degree programs, a supervisor is normally appointed at the time of admission.

### 10. Required Examinations

All final thesis oral examinations involve a public seminar/presentation before a open oral examination.

### 11. Research Proposal Requirements

None.

### 12. Special Registration Information

None.

### 13. Financial Assistance

See "Engineering Programs."

### 14. Other Information

See "Engineering Programs."

### 15. Faculty Members/Research Interests

The current research interests of the faculty members can be found at http://www.schulich.ucalgary.ca/CEERE/ or from the various engineering departments.

## ENVIRONMENTAL ENGINEERING, INTERDISCIPLINARY SPECIALIZATION ENEN

#### Contact Info

Location: Information & Communications Technology Building, Room ICT248
Faculty number: (403) 210-9892
Fax: (403) 210-9892
E-mail address: ceere@ucalgary.ca
Web page URL:
http://www.schulich.ucalgary.ca/CEERE/

The Centre for Environmental Engineering Research and Education (CEERE) in the Schulich School of Engineering (SSE) has the overall responsibility for the coordination and delivery of a comprehensive postgraduate program specialization in the multi-disciplinary field of environmental engineering. All five engineering departments participate in delivering this SSE-wide environmental engineering specialization.

Applications for admission to the Faculty of Graduate Studies should be submitted to the engineering department that best matches the applicant's undergraduate and/or postgraduate academic training.

### 1. Degrees and Specializations Offered

Degrees with an interdisciplinary specialization in Environmental Engineering:
Doctor of Philosophy (PhD)
Master of Science (MSc), thesis-based
Master of Engineering (MEng), thesis-based and course-based

### 2. Admission Requirements

In addition to the Faculty of Graduate Studies, SSE, and home department requirements, the Environmental Engineering specialization requires:

#### Master of Engineering and Master of Science

A Bachelor's degree in engineering
*Note: Applicants with applied science degrees may be considered, but additional undergraduate engineering courses may be required.*

#### Doctor of Philosophy

A Master's degree in engineering, preferably in environmental engineering or equivalent
*Note: Transfer to the doctoral program without completing the Master's degree may be approved for exceptional students.*

### 3. Application Deadline

See departmental and program sections in this Calendar for deadlines regarding submission of complete applications for students with international transcripts or with Canadian and US transcripts.

### 4. Advanced Credit

See "Engineering Programs" in this Calendar.

### 5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements and the course requirements described below, students should consult their "home" department in the Schulich School of Engineering for any additional program or course requirement(s).

#### Master of Engineering (Courses-based Route)

10 half-courses. ENEN 603 and 605 are normally required, together with at least one of ENEN 621, 623, 625 or 627. ENEN 601 is not required.

Students with non-engineering undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

#### Master of Engineering (Thesis-based Route)

A minimum of five half-courses. ENEN 603 and 605 are normally required, together with at least one of ENEN 621, 623, 625 or 627. ENEN 601 is not required.

Students with non-engineering undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

#### Master of Science

A minimum of five half-courses plus ENEN 601. ENEN 603 and 605 are normally required, together with at least one of ENEN 621, 623, 625 or 627.

Students with non-engineering undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

#### Doctor of Philosophy

For applicants with Bachelor of Science and Master of Science degrees in Environmental Engineering:

A minimum of three half-courses plus ENEN 601. One of ENEN 621, 623, 625 or 627 is normally required.

For applicants with Bachelor of Science and Master of Science degrees in Engineering, but not Environmental Engineering:

A minimum of four half-courses and ENEN 601. ENEN 603 and 605 are normally required, together with at least one of ENEN 621, 623, 625 or 627.

For applicants with a Bachelor's degree in Engineering, but without a completed Master's degree:

A minimum of eight half-courses plus ENEN 601. ENEN 603 and 605 are normally required, together with at least two of ENEN 621, 623, 625 or 627.

### 6. Additional Requirements

All full-time Master of Science and Doctor of Philosophy students are required to register and participate in the Research Seminar course, Environmental Engineering 601, in each of the Fall and Winter terms.

### 7. Credit for Undergraduate Courses

Not applicable.

### 8. Time Limit

Expected completion time is two years for the Master of Science degree, and three years for the Doctor of Philosophy. Maximum completion time is four years for the Master of Science and Master of Engineering (thesis-based) degrees and six years for the Master of Engineering (course-based) and Doctor of Philosophy degrees.

### 9. Supervisory Assignments

All students are required to have a thesis supervisor before the second annual registration. For students in the Master of Science and Doctor of Philosophy degree programs, a supervisor is normally appointed at the time of admission.

### 10. Required Examinations

All final thesis oral examinations involve a public seminar/presentation before a open oral examination.

### 11. Research Proposal Requirements

None.

### 12. Special Registration Information

None.

### 13. Financial Assistance

See "Engineering Programs."

### 14. Other Information

See "Engineering Programs."

### 15. Faculty Members/Research Interests

The current research interests of the faculty members can be found at http://www.schulich.ucalgary.ca/CEERE/ or from engineering departments.

#### Graduate Courses

**Environmental Engineering 601** E(0-3S)

*Research Seminar*
Oral presentations consisting of reports on studies of the literature or of current research. Required of all full-time graduate students registered in MSc and PhD degree programs in Environmental Engineering (in each of Fall and Winter terms).
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

**Environmental Engineering 603** H(3-0)

*Principles of Environmental Engineering*
Mass and energy balance for reacting and non-reacting environmental engineering systems under steady state and unsteady state conditions. Fundamentals of momentum, heat and mass transfer as applied in air and water pollution. Thermodynamic and phase equilibria considerations. Contaminant partitioning and transport in air, surface water and groundwater. Chemical reaction kinetics. Application of ideal continuously stirred tank reactor (CSTR) and plug flow reactor (PFR) concepts in environmental engineering. Residence time distribution (RTD) and reactor non-idealities. Introduction to life cycle analysis.

Environmental Engineering 605 H(3-0)

*Environmental Chemistry and Microbiology*
Chemistry of organic and inorganic contaminants in the environment. Natural chemical cycles in the biosphere, geosphere, hydrosphere and atmosphere, and consequences of anthropogenic disturbances. Aquatic, atmospheric and soil chemistry. The fate of hazardous, refractory and heavy metal pollutants in the environment. Introductory toxicological chemistry and atmospheric chemistry. Analytical techniques for contaminants in air, water, energy and soil. Introductory microbiology: characteristics and classification of microorganisms, kinetics and mathematical models of microbial growth, applications in environmental engineering. Introduction to ecology.
Note: Credit for both Environmental Engineering 605 and Chemical Engineering 619.19 will not be allowed.

Environmental Engineering 619 H(3-0)

*Special Topics*
New courses on specialized topics relevant to environmental engineering. It may also be offered to doctoral degree students to enable them to pursue advanced studies in particular areas under the direction of a faculty member, which must be arranged and approved prior to registration.
MAY BE REPEATED FOR CREDIT

Environmental Engineering 621 H(3-0)
(Chemical Engineering 701)

*Experimental Design and Error Analysis*
Statistical analysis and design of engineering experiments. Random variables and sampling distributions; estimation and hypothesis testing; concepts of central tendency, variability, confidence level; correlation, regression and variation analysis; robust estimation; experiments of evaluation; experiments of comparison; factorial experiments (analysis of variance); experimental designs (involving randomization, replication, blocking and analysis of covariance).
Note: Credit for both Environmental Engineering 621 and Chemical Engineering 619.45 will not be allowed.

Environmental Engineering 623 H(3-0)

*Air Dispersion Modelling*
Regulations and policy. Mathematical models of contaminant transport in the atmosphere. Atmospheric thermodynamics. Turbulence in the planetary boundary layer. Turbulence and air pollution meteorology. Gaussian plume. Gradient transport and higher-order closure models. Point, area and line sources. Similarity theories. Basic statistical methods applied to turbulent flows. Urban air shed modelling. Theoretical development and practical applications to engineering problems. Air dispersion modelling using computer software.

Environmental Engineering 625 H(3-0)

*Computational Methods for Environmental Engineering*
Taylor series, numerical integration. Linear and nonlinear algebraic equations and solvers. Ordinary and partial differential equations. Finite difference methods: explicit, implicit and Crank-Nicholson methods. Finite difference, finite element or finite volume numerical approximations. Initial and boundary value problems. Boundary conditions, discretization considerations, and design of approximations, accuracy and error reductions. Applications in environmental engineering, such as pollutant dispersion and transport, will be discussed.
Note: Credit for Environmental Engineering 625 and any of Chemical Engineering 639, Civil Engineering 743 or Mechanical Engineering 631 will not be allowed.

Environmental Engineering 627 H(3-0)

*Contaminant Transport*
Mathematical models for contaminant transport in ground water. Flow/transport through porous media, advection, dispersion, diffusion. Sources and sinks. Applications of analytical finite element and finite difference equations, Environmental modelling using computer software.

Environmental Engineering 631 H(2-2)

*Remote Sensing for Environmental Modelling*
Application of geomatics technologies to monitoring, modelling and mitigation of environmental engineering problems. Remote sensing (RS) and Geographic Information Systems (GIS) for estimating parameters in earth systems modelling and land based processes including evapotranspiration, precipitation, snowmelt, temperature, and effects of El Nino. Monitoring of climate change and impacts of anthropogenic activities such as farming induced erosion and desertification. Science and engineering of water quality in inland, coastal and deep ocean environments and the use of RS and GIS to monitor and model eutrophication, sediment levels and temperature.

Environmental Engineering 633 H(3-0)

*Fuzzy Logic for Environmental Engineering*
Complex, nonlinear, or ambiguous system models. Fuzzy set theory, fuzzy logic operations, fuzzification and de-fuzzification. Development of membership functions, fuzzy system simulation, Rule-based reduction methods, Fuzzy classification and pattern recognition, Fuzzy arithmetic and extension principle, Fuzzy Control and Fuzzy cognitive mapping, applications in environmental engineering.
Note: Credit for Environmental Engineering 633 and any of Civil Engineering 619.30 or 619.91 will not be allowed.

Environmental Engineering 635 H(2-2)
(Geomatics Engineering 583)

*Environmental Modelling*
Nature and purpose of environmental modelling; the top-down and the bottom-up approaches; typology of environmental models; definition of fundamental concepts; steps involved in designing and building a model; calibration, verification and validation of models; scale dependency; sensitivity analysis; characteristics, architecture and functioning of selected environmental models.

Environmental Engineering 641 H(3-0)
(Chemical Engineering 643)

*Air Pollution Control Engineering*
Introduction to air quality and air pollution. Impact of air pollution and greenhouse gases on health and climate change. Energy and air pollution. Fundamentals of fossil fuel combustion and related air pollution. Pre-combustion air pollution control strategies: fossil fuel cleaning/refinery, renewable energy (wind, solar, biomass, etc.), and alternative energy sources (hydrogen, etc). In-combustion air pollution control. Post-combustion air pollution control. Industrial air pollution control. Control of particulate matter. Control of VOCs, SOx, and NOx. Adsorption and absorption of air pollutants. GHG emission control. Indoor air quality engineering. Recent advances on related topics.

Environmental Engineering 643 H(3-0)

*Air Pollutant Sampling and Characterization*
Fundamentals and principles of air pollutant sampling and characterization. Kinematics of gases. Principles of gaseous pollutant sampling. Aerosol technology. Isokinetic sampling. Statistics and data analyses for airborne particulate matter. Particle size and concentration measurements. Indoor air quality assessment.
Note: Credit for Environmental Engineering 643 and any of Mechanical Engineering 619.19 or 619.56 will not be allowed,

Environmental Engineering 651 H(3-0)

*Geo-Environmental Aspects of Landfill Design*
Soil-chemical interactions and implications. Waste disposal system design. Leachate migration in unsaturated/saturated zones. Analytical and numerical solution of flow and transport equations. Case studies of groundwater contamination. Design and construction of barrier systems. Leachate collection systems. Landfill closure issues. Landfill gas issues and control systems.
Note: Credit for both Environmental Engineering 651 and Civil Engineering 619.80 will not be allowed.

Environmental Engineering 653 H(3-0)
(Civil Engineering 747)

*Contaminated Soil Remediation*
Overview of soil remediation engineering. Contaminant partitioning in air, water and gas phases. Phases of site assessments, Physical and chemical treatment processes, soil vapour extraction, air sparging, soil washing, soil flushing, thermal desorption and incineration, solidification and stabilization, vitrification, biological treatment processes, bioremediation kinetics, ex situ and in situ techniques. Liquid phase bioremediation as it pertains to soil remediation.
Note: Credit for both Environmental Engineering and Civil Engineering 747 or 619.62 will not be allowed.

Environmental Engineering 655 H(3-0)
(Civil Engineering 745)

*Hazardous Waste and Contaminated Site Management*
Integrated waste management. Functional and fundamental properties of hazardous waste. Toxicological properties of contaminants. Contaminant release mechanisms. Fate and transport of contaminants in the environment. Contaminated site assessment principles. Quantitative human health risk assessment (QHHRA) as applied to contaminated sites. Hazard identification, exposure pathway analysis, risk characterization. Risk management and site remediation. Methods of hazardous waste treatment and contaminated site remediation. Secure land disposal of hazardous waste and contaminated soils and sludges.
Note: Credit for both Environmental Engineering 655 and Civil Engineering 619.60 will not be allowed.

Environmental Engineering 661 H(3-0)
(Chemical Engineering 645)

*Industrial and Produced Wastewater Treatment*
Sources and characterization of industrial wastewater. Treatment objectives and regulations. Unit and process design. Physical/chemical treatment including sedimentation, coagulation, filtration, absorption, adsorption, ion exchange, membrane processes and pH adjustment.

Environmental Engineering 663 H(3-0)
(Civil Engineering 741)

*Biological Processes for Wastewater Treatment*
Specialized biological wastewater treatment processes for removal of impurities not effectively removed by conventional secondary wastewater treatment systems, such as nutrients (e.g. nitrogen and phosphorus), residual organics, residual solids, bacteria and viruses. Wetlands. Activated sludge modelling. Biological nutrient removal. Sludge management. Disinfection.
Note: Credit for both Environmental Engineering 663 and Civil Engineering 619.21 or 741 will not be allowed.

Environmental Engineering 665 H(3-0)
(Chemical Engineering 665)

*Wastewater Issues for the Oil and Gas Industry*
Produced water characteristics, regulations governing produced water management, management options. Technologies used for produced water treatment, novel/emerging technologies. Process design approaches and comparative evaluation of various technologies. Case Studies.
Note: Credit for both Environmental Engineering 665 and Chemical Engineering 619.79 will not be allowed.

Environmental Engineering 671 H(3-0)

*Energy and Environment*
A graduate seminar course. Lectures will alternate with discussion based on assigned reading. Topics will be selected to satisfy the interests of students from the following list. Energy overview from primary energy to end use including, quantities, fuels and prices; energetics of natural systems; formation, extraction, and transformations of fossil fuels; physics and engineering of nuclear power; modern renewables: biomass, solar and wind; electricity generation, transmission and economics; building energy systems; heat and power integration; overview of climate science: paleo-climatology, processes that determine climate, predictions and observations of anthropogenic climate change; technical options for reducing $CO_2$ emissions.
Note: Credit for both Environmental Engineering 671 and Chemical Engineering 619.61 will not be allowed.

Environmental Engineering 673 H(3-0)
(Mechanical Engineering 637)

*Thermal and Cogeneration Systems*
Fundamentals of thermodynamics, fluid mechanics and heat transfer. Thermal and energy systems, heat exchangers, co-generation, etc. Second law of thermodynamics and concept of entropy generation and thermo-economics. Environmental issues and pollution control. Renewable energy system. Co-generation design, heat exchanger design, energy storage systems. Optimization process.
Note: Credit for both Environmental Engineering 673 and Mechanical Engineering 619.13 or 637 will not be allowed.

Environmental Engineering 681 H(0-6)

*Project in Environmental Engineering I*
A one-term half-course which allows course-based MEng degree students with the opportunity of pursuing advanced studies or a design project in environmental engineering under the direction of one or more faculty members, which must be arranged and approved prior to registration. A written proposal, progress reports, and a final report are required.
Note: Credit for Environmental Engineering 681 and any of Engineering 683, Engineering 685 or Environmental Engineering 682 will not be allowed.
Note: Available to course-based MEng degree students only. Cannot be taken following the completion of Environmental Engineering 682.

Environmental Engineering 682 F(0-6)

*Project in Environmental Engineering II*
A two-term full-course which allows course-based MEng degree students with the opportunity to work on a comprehensive research or design project under the supervision of one or more faculty members, which must be arranged and approved prior to registration. A written proposal, progress reports, and a final report are required.
Note: Credit for Environmental Engineering 682 and any of Engineering 683, Engineering 685 or Environmental Engineering 681 will not be allowed.
Note: Available to course-based MEng degree students only. Cannot be taken following the completion of Environmental Engineering 681.

Environmental Engineering 691 H(3-0)

*Environmental Policy Analysis*
Risk analysis: characterizing uncertainty, defining risk, probabilistic risk analysis and fault trees, estimating dose-response relationships, limits to risk analysis. Decision analysis: utility, decision-making under uncertainty. Benefit-cost analysis: elementary economics including rents, consumer and producer surplus and discounting, value of life. Structure and evolution of environmental regulation.

Environmental Engineering 693 H(3-0)

*Life Cycle Assessment*
Concepts of life cycle assessment. Consideration of environmental and economic impacts from the extraction of resources to the disposal of unwanted residuals. Review and evaluation of tools and frameworks (e.g. process, input-output, hybrid life cycle assessment). Relative merits of various methods for interpreting and valuing the impacts. Examples of applications in environmental engineering and the energy industry.

## ISRAEL STUDIES , INTERDISCIPLINARY SPECIALIZATION ISST

### Contact Info

Dr. David Tal
Kahanoff Chair in Israel Studies
Location: SS 646
Faculty number: (403) 220-6405
Fax: (403) 282-8606
E-mail address: dtal@ucalgary.ca
Web page URL: http://ss.ucalgary.ca/isst/

### 1. Degrees and Specializations Offered

The University offers an interdisciplinary specialization in Israel Studies to students registered in an existing graduate program. The student will receive the degree offered by the home program.

Master of Arts (MA), thesis-based
Specialization: Israel Studies (Interdisciplinary)

### 2. Admission Requirements

In selecting students for the program, a broad range of disciplinary backgrounds will be considered as well as relevant experience. Upon application to an existing program students must contact the Israel Studies Program Director.

All applicants must meet the requirements of the Faculty of Graduate Studies and the home program. In addition applicant must send the Israel Studies Program:

a) A copy of a graded writing sample
b) A 250-word (minimum) statement of research interest including research topics in the field and reasons for pursuing a graduate degree with a specialization in Israel Studies

### 3. Application Deadline

The deadlines for the submission of complete applications correspond to the home program through which applicants have applied.

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

### 5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and the home program requirements, the Program requires:

Master of Arts

a) A minimum of one year of full-time study at the University of Calgary
b) Three full-course equivalents:
   - Israel Studies 601 (half-course)
   - One full-course equivalent in the student's disciplinary focus
   - One appropriate methods course in the focus discipline - for example, History 690 or Political Science 691 (half-course)
   - One full-course equivalent in Israel Studies options, to be chosen from:
     - English 607.14
     - English 607.17
     - History 515
     - History 691
     - Political Science 596.74
     - Political Science 675.01
     - Political Science 681
     - Religious Studies 601
     - Religious Studies 681
     - Strategic Studies 651 (topic focused on Israel)
     - Strategic Studies 653 (topic focused on Israel)

   Course selection will be made in consultation with the Israel Studies Program Director and in relation to the student's field of thesis research.
c) A demonstration of reading knowledge of Hebrew or a second language related to the major field of study before the oral thesis defence. Students may satisfy this requirement by successfully completing a language examination administered by the Israel Studies Program Director, by successfully competing Religious Studies 207 and 209, or by successfully completing equivalent language courses (e.g., in Arabic or Russian) should this be required by a student's area of concentration.

### 6. Additional Requirements

None.

### 7. Credit for Undergraduate Courses

Students may apply for no more than one 500-level course for graduate credit, subject to the approval of the Israel Studies Program Director. Graduate students taking a 500-level course for graduate credit will be required to complete additional assignments.

### 8. Time Limit

Expected completion time is two years. Maximum completion time is four years.

### 9. Supervisory Assignments

Students will be assigned a supervisor upon admission.

### 10. Required Examinations

Final thesis oral examinations are open.

### 11. Research Proposal Requirements

Within twenty months of entering the program, the student, with the supervisor's advice, develops a thesis research proposal to be submitted to the Israel Studies Program Director for approval and placed on file.

### 12. Special Registration Information

None.

### 13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to the Program in accordance with the home department deadline.

### 14. Other Information

Given the limited resources, the Program may, in any year, admit fewer applicants than those who are qualified to undertake graduate studies.

Graduate Course

| | |
|---|---|
| Israel Studies 601 | H(3-0) |

*Modern Israel*
Discussion of major themes in the origin and establishment of modern Israel. Topics may include emancipation and Zionism; nation building; social, ethnic, and religious composition; human rights, equality and gender, economic, political, and cultural institutions.
MAY BE REPEATED FOR CREDIT

## RESERVOIR CHARACTERIZATION, INTERDISCIPLINARY SPECIALIZATION RSCH

Contact Info

Contact the departments of GeoScience or Chemical and Petroleum Engineering for further information.

### Department of Chemical and Petroleum Engineering

Location: Schulich School of Engineering, Room B202
Phone: (403) 220 - 4802
Fax: (403) 284 - 4852
Email Address: gradstud@ucalgary.ca
Web page URL: http://www.eng.ucalgary.ca/Chemical

### Department of GeoScience

Location: Earth Sciences 118
Phone: (403) 220 - 3254
Fax: (403) 284 - 0074
Email Address: geosciencegrad@ucalgary.ca
Web page URL: http://www.geo.ucalgary.ca

### 1. Degrees and Specializations Offered

The University offers an interdisciplinary specialization in Reservoir Characterization to students registered in an existing course-based Master's program in the Departments of Chemical and Petroleum Engineering or GeoScience. The program integrates reservoir engineering, geology, geophysics, and reservoir characterization. The student will receive the degree offered by the home program:

Master of Engineering in Chemical and Petroleum Engineering (MEng), or
Master of Science (MSc) (Geology and Geophysics)
Specialization: Reservoir Characterization (Interdisciplinary)

All students will normally be considered to have full-time status. In exceptional circumstances part-time status may be considered and must be approved by the Graduate Director.

### 2. Admission Requirements

In addition to Faculty of Graduate Studies requirements, all applicants must meet the minimum standards of the home program.

Acceptance into the Master of Engineering program would normally require the completion of the equivalent of the Bachelor of Science in Oil and Gas Engineering degree offered by the University of Calgary. However, individuals with more diverse background and industry experience may be considered for admission.

Acceptance into the Master of Science program requires the completion of a Bachelor of Science in Geology and Geophysics plus ENPE 507 – Well Logging and Formation Evaluation, or equivalent.

Applicants with an undergraduate degree in geology must demonstrate acceptable proficiency in mathematics. It is an asset for geologists to have taken additional mathematics courses as technical electives during their undergraduate degree.

### 3. Application Deadline

See departmental listings for the deadlines for the submission of complete applications.

### 4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

### 5. Program/Course Requirements

To address the broad background of students entering the Reservoir Characterization Interdisciplinary Specialization, there are three streams for completion: Geology, Geophysics and Engineering.

In addition to the Faculty of Graduate Studies and the home program requirements, the Specialization requires:

a) Students with undergraduate degrees in engineering and geosciences may also be required to take an applied mathematics course in the block week before the first term in program, at the discretion of their academic advisors and the specialization Graduate Program Director.
b) A minimum of five (5) half-course equivalents (HCEs) must be chosen from the corresponding lists for Year 1, including at least three (3) engineering HCEs (ENPE, ENGG, ENCH) for geoscientists, and at least three geosciences HCEs (GLGY, GOPH) for engineers. Year 2 courses are all required.

Year 1

No more than half of the courses from the stream lists can be at the 500 level.

*Engineering Stream*

Fall Term

GLGY/GOPH 649 – Petrophysical Techniques
GOPH 671 – Inverse Theory and Methods
GLGY 693.02 – Stratigraphy and Sedimentation of clastic rocks (Q)*
GLGY 693.03 – Stratigraphy and Sedimentation of carbonate rocks (Q)*
GLGY 699.16 – Geological History of the Western Canada Sedimentary Basin
ENPE 543 – Geological Characterization of Oil and Gas Reservoirs

Winter Term

GOPH 559 – Geophysical Interpretation
GLGY 595.03 – Reservoir Evaluation and Hydrocarbon Play Assessment
ENCH 687 – Petroleum Economics

*Geology Stream*

Fall Term

ENPE 523– Introduction to Reservoir Engineering
ENPE 543 – Geological Characterization of Oil and Gas Reservoirs
ENGG 407– Numerical Methods
GLGY 649/GOPH649 – Petrophysical Techniques

Winter Term

ENPE 525 – Waterflooding and Enhanced Oil Recovery**
ENCH 687 – Petroleum Economics
ENPE 533 – Petroleum Production Engineering
GLGY 613 – Flow in Porous Media**
GOPH 559– Geophysical Interpretation
GLGY 595.03 - Reservoir Evaluation and Hydrocarbon Play Assessment

*Geophysics Stream*

Fall Term

ENPE 523 – Introduction to Reservoir Engineering
ENPE 543 – Geological Characterization of Oil and Gas Reservoirs
ENGG 407 – Numerical Methods
GLGY 649/GOPH649 – Petrophysical Techniques
GLGY 693.02 – Stratigraphy and Sedimentation of clastic rocks (Q)*
GLGY 693.03 – Stratigraphy and Sedimentation of carbonate rocks (Q)*

Winter Term

ENPE 525 – Waterflooding and Enhanced Oil Recovery**
ENCH 619.87 – Petroleum Economics
ENPE 533 – Petroleum Production Engineering
GLGY 613 (or ENPE 513) – Flow in Porous Media
GLGY 595.03 - Reservoir Evaluation and Hydrocarbon Play Assessment

Year 2

The second year is common to all students and requires the completion of:

Fall Term

ENCH 621 – Reservoir Simulation
ENCH 661 – Geostats for Reservoir Characterization or GLGY 697 – Advanced Geostatistics
HROD 789 – Optimizing Team Dynamics

Winter Term

ENCH 698/GLGY698 – Reservoir Characterization for Field Development (RCFD)***

* (Q) = quarter course taught in ½ semester; GLGY 693.02 and .03 together make-up one (1) HCE.
** Choose only one (1) of GLGY 613 or ENPE 525
*** Successful completion of Reservoir Characterization for Field Development ENCH 698/GLGY 698 ( and required comprehensive oral examination on the project is the exit requirement for the program.

The RCFD course is a team-based experience with each team required to analyze and integrate various data (e.g., seismic, logs, and production) from a real field. Each member of the team is expected to have proficiency on the software packages for geophysical interpretation, geological mapping, geostatistical modeling and reservoir flow modeling. The reservoir characterization will require the development and assessment of a geostatistical model of the field that will be used for a history match and to propose future development. The project will conclude with a formal presentation to experts from both academia and industry.

## 6. Additional Requirements

None.

## 7. Credit for Undergraduate Courses

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree or diploma program, or for courses taken to bring the grade point average to the required level for admission.

## 8. Time Limit

Expected completion time is two years and maximum completion time is six years.

## 9. Supervisory Assignments

Supervisors will be approved by the specialization Graduate Program Director.

## 10. Required Examinations

After the conclusion of Reservoir Characterization for Field Development ENCH 698/GLGY 698, there will be a comprehensive oral examination of each student before an examining committee that includes a faculty member from each of the three disciplines. Each student will be expected to express in-depth knowledge in his/her area of expertise (engineering, geology, geophysics), and to have a comprehensive knowledge of the significance of the other two areas in successful reservoir characterization.

## 11. Research Proposal Requirements

None .

## 12. Special Registration Information

None.

## 13. Financial Assistance

For information on awards, see the Awards and Financial Assistance section of this Calendar.

## 14. Other Information

None.

## 15. Faculty Members/Research Interests

See the website of the home department of the faculty members.

# Awards and Financial Assistance For Graduate Students

The University of Calgary is very proud of its Graduate Student Awards program. In addition to recognizing academic achievement, scholarships are important in helping to bridge the gap between the rising cost of attending university and limited student income. Attracting top national and international students to the University of Calgary continues to be a very high priority.

We are extremely pleased that our donors share our commitment to graduate student awards, and we greatly appreciate the financial support offered by all of our valued donors.

Full-time students registered in a graduate degree program at the University of Calgary are eligible for awards and financial assistance.

Scholarship information, application forms and instructions are found through the searchable awards database on the web at
http://grad.ucalgary.ca/awards

Additional information is available from your program. Because this Awards List is published a considerable time before the opening of the session, the University reserves the right to make whatever changes circumstances may require, including cancellation or addition of particular awards.

## I. University Assistantships

University Graduate Assistantships are governed by the *Collective Agreement between the Governors of the University of Calgary and the Graduate Students' Association*. Each year teaching units have available varying numbers of graduate assistantships to be awarded on the basis of merit. Individuals interested in such appointments should contact the appropriate program administrator for information about eligibility, application deadlines and procedures. The stipends indicated are subject to change without notice. Appointments are available from most units in which graduate programs are offered.
Categories of appointment include Graduate Assistantships (Teaching, Non-Teaching and Trust).

### Graduate Assistantships (GA, Teaching/Non-teaching)

A Graduate Assistantship (Teaching) is an appointment made to assist with the instructional responsibilities of departments or faculties. GA(T)s are appointed to provide teaching or instructional service, which might encompass lecturing assistance, laboratory supervision, office hours, grading assignments, tutorial direction, assistance in preparation of demonstration and instructional aids, and other related academic duties.

A Graduate Assistantship (Non-Teaching) is an appointment made to assist departments and/or professors with non-teaching responsibilities. The duties of a GA(NT) may include, for example, collecting research data, interviewing research subjects, bibliographic work or general research services.

Remuneration paid to Graduate Assistants must comply with the *Collective Agreement* or the regulations of the agency providing the funds. The stipend is listed in the *Collective Agreement*.

### Graduate Assistantships (Trust)

A graduate student is appointed to a Graduate Assistantships (Trust) to build academic experience by assisting with a research project, with duties similar to those described above for a Graduate Assistantship (Non-Teaching). GA (Trust) appointments are funded from the research support accounts held in trust for University staff who select and recommend graduate students for such appointments. The stipends vary. This type of support is arranged directly between graduate students and their prospective supervisors.

## II. Project Employment

A Graduate Project Employee (GPE) is funded from a trust account to provide a direct service in connection with a faculty member's research. This research is normally not related to the student's program and/or area of research. The service provided is normally supervised by someone other than the student's supervisor and is treated as regular employment.

## III. Sessional Instructorship

A department or faculty may appoint a graduate student as a Sessional Instructor to teach a course as Instructor of Record. Sessional Instructor appointments are Term Certain Appointments covered under the *Collective Agreement between the Governors of the University of Calgary and the University of Calgary Faculty Association* (www.ucalgary.ca/HR/policies/academic.html).

## IV. Graduate Teaching Fellowships (GTF)

A Graduate Teaching Fellowship (GTF) is an award of merit to a doctoral student who has completed candidacy. A senior graduate student appointed as a Sessional Instructor may be recommended by the department for a GTF award of $3,000, in addition to the normal stipend for the sessional instructorship. Normally, a student may not be a Sessional Instructor for more than one half-course or one full course at any one time.

## VI. Dean's Entrance Scholarships (DES)

Awarded to Canadian or international students with excellent academic records and potential who will be entering a doctoral program at the University of Calgary. Successful candidates must be registered full-time in the Faculty of Graduate Studies at the time of tenure. Students receiving this award must hold or apply for major awards from such funding agencies as: NSERC, SSHRC, CIHR, AHFMR, iCORE, and Alberta Ingenuity, if eligible.
Graduate programs allocate these awards, and students should check with the program administrator for application procedures.

## VII. Faculty of Graduate Studies Scholarships (FGSS)

To be eligible for a Faculty of Graduate Studies Scholarship, students must be registered full-time in the Faculty of Graduate Studies in a thesis program at the University of Calgary. Graduate programs allocate these awards, and students should check with the program administrator for application procedures.

## VIII. Graduate Students' Association Bursaries

The Graduate Students' Association makes available bursaries of up to $1,000 per year to students who at the time of tenure will be registered in a graduate program at the University of Calgary and can demonstrate financial need. Application forms are available from the Graduate Students' Association, 350 MacEwan Student Centre, telephone (403) 220-5997. Contact the GSA office for further information.

## VIX. Government Financial Assistance

The provincial and federal governments make assistance available to students in the form of loans. Students must be Canadian citizens or Permanent Residents of Canada and provide sufficient evidence that financial assistance is essential to enable the student to continue her/his education. The amount of assistance varies. Students should contact their provincial funding office directly to obtain detailed information about the student loans, grants and bursaries offered through their province. Links to the out of province government loan websites are available from the Student Awards and Financial Aid website: www.ucalgary.ca/awards/.

## X. International Students

International students planning to do graduate work at the University of Calgary should be aware that a number of Canadian scholarship programs require Canadian citizenship or permanent residence status. However, the Government of Canada does support a number of programs designed to assist individuals who wish to study in Canada on a Study Permit. These programs are usually organized through agencies of the individual's own government, and prospective students are encouraged to explore these possibilities. International students may apply for Graduate Assistantships, Graduate Teaching Fellowships and FGS Scholarships.

## XI. Awards Offered by Government, Industry and Others

Many foundations, companies, professional organizations and other agencies offer financial support to graduate students. A number of international, national and provincial organizations award scholarships and fellowships, tenable at this and other universities. Details about many of these awards are available from the Graduate Awards Database which is found through the MyUofC portal or at. http://grad.ucalgary.ca/awards

## XII. University Research Grants Committee Thesis Research Grants

The University Research Grants Committee recognizes that there are instances where the ordinary resources for thesis research available through a program or faculty may not be adequate to attend to certain special needs of a particular thesis research project or where unpredictable circumstances have made it impossible to provide funds from current budgets.

Thesis Research Grants are made to assist graduate students with the acquisition of special equipment, services or materials or for fieldwork essential to the conduct of their thesis projects. These awards are competitive. An application guide and the application form may be found at
http://www.ucalgary.ca/research/files/research/Thesis%20Dissertation%20Fillable.pdf. Further information is available through the Office of Research Services, Main Floor, 3512 33St. NW, University Research Park Calgary, Alberta. Telephone (403) 220-6354.

## XIII. Conference Travel Award (Graduate Students)

Graduate Student Travel Awards are made to assist graduate students in presenting the results of their thesis research at significant scientific or scholarly meetings, and equally, to provide students with an opportunity to gain experience in conference presentation and to meet colleagues in universities and industries who will be of importance to their future career.
Canadian and permanent residents will apply through the Faculty of Graduate Studies. Information and the application form may be found at http://grad.ucalgary.ca/awards

International students will apply through the Office of Research Services Main Floor, 3512 33St. NW, University Research Park Calgary, Alberta. Telephone (403) 220-6354. http://www.ucalgary.ca/research/funding/internalgrants

## XIV. Awards in the Faculty of Graduate Studies

The Faculty of Graduate Studies Scholarship Committee awards the scholarships, bursaries and fellowships listed here.

Details of all awards administered by the Faculty of Graduate Studies can be found in the searchable Graduate Awards Database found through the MyUofC portal or a link at http://grad.ucalgary.ca/awards

Scholarships and fellowships are awarded on the basis of academic standing and demonstrated potential for advanced study and research. Normally, only Master's students in the first two years of program and doctoral students in the first four years of program are eligible to hold scholarships. If, in the opinion of the Graduate Scholarship Committee, a suitable candidate cannot be found, it reserves the right not to award any one or any number of scholarships in any year. Unless otherwise stated, awards are for one year only. The value and terms of the awards are subject to change without notice. Written requests, endorsed by the supervisor and Graduate Program Director, for off-campus tenure of awards should be submitted to the Dean of Graduate Studies.

Notification of award is sent electronically to successful candidates as soon as possible after the adjudication. All award winners are asked to accept or decline the offer through the Student Centre as soon as possible and no later than the deadline stated in the notification of award. All award payments begin in September unless otherwise stated in the terms of reference.
Should it become known that a student is unqualified for any reason, the University reserves the right to terminate the award(s) and funds already paid out must be returned.

The following payment schedule applies to all awards in the Faculty of Graduate Studies, unless the terms of reference of the award specifies otherwise.

| Amount of Award | Payment |
|---|---|
| Up to $2,500 | One lump sum payment |
| $2,501 to $6,000 | Paid in equal monthly installments over a four month term |
| $6,001 to $10,000 | Paid in equal monthly installments over eight months |
| Awards over $10,000 | Paid in equal monthly installments over twelve months |

If a student has a successful final oral examination during the tenure of a scholarship, the award will be terminated at the end of the month in which the thesis is submitted to the Faculty of Graduate Studies, unless otherwise specified in the terms of reference of the award, or at the date of the termination of the award, whichever comes first.
No student can receive a total of more than the minimum tri-council scholarship value (currently $17,300) from awards made in the Open Scholarship competition, the Special Awards and Bursaries competitions, and Program Recommended Awards.

A student holding external awards with a total value equal to or greater than the minimum tri-council scholarship is not eligible for funding from the Special Awards and Bursaries competition, Program Recommended awards or the Open Scholarship competition (with the exception of an Honorary Izaak Walton Killam Doctoral Scholarship).

A student who is awarded both a University of Calgary scholarship (or combination of awards) and an external award equal to or greater than the amount stated above must take up the external award at the earliest possible date and decline the University of Calgary scholarship(s) effective on that same date. In such a case, a student may include the offer of the forfeited award on a curriculum vitae.

The Dean's Entrance Scholarship (DES), Graduate Teaching Fellowships (GTF) and Travel Awards are not subject to the limits just described. Similarly, funds awarded by programs from their Graduate Student Support allocation are not subject to this limit.

Before accepting other forms of awards or remuneration, especially those involving service, students must check with the Graduate Scholarship Office, to ensure that acceptance of the award does not affect the holder's full-time registration status.

Students holding multiple year funding must submit a Scholarship Progress Report to the Faculty of Graduate Studies Scholarship Office not later than the end of the eleventh month of the registration year.

| Adjudication Process | Method of Application |
|---|---|
| Open Doctoral Scholarship Competition | On-line application: http://grad.ucalgary.ca/awards<br>Supporting documents sent to the graduate program in which the student will be registered. Contact the graduate program administrator for more information. |
| Recommended by Program | Variable, check the terms of reference http://grad.ucalgary.ca/awards<br>or with the graduate program administrator for details. |
| Special Awards Competition | Complete the *Application for Graduate Scholarships* http://grad.ucalgary.ca/awards . Submit to the Graduate Scholarship Office, including all supporting documents. |
| Bursary Competition | Complete the *Application for Graduate Bursary* http://grad.ucalgary.ca/awards. Submit to the Graduate Scholarship Office, including all supporting documents.<br>NOTE: Applicants must show financial need commensurate with the value of the award |

Full Terms of Reference and application documents for each award are available through the searchable database tool, found on the web at http://www.grad.ucalgary.ca/.

When required, complete application packages should be sent to:

Graduate Scholarship Office
Faculty of Graduate Studies
University of Calgary
Earth Sciences 720
2500 University Drive NW
Calgary AB T2N 1N4

Important note: Scholarship payments cannot be made if the student has not registered for the upcoming academic year. Students who have been awarded scholarships and other awards should register as soon as possible to ensure timely payment.

Please note that the following lists of awards, although current at time of compilation, may change over the year. The searchable Graduate Awards Database is the most up-to-date and reliable source for available awards and their complete terms of reference (https://pr1web.ucalgary.ca/UofC_FGSA/public/publichome.aspx).

## GRADUATE AWARDS

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| A.T.J. Cairns Memorial Scholarship | Estate of A.T.J Cairns, matching grant provided by the Province of Alberta's Advanced Education Endowment Fund | English | $1,000 - $5,000 | Recommended by Program |
| Achievers in Medical Science Graduate Recruitment | Endowed by an anonymous donor, through an endowment established with the Calgary Foundation | Academic medical or biomedical research | $25,000 | Recommended by Program |
| Achievers in Medical Science Leaders in Medicine Scholarship | Endowed by an anonymous donor, through an endowment established with the Calgary Foundation | Academic medical or biomedical research | up to $40,000 | Recommended by Program |
| Achievers in Medical Science Post-doctoral Scholarship | Endowed by an anonymous donor, through an endowment established with the Calgary Foundation. | Academic medical or biomedical research | up to $15,000 | Recommended by Program |
| Achievers in Medical Science Research Excellence Award | Endowed by an anonymous donor, through an endowment established with the Calgary Foundation | Academic medical or biomedical research | $3,500 per year | Recommended by Program |
| Alastair H. Ross Memorial Graduate Scholarship | Endowed by Mrs. Joan Ross and family, and friends of Alastair H. Ross | Management, with a focus on technology as it relates to the study of Management | $8,500 | Recommended by Program |
| Albert Comanor Memorial Graduate Social Work Scholarship | Endowed by family, friends, colleagues from the University of Calgary and elsewhere in Canada and the United States in honour of Albert Comanor, Professor Emeritus, matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Social Work | $1,600 | Recommended by Program |
| Alberta Association of Architects – Cecil Scott Burgess Scholarship | Alberta Association of Architects from the Estate of Cecil Scott Burgess | Architecture | $500 | Recommended by Program |
| Alberta Association of Architects – Norman Fleming Award | Endowed by the Alberta Association of Architects, friends and colleagues of Norman Fleming | Architecture | $600 | Recommended by Program |
| Alberta Building Envelope Council South Award | Alberta Building Envelope Council South | Architecture | $1,500 | Recommended by Program |
| Alberta Foundation for the Arts Graduate Scholarships in the Department of Art | Endowed by the Alberta Art Foundation, matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Major fields of study in the Department of Art | $7,000 | Recommended by Program |
| Alberta Graduate Student Scholarships | Endowed by the Province of Alberta, Alberta Learning | Unrestricted | $3,000 each | Recommended by Program |
| Alberta Law Foundation Graduate Scholarship | Alberta Law Foundation | Natural Resources, Energy and Environmental Law | up to $17,500 in the LLM Program and $20,000 in the PhD Program | Recommended by Program |
| Alexa W. Church Graduate Scholarship in Medical Sciences | Endowed by the B.C. Church family | Medical Sciences | $7,500 | Special Awards and Bursaries |
| Allan Clowes Family MBA Fellowship | Endowed by Allan Clowes | Management | $5,000 per year | Recommended by Program |

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| Allan H. Bill Memorial Scholarship | Allan Bill Memorial Fund Society, Calgary<br><br>(Calgary Fish and Game Association) | Ecological Management | $1,200 | Recommended by Program |
| Anita K.F. Li Graduate Scholarship | Endowed by the colleagues, friends, students, and family of Anita K.F. Li, on the occasion of her retirement from the University of Calgary | Applied Psychology | $3,000 | Recommended by Program |
| Anne Severson Memorial Graduate Scholarship in Fine Arts | Endowed by family and friends of Patricia Anne Severson | Major fields of study in the Department of Art | $1,000 | Recommended by Program |
| Annette LaGrange Graduate Scholarship | Joanne Cuthbertson and Charles Fischer | Education | $1,250 | Recommended by Program |
| AOSTRA/Devenny Graduate Scholarship | Endowed by Dr. David Devenny | Environmental Engineering | $900 | Recommended by Program |
| APEGGA Education Foundation Graduate Scholarship | APEGGA Education Foundation | Engineering | $5,000 | Special Awards and Bursaries |
| Archibald Waynne Dingman Memorial Graduate Scholarship | Endowed through a bequest of the late Corinne Patteson, in memory of her father | Petroleum Industry | $3,300 | Special Awards and Bursaries |
| Arthur J.E. Child Memorial Bursary in Economics | Endowed by the Arthur J.E. Child Foundation | Economics | $12,000 | Special Awards and Bursaries |
| Arthur J.E. Child Memorial Bursary in History | Endowed by the Arthur J.E. Child Foundation | History | $12,000 | Special Awards and Bursaries |
| ASPB Graduate Scholarship | Alberta Society of Professional Biologists | Biological Sciences | $2,500 | Recommended by Program |
| Bantrel Co. Graduate Scholarship | Bantrel Co. | Management | up to $2,500, each | Recommended by Program |
| Barker Award | Calgary Co-operative Association Ltd, matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Business Administration with emphasis on Entrepreneurship, New Venture Development and Marketing | $1,800 | Recommended by Program |
| BCW Architects Entrance Scholarship | BCW Architects | Environmental Design – Architecture | $3,000 | Recommended by Program |
| Bernice Gibb Memorial Graduate Scholarship in Language and Literacy Education | Family of Bernice Gibb | Curriculum, Teaching and Learning Specialization | $1,000 | Recommended by Program |
| Bettina Bahlsen Memorial Graduate Scholarship | Bettina Bahlsen Memorial Fund; matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Cellular, Molecular, Microbial or Biochemical Biology | $17,300 | Open Doctoral Scholarship |
| Bill Ross Scholarship | Endowed by Professor Bill Ross, Calgary | Environmental Design | $1,400 | Recommended by Program |
| Bob McTague Graduate Award in Project Management | Hatch Ltd | Project Management | $3,000 | Recommended by Program |
| Brenda Strafford Centre for Excellence in Gerontological Nursing Graduate Scholarship | Brenda Strafford Foundation | Gerontological Nursing | $10,000 | Recommended by Program |
| Brenda Strafford Leadership in Nursing Graduate Scholarship | Brenda Strafford Foundation | Gerontological Nursing | $5,000 | Recommended by Program |
| Brian R. Sinclair Graduate Scholarship in Environmental Design | Brian R. Sinclair and the University of Calgary Keynote Series on Sustainable Environmental Design | Environmental Design | $1,500 | Recommended by Program |

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| Bruce M. Irons Memorial Scholarship | Bruce M. Irons Memorial Scholarship Fund endowed by relatives, friends & colleagues in honour of the late Bruce Moncur Irons & a matching grant provided from Alberta's Advanced Education Endowment Fund: also royalty payments from books written by Bruce Irons | Civil Engineering | $5,000 | Recommended by Program |
| C.F. Gauss Award | Klaus-Peter Schwarz, Alex Bruton, and Craig Glennie | Mathematical models for Geomatics | $3000 | Recommended by Program |
| Calgary Airport Authority Graduate Scholarship | Calgary Airport Authority | Transportation | $5,000 | Special Awards and Bursaries |
| Calgary Chamber of Commerce & ENMAX Graduate Scholarship in Global Climate Change Research | Calgary Chamber of Commerce and ENMAX Corporation | Climate Change | $1,000 | Special Awards and Bursaries |
| Calgary Chapter of the Schizophrenia Society of Alberta, Dr. S.K. Littman Graduate Award | Endowed by the Calgary Chapter of the Schizophrenia Society of Alberta, in memory of Dr. S.K. Littman | Schizophrenia | $1,200 | Special Awards and Bursaries |
| Calgary Chapter of the Strategic Leadership Forum Scholarship | Endowed by the Calgary Chapter of the Strategic Leadership Forum; matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Strategic Management/Planning Studies | $3,000 | Recommended by Program |
| Calgary Housing Commission Prize | Endowed by the City of Calgary Housing Commission and the Calgary Real Estate Board | Planning | $1,000 | Recommended by Program |
| Calgary Institute for the Humanities Frances Spratt Graduate Fellowship | Calgary Institute for the Humanities and anonymous donors | Humanities approach to any discipline, as stated above | $7,500 with office amenities for an eight-month period, in the Calgary Institute for the Humanities, with limited administrative support | Recommended by Program |
| Canadian Association of Petroleum Producers Award | Canadian Association of Petroleum Producers | Management | $800 | Recommended by Program |
| Canadian Defense and Foreign Affairs Institute & Arthur J.E. Child Memorial Doctoral Scholarship in Military and Strategic Studies | Arthur J.E. Child Foundation and an anonymous donor | Military and Strategic Studies | $60,000 annually in the recommended allotment of: Up to three awards of $20,000 each, up to four awards of $15,000 each, up to six awards of $10,000 each and up to twelve awards of $5,000 each | Recommended by Program |

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| Canadian Defense and Foreign Affairs Institute & Arthur J.E. Child Memorial Master's Scholarship in Military and Strategic Studies | Arthur J.E. Child Foundation and an anonymous donor | Military and Strategic Studies | $19,000 in allotments ranging from $1,000 to $6,000 depending upon the candidate's qualifications, experience, and graduate program. | Recommended by Program |
| Canadian Environmental Scholarship | Endowed by an anonymous donor | Environmental Science | $1,600 | Recommended by Program |
| Canadian Gas Association Scholarship | Canadian Gas Association | Topics relevant to the Canadian Energy Industry | $2,750 | Recommended by Program |
| Canadian Heavy Oil Association Graduate Scholarship | Canadian Heavy Oil Association | Heavy Oil | $3,000 | Special Awards and Bursaries |
| Canadian Natural Resources Limited Graduate Scholarship | Endowed by Canadian Natural Resources Ltd (formerly Sceptre Resources Limited); matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Economics, Geoscience, Engineering or Management | $9,000 | Special Awards and Bursaries |
| Canadian Project Forum Graduate Scholarship in Project Management Specialization | Canadian Project Forum | Project Management Specialization | $4,000 | Special Awards and Bursaries |
| Cantos Music Foundation Organ Graduate Scholarship | Cantos Music Foundation | Organ Performance | up to $10,000 | Recommended by Program |
| Captain Nichola K.S. Goddard Memorial Graduate Scholarship | Endowed by the family, friends and colleagues of Nichola Goddard | Unrestricted | $5,000 | Special Awards and Bursaries |
| Carl O. Nickle Graduate Scholarship | Endowed by family and friends of Carl O. Nickle, Alberta Natural Gas Co. Ltd. (now Trans Canada PipeLines) and the Province of Alberta's Advanced Education Endowment Fund | Western Canadian Studies, including history, culture, art, economics, political science; studies related to the growth and development of Western Canada | $4,500 | Special Awards and Bursaries |
| Certified General Accountants, Alberta, Graduate Scholarship for Excellence in Accounting | Certified General Accountants, Alberta | Accounting | $5,000 | Recommended by Program |
| Certified Management Accountants, Alberta Graduate Scholarship for Excellence in Management Accounting | Certified Management Accountants, Alberta | Accounting | $2,500 | Recommended by Program |
| CFUW /Calgary, Hall/Street Graduate Scholarship in Nursing | Endowed through a gift from the Calgary Chapter, Canadian Federation of University Women in honour of Gertrude M. Hall and Margaret M. Street, pioneers in Nursing Ed; matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Nursing | $1,500 | Recommended by Program |
| CFUW/Calgary Graduate Scholarship in Social Work or Social Sciences (Canadian Federation of University Women) | Canadian Federation of University Women/Calgary | Social Work or Social Sciences | $1,000 | Special Awards and Bursaries |

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| Chancellor Norford Graduate Scholarship | Endowed by alumni, students, senators, governors and other friends of the University of Calgary | History | $5,000 | Recommended by Program |
| Chancellor's Challenge Graduate Scholarship | Chancellor's Challenge Golf Tournament | Unrestricted | Variable | Open Doctoral Scholarship |
| Chancellor's Graduate Medal | Faculty of Graduate Studies, in honour of the Chancellor of the University of Calgary | Unrestricted | Silver medal and certificate | Medals and Prizes |
| Charles B. Locke Graduate Award in Tourism | Endowed by Charles B. Locke | Tourism Management | $6,000 | Recommended by Program |
| Charles E. & Walton Kendrew Scholarship | Endowed by the estate of Ethel May Kendrew | Ecological Design | $5,600 | Recommended by Program |
| Charles R. Steele Memorial Scholarship | Endowed by family and friends of the late Charles R. Steele; matching grant provided by the Province of Alberta's Advanced Education Endowment Fund | English | $7,500 | Recommended by Program |
| Charles W. Berard Graduate Scholarship in Natural Resources & Environmental Law | Vermilion Energy Trust through Vermilion Resources Ltd. | Natural Resources & Environmental Law | $2,500 | Recommended by Program |
| Charlotte Firth Memorial Graduate Scholarship in Community Health Nursing | Friends and family of Charlotte Firth | Nursing | $1,000 | Recommended by Program |
| Chickwagon! Graduate Scholarship in Social Work | The Chickwagon! Foundation and friends | Domestic violence | $1,000 | Recommended by Program |
| Choquette Family Foundation Global Experience Graduate Scholarship | The Choquette Family Foundation | Unrestricted | $10,000 | Special Awards and Bursaries |
| Christ Church Peter Craigie Memorial Graduate Award | Parishioners of the Christ Church, Calgary; matched by the Province of Alberta's Advanced Education Endowment Fund | Religious Studies, with a specialization in biblical studies | $1,200 | Recommended by Program |
| Christiane Adèle Roy Scholarship | Endowed by the family, friends, and colleagues of Christiane Adele Roy | Workplace and Adult Learning (formerly the Master of Continuing Education program) | $5,000 per year | Recommended by Program |
| CN Graduate Award in Transportation | CN | Transportation Studies | $10,000 | Special Awards and Bursaries |
| Cogeco Inc. Graduate Scholarship | Cogeco Inc. | Communications Studies | $7,500 | Recommended by Program |
| COHOS EVAMY Integratedesign Travel Scholarship | Endowed by Cohos Evamy Partners, Calgary | Architecture | $6,000 | Recommended by Program |
| ConocoPhillips Canada Graduate Scholarship in Applied Basin Studies | ConocoPhillips Canada (CPC) | Applied Basin Studies | $12,000 | Recommended by Program |
| Cooper H. Langford Graduate Scholarship | Endowed by Cooper H. Langford III | Chemistry, Civil Engineering, Communications Studies or Philosophy | $750 | Recommended by Program |
| Coutts Family Western Canadian Graduate Archaeology Scholarship | Endowed by David B. Coutts | Western Canadian Archaeology | $2,500 | Recommended by Program |
| Coutts Family Western Canadian Graduate History Scholarship | Endowed by David B. Coutts | Western Canadian History | $2,500 | Recommended by Program |
| D.L. Mills Graduate Sociology Scholarship | Endowed by family, friends and University of Calgary colleagues in honour of D.L. Mills, and a matching grant provided from the Province of Alberta Advanced Education Endowment Fund | Sociology | $2,000 | Recommended by Program |

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| D.S. Stevens Memorial Scholarship | Endowed by family & friends of the late Donald S. Stevens | Architecture | $2,000 | Recommended by Program |
| Danny Browning, R.N. Graduate Scholarship | Dr. Jack Browning in memory of his wife, Danny Browning | Nursing | $3,500 | Recommended by Program |
| David Johnston Research Travel Award | Sheila Moore Johnston | Schizophrenia and/or Bi-Polar disorders | $1,000 | Special Awards and Bursaries |
| David Wilson Memorial Graduate Scholarship in Geoscience | Family, Friends and Colleagues of David Wilson | Heavy Oil or Coal | $1,000 | Recommended by Program |
| Dean's Doctoral Scholarship | Faculty of Graduate Studies | Unrestricted | $15,000 | Open Doctoral Scholarship |
| Dean's Entrance Scholarship | Faculty of Graduate Studies | Unrestricted | $6,000 | Recommended by Program |
| Denise H.S. Owen Scholarship | Endowed by Mr. and Mrs. Robert M.S. Owen in memory of their daughter | Applied Psychology | $3,500 | Recommended by Program |
| Dennis Parkinson Graduate Scholarship | Endowed by Edward A. Johnson and Kiyoko Miyanishi | Biological Sciences | $3,500 | Recommended by Program |
| Department of Chemical and Petroleum Engineering Graduate Award | Endowed by the Conference Organizing Committee of the 5th International Conference on Petroleum Phase Behaviour and Fouling (2004) and other contributors | Phase behaviour and fouling of petroleum fluids/solids | $2,500 | Recommended by Program |
| Department of Chemistry Graduate Scholarship | Members of the Department of Chemistry, the University of Calgary and other private donors; matching funds provided by the Province of Alberta's Advanced Education Endowment Fund | Chemistry | $2,500 | Recommended by Program |
| Department of Philosophy Graduate Essay Award | Department of Philosophy | Philosophy | up to $2,500 | Recommended by Program |
| Department of Religious Studies Graduate Scholarship | Endowed by members of the Department of Religious Studies, the University of Calgary, and the Humanities Associates Program; matched by the Province of Alberta's Advanced Education Endowment Fund | Religious Studies | $2,200 | Recommended by Program |
| Detomasi Environmental Design Thesis Award | Endowed by Dr. and Mrs. D.D. Detomasi, friends, and colleagues | All programs in Environmental Design | $1,000 | Recommended by Program |
| Dixon A.R. Thompson Memorial Graduate Scholarship | Family and friends of Dixon A.R. Thompson | Interdisciplinary research focusing on environmental management and sustainable development | $500 | Recommended by Program |
| Dobson Family Master of Nursing Scholarships | | Nursing | $2,500 | Recommended by Program |
| Dominion Exploration Canada Limited MBA Scholarship | Dominion Exploration Canada Ltd. (formerly Dominion Energy Canada Limited) | Management | $2,700 | Recommended by Program |
| Donald N. Byers Memorial Killam Prize for Best Statement of Program of Studies and Research | Endowed through a bequest of the late Dorothy J. Killam and the Izaak Walton Killam Memorial Fund for Advanced Studies | Unrestricted | $1,000 | Open Doctoral Scholarship |
| Donald R. Hayes Memorial Scholarship | Endowed by the Kodaly Society of Canada and the graduates of the Kodaly Diploma Program (Faculty of Fine Arts, The University of Calgary) | Music Education - Kodaly concentration | $400 | Recommended by Program |

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| Doreen & Donald Lougheed Graduate Scholarship | Endowed by Doreen and Donald Lougheed | Business | $13,500 for the first year and $4,500 for the second year | Recommended by Program |
| Doreen F. Wilson Legacy Graduate Award | W. Brett Wilson & Calgary Communities Against Sexual Abuse | Sexual Abuse and Sexual Assault | $2,500 | Special Awards and Bursaries |
| Douglas W. Mack Award | Endowed by Mrs. Margaret Mack in honour of her husband, Dr. Douglas W. Mack; matching grant provided by the Government of the Province of Alberta's Advanced Education Endowment fund. | Business Administration | $1,500 | Recommended by Program |
| Dr Chen Fong Chancellor's Club Doctoral Scholarship | University of Calgary Chancellor's Club | Unrestricted | $20,000 | Open Doctoral Scholarship |
| Dr Paul and Mrs Apar Sarpal Graduate Scholarship in Mechanical Engineering | Dr Gurcharan (Paul) & Mrs Apar Sarpal | Mechanical Engineering, thermal fluids in energy-related areas | $5,000 | Recommended by Program |
| Dr. Alfred A. Levinson Memorial Graduate Scholarship In Mineralogy/Geochemistry | Endowed by family, friends and colleagues of the late Dr. Alfred A. Levinson | Mineralogy/Geochemistry | $1,000 | Recommended by Program |
| Dr. Anthony Russell Distinguished Faculty Achievement Graduate Scholarship in Zoology | Endowed by the Distinguished Faculty Achievement Award Fund | Zoology | $1,000 | Recommended by Program |
| Dr. Benno Nigg Distinguished Faculty Achievement Graduate Scholarship | Endowed by the Distinguished Faculty Achievement Award Fund | Research related to human neuro-musculo-skeletal health and wellness from birth to old age | $1,000 | Recommended by Program |
| Dr. Bonnie Shapiro Distinguished Faculty Achievement Graduate Scholarship | Endowed by the Distinguished Faculty Achievement Award | Education, with a focus on one of: science education, teacher education, environmental education, curriculum inquiry or interpretive studies in education | $1,000 | Recommended by Program |
| Dr. Devendra Singh Mohindra Memorial Bursary | Cukee Mohindra (wife) and Family | Mechanical Engineering | $1,200 | Special Awards and Bursaries |
| Dr. Frank Eyck Memorial Graduate Scholarship in European History | Rosemarie Eyck, family, friends and colleagues | European History | $3,000 | Recommended by Program |
| Dr. Frank Ramsay Graduate Award In Neuroscience | The Parkinson's Society of Southern Alberta | Neurosciences related to Parkinson's disease | $1,000 | Special Awards and Bursaries |
| Dr. G. Barry Mellon Graduate Award | Endowed by the ALBERTA ENERGY RESEARCH INSTITUTE (Formerly known as: Alberta Oil Sands Technology Research Authority - AOSTRA) | Business Administration | $1,000 | Recommended by Program |
| Dr. George Self Graduate Scholarship | Endowed by members of the Department of History, University of Calgary and matched by the Province of Alberta's Advanced Education Endowment Fund | History | $2,500 | Recommended by Program |
| Dr. Gordon Nelson Graduate Scholarship in Interdisciplinary Studies | Interdisciplinary Graduate Program | Unrestricted | $4,000 | Recommended by Program |
| Dr. Jeanette Nicholls Graduate Scholarship | Endowed by the friends of Dr. Jeanette Nicholls | Unrestricted | $5,000 | Special Awards and Bursaries |
| Dr. Marlene Reimer Memorial Graduate Scholarship in Nursing | Family, friends and colleagues of Dr. Marlene Reimer | Neuroscience or rural nursing | $1,025 | Recommended by Program |
| Dr. Michael C. Pyryt Memorial Graduate Scholarship | Family and friends of Dr. Michael C. Pyryt | Educational Research – Gifted Education | 1,000 | Recommended by Program |

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|---|---|---|---|---|
| Dr. Monica Scarabello Memorial Graduate Research Award | Family in memory of Dr. Monica Scarabello | Cardiovascular Research | $2,000 | Recommended by Program |
| Dr. Murray Fraser Memorial Graduate Scholarship | Graduate Students' Association of the University of Calgary | Open | $1,500 | Open Doctoral Scholarship |
| Dr. Roger Butler Memorial Graduate Scholarship | Endowed by the family, friends, colleagues, and students of Roger Butler | Chemical and Petroleum Engineering | $10,000 | Recommended by Program |
| Dr. Roland Lambert Applied Psychology Bursary | Endowed by the Family and Friends of Dr. Roland Lambert | Applied Psychology | $1,000 | Special Awards and Bursaries |
| Dr. Tristram Chivers Distinguished Faculty Achievement Graduate Scholarship | Endowed by the Distinguished Faculty Achievement Award Fund | Inorganic Chemistry | $1,000 | Recommended by Program |
| Drs. George and Susannah Kurian Doctoral Scholarship in Sociology | George and Susannah Kurian | Sociology | $5,000 per year | Recommended by Program |
| Eberlein Systems Dynamics Graduate Scholarship | Dr. Robert Eberlein | Systems Dynamics | $3,000 | Special Awards and Bursaries |
| Economics Alumni Graduate Scholarship | Endowed by Graduate Alumni and Faculty of the Economics Department | Economics | up to $2,500 | Recommended by Program |
| Economics Society of Calgary Graduate Scholarship | Economics Society of Calgary with matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Economics | $2,500 | Recommended by Program |
| Education for the Future Doctoral Scholarship in Nursing | Anonymous | Nursing | $3,000 | Recommended by Program |
| Education for the Future Master of Nursing Scholarship | Anonymous | Nursing | $2,000 | Recommended by Program |
| Educational Technology Entrance Award | Faculty of Education Graduate Division of Educational Research through the Government of Alberta Access Fund Program | Educational Technology | $1,000 | Recommended by Program |
| Edward Wichert Graduate Scholarship | Robert E. Wichert | Chemical Engineering, Petroleum Engineering, or Energy and Environmental Engineering | $20,000 | Recommended by Program |
| Eleanor Luxton Historical Foundation Graduate Scholarship | Eleanor Luxton Historical Foundation | Western Canadian History in Banff, the Bow Valley, and Western Canada in the 19th and 20th centuries | $15,000 annually; One award of $5,000 in the Masters program and one award of $10,000 in the Ph.d. program | Recommended by Program |
| Eleanor Mackie Doctoral Scholarship in Women's Health | Estate of Eleanor Bergen Mackie | Immunology or Microbiology & Infectious Diseases dealing with diseases pertaining to women | $20,000 | Recommended by Program |
| Elsie Mary Bell Graduate Scholarship in Music | Endowed by Dr. Graeme I. Bell | Music | $10,000 | Recommended by Program |
| Emeritus Professors of English Award | Endowed by Susan Stratton, with members and friends of the University of Calgary's English department | English | $500 | Recommended by Program |
| Eratosthenes Award | Klaus Peter Schwarz and Naser El-Sheimy | History of Geomatics Engineering | $1,000 | Recommended by Program |
| Eric Milner Graduate Scholarship | Endowed by family, friends and colleagues of Eric Milner | Mathematics | $5,000 | Recommended by Program |

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| Estelle Milner Memorial Scholarship | Endowed by a gift from Dr. E.C. Milner in memory of Estelle Milner, the first PhD student in the department of English; matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | English | $3,000 | Recommended by Program |
| EVDS Alumni Scholarship | EVDS Annual Fund Donors | Environmental Design | $500 | Recommended by Program |
| EVDS Dean’s Advisory Council Entrance Scholarship | EVDS Dean's Advisory Council | Environmental Design | $1,000 | Recommended by Program |
| F.R. Helmert Award | Klaus-Peter Schwarz, Alex Bruton, and Craig Glennie | Geomatics Engineering with a research specialization in gravity field modeling and geodynamics. | $3,000 | Recommended by Program |
| Fabjob.com Graduate Award | FabJob.com | Technology in Communications | $500. | Recommended by Program |
| Faculty of Education Endowment Graduate Scholarship | The Education Endowment Fund | Graduate Division of Educational Research or Applied Psychology | $4,000 | Recommended by Program |
| Faculty of Graduate Studies Doctoral Scholarship | Faculty of Graduate Studies | Unrestricted | $10,000 | Open Doctoral Scholarship |
| Faculty of Graduate Studies Travel Award | Alberta Advanced Education and Technology | Unrestricted | up to $1,000 overseas destination, up to $500 North America destination | Recommended by Program |
| Faculty of Law Graduate Scholarship | Endowed through contributions made to the Focus on Natural Resources Law Campaign; matching grant provided from the Province of Alberta | Natural Resources, Energy and Environmental Law | $9,700 | Recommended by Program |
| Faculty of Nursing Alumni Graduate Bursary | Endowed by the Faculty of Nursing Alumni of the University of Calgary | Nursing | $2,500 | Special Awards and Bursaries |
| FirstEnergy Graduate Bursary in Engineering Studies in Energy | FirstEnergy Community Foundation | Engineering with a focus on energy-related studies | $10,000 | Special Awards and Bursaries |
| Frank Mink Graduate Economics Scholarship | Economics Society of Calgary and the Alberta Energy and Utilities Board (AEUB) | Economics | $2,000 | Recommended by Program |
| Friends of Head-Smashed-In Graduate Scholarship | Endowed by the Friends of Head-Smashed-In Buffalo Jump Interpretive Centre | Canadian Plains Anthropology and Archaeology | $3,000 | Special Awards and Bursaries |
| Frost Graduate Scholarship In Cardiology | Frost Fund at the Calgary Foundation | Cardiovascular Sciences | $5,000 | Recommended by Program |
| Gallagher-Galileo Fellowship | Jack Gallagher Education Fund of the Calgary Foundation | Integration of technology into teaching and learning | $35,000 | Recommended by Program |
| GEC Award of Excellence in Comprehensive Design | Graham Edmunds Cartier Architects | Architecture | $2,500 | Recommended by Program |
| Gene Huber Graduate Thesis Prize in Biological Sciences | Endowed by Dr. Gene Huber | Biological Sciences | $1,000 | Recommended by Program |
| George and Joan Wing Memorial Graduate Bursary | Endowed by the family of George and Joan Wing | English | $1,250 | Special Awards and Bursaries |
| Gibbs Gage Graduate Scholarship in Architecture | Gibbs Gage Architects | Architecture | $2,500 | Recommended by Program |
| Gifted Studies Graduate Scholarship | Endowed by the Central Alberta Supporters of Quality Education for Gifted Students | Gifted education | $500 | Recommended by Program |

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|---|---|---|---|---|
| Glaholt Graduate Entrance Scholarship in Sustainable Environmental Design | Randal Glaholt | Environmental Design | $10,000 | Recommended by Program |
| Glaholt Graduate Scholarship in Ecological Design | Randal Glaholt | Environmental Design | $10,000 | Recommended by Program |
| Golder Associates Ltd Entrance Scholarship in Ecological Design | Golder Associates Ltd | Environmental Design | $2,500 | Recommended by Program |
| Gordon Lewis Hedberg Doctoral Scholarship | Endowed by the estate of Gordon Lewis Hedberg | Electrical and Computer Engineering | $8,000 per year | Recommended by Program |
| Governor General's Gold Medal | Governor General of Canada | Unrestricted | Gold medal and certificate | Medals and Prizes |
| Graduate Faculty Council Scholarship | University of Calgary Graduate Faculty Council | Unrestricted | $10,000 each. | Open Doctoral Scholarship |
| Graduate Teaching Fellowships (GTF) | Faculty of Graduate Studies | Unrestricted | $3,000 per half-course | Recommended by Program |
| Graeme Bell and Norman Kay Sullivan-Bell Graduate Scholarship in Biology | Endowed by Graeme I. Bell and Norma Kay Sullivan-Bell | Biology | $4,500 | Recommended by Program |
| Graeme Bell Graduate Travel Award | Graeme Bell | Unrestricted | up to $1,000 overseas destination or up to $500 North America destination | Recommended by Program |
| Grant Mossop Graduate Scholarship in Geology | Endowed by the family and friends of Grant Mossop | Geology | $5,000 | Recommended by Program |
| Grant Spratt Graduate Scholarship in Geology | Endowed by Frances (Jane) Birdsell | Geology | $1,100 | Recommended by Program |
| Harry and Laura Jacques Bursary | Award endowed through a bequest from the Estate of the late Laura Jacques | Unrestricted | $4,000 | Special Awards and Bursaries |
| Haskayne School of Business MBA Entrance ($10,000) Scholarship | Haskayne School of Business | Business | $7,000 for the first year and renewable at $3,000 for the second year | Recommended by Program |
| Haskayne School of Business MBA Entrance ($5,000) Scholarship | Haskayne School of Business, from differential fee student support revenue | Business | $5,000 per year | Recommended by Program |
| Haskayne School of Business MBA Entrance Scholarships for Evening Students | Haskayne School of Business, from differential fee student support revenue | Business | $3,000 | Recommended by Program |
| Haskayne School of Business MBA Scholarships for Continuing Students | Haskayne School of Business, from differential fee student support revenue | Business | $3,000 | Recommended by Program |
| Helen McWilliam Memorial Scholarship | Relatives, friends and colleagues of Helen McWilliam, Supervisor of School Psychology, Calgary Board of Education 1963-1982; matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | School Psychology | $2,000 | Recommended by Program |
| Helmut Moritz Graduate Scholarship | Endowed from proceeds of the Inertial Systems Conference 1985, Dr. K.P. Schwarz and various private and corporate donors, matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Geodesy | Up to $3,200 | Recommended by Program |
| Henrietta Weyland Graduate Scholarship in Mathematics | Endowed by Henrietta Weyland | Mathematics and Statistics | $2,500 | Open Doctoral Scholarship |

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|---|---|---|---|---|
| Hillhurst Sunnyside Prize | Endowed by L. Douglas Rae, through the Calgary Foundation | Social, political or physical issues relating to the development or preservation of Calgary's inner city | $812 | Special Awards and Bursaries |
| Honourable N.D. McDermid Graduate Scholarships | Endowed by the McDermid Law Fund | Law | $12,000 | Recommended by Program |
| Hopewell Teaching English as a Second Language Graduate Scholarship | Mr. Sanders Lee and friends of the Faculty of Education, matched by a bequest from Marilyn McClinton | Teaching English as an Additional Language | $4,000 | Recommended by Program |
| Humanities Graduate Scholarship | Endowed by the faculty and staff members of the departments of English, French, Italian and Spanish, Germanic, Slavic and East Asian, Greek and Roman Studies, Philosophy and Religious Studies | Humanities | $1,500 | Special Awards and Bursaries |
| Husky Energy Inc. Scholarship | Husky Energy Inc. Calgary | Environmental Design | $1,000 | Recommended by Program |
| Iain Cullen Ramsay Graduate Scholarship In Social Work | Cullen and Ramsay family | Social Work | $2,500 | Recommended by Program |
| Ian N. McKinnon Memorial Fellowship | Award endowed by gifts from Consolidated Natural Gas Ltd., B.P. Canada, Inc. and Kaiser Resources | All areas relevant to the effective development and utilization of energy resources, with special emphasis on economics, engineering and geology | $3,500 | Special Awards and Bursaries |
| Illuminating Engineering, Calgary Section Scholarship | Illuminating Engineering Society of North America, Chinook Section | Architecture | up to $1,000 | Recommended by Program |
| Innovation in Mobile Mapping Award | Klaus Peter Schwarz and Naser El-Sheimy | Geomatics Engineering with a research specialization in INS/GNSS integrated systems for mobile mapping, and positioning | $3,500 | Recommended by Program |
| Institute for Space Research Graduate Scholarship in Space Physics | Canadian Corporation for University Space Science | Space Physics | $1,000 | Recommended by Program |
| Institute of Navigation (ION) Alberta Section Graduate Award | Institute of Navigation (ION) Alberta Section | Satellite based, ground-based and integrated wireless location and navigation systems | $1,000 | Recommended by Program |
| Institute of Navigation (ION) Graduate Award | Institute of Navigation (ION) Alberta Section | Satellite based navigation systems | Canadian dollar equivalent of US $1,000 | Recommended by Program |
| Institute of Navigation (ION) National Graduate Award | Institute of Navigation (ION) | Satellite based and integrated navigation systems | Canadian dollar equivalent of US $1,250 | Recommended by Program |
| Izaak Walton Killam Pre-Doctoral Scholarships | Endowed through a bequest of the late Dorothy J. Killam And the Izaak Walton Killam Memorial Fund for Advanced Studies | Unrestricted | $28,000 | Open Doctoral Scholarship |

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|---|---|---|---|---|
| J.B. Hyne Graduate Scholarship | Endowed with contributions from friends and associates as a tribute to J.B. Hyne, the first Dean of the Faculty of Graduate Studies as the University of Calgary and a matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Unrestricted | $2,400 | Open Doctoral Scholarship |
| Jacques Cartier Award | Klaus-Peter Schwarz, Alex Bruton, Craig Glennie | Geomatics Engineering with a research specialization in the field of navigation | $3,000 | Recommended by Program |
| Jake Duerksen Memorial Scholarship | Endowed by the family and friends of Jake Duerksen; matching funds provided by the Province of Alberta's Advanced Education Endowment Fund | Biology | $2,500 | Recommended by Program |
| Jake Swart Memorial Graduate Scholarship | Robert Swart | Geoscience | $2,500 | Recommended by Program |
| James Frideres Award in Quantitative Sociology | Endowed by Dr. James Frideres | Sociology | $250 | Recommended by Program |
| James Gripton Doctoral Scholarship in Social Work | Mary Valentich, family and friends of James Macpherson Gripton and the Faculty of Social Work, University of Calgary. | Social Work | $1,000 | Recommended by Program |
| James Robert Cuthbertson Graduate Scholarship in Geology | James Robert Cuthbertson | Geology | $5,000 | Recommended by Program |
| Jim and Jean Cragg Doctoral Scholarship in Biological Sciences | Endowed by the Estates of Jim and Jean Cragg | Ecology | $5,250 | Recommended by Program |
| Jim and Jean Cragg Doctoral Scholarship in Environmental Design | Endowed by the estate of Jim Cragg | Environmental Design, with an interest in environmental sustainability | $6,000 per year | Recommended by Program |
| Jocelyn Monsma Selby Graduate Scholarship in Social Work | Jocelyn Monsma Selby | Social Work | $1,000 | Recommended by Program |
| Joe Woodsworth Memorial Scholarship | Endowed by family members, friends, students and colleagues of Dr. Joseph Woodsworth | Applied Psychology | $9,000 | Recommended by Program |
| John D. Petrie, QC, Memorial Bursary | Endowed by the estate of Mary H. Petrie | Unrestricted | $10,000 per year | Special Awards and Bursaries |
| John F. Morrall Graduate Scholarship in Transportation Engineering | Transoft Solutions Inc. | Transportation Engineering | $5,000 | Recommended by Program |
| John Labatt Limited Scholarship | Endowed through a gift from John Labatt Limited; matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Business, Management and related areas | $3,300 | Recommended by Program |
| John M. Dalgarno Memorial Award | Frank R. Anton; matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Agricultural Economics | $1,800 | Recommended by Program |
| John O. Galloway Memorial Scholarship | Family of John O. Galloway and associated companies; matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Geoscience | $6,000 | Recommended by Program |

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|---|---|---|---|---|
| John S. Poyen Scholarship | TransCanada PipeLines (formerly Alberta Natural Gas Co. Ltd.) with matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Analysis of energy economics and related environmental policy issues in the producing, transportation, and consuming sectors | $4,000 | Special Awards and Bursaries |
| Julius Schulich Award for Entrepreneurship | Endowed by the Julius Schulich Foundation | Master of Business Administration with a specialization in Entrepreneurship Studies | $15,000 | Recommended by Program |
| Karen Gammie Graduate Scholarship | Endowed by the Karen Gammie Memorial Fund of the Calgary Real Estate Board Charitable Foundation | Paediatric Nursing | $2,500 | Recommended by Program |
| Kathleen and Russell Lane Canadian Writing Scholarship | Endowed by the Estate of Kathleen Isabell Lane | Creative Writing | $1,200 | Recommended by Program |
| Kenneth MacLean Glazier Graduate Scholarship | Endowed by Kenneth MacLean Glazier, family and friends | Environmental Design | $600 | Recommended by Program |
| Kenneth Victor Nasedkin Memorial Award | Endowed by the estate of Kenneth Victor Nasedkin, Calgary | Architecture | $1,200 | Recommended by Program |
| Kertland Family Doctoral Scholarship in Vascular Biology | Endowed by David S. Kertland | Vascular Biology | $10,000 | Recommended by Program |
| Kertland Family Postdoctoral Fellowship in Vascular Biology | Endowed by David S. Kertland | Vascular Biology | $20, 000 | Recommended by Program |
| KIS-94 Graduate Scholarship | Endowed from proceeds of the Kinematic International Conference 1994, Dr M. Elizabeth Cannon and Dr. Gerard Lachapelle, Faculty of Engineering, the University of Calgary | Satellite navigation | $2,000 | Recommended by Program |
| Klohn Crippen Berger Graduate Scholarship | Klohn Crippen Berger Limited | Geotechnology | $5,000 | Recommended by Program |
| L.R. (Dick) Newby Memorial Award | Endowed by the friends, family and associates of L.R. (Dick) Newby | Geomatics Engineering | $750 | Recommended by Program |
| Leaders in Medicine Scholarship | An anonymous donor and the Faculty of Medicine | Leaders in Medicine program | Full or partial MD program fees | Recommended by Program |
| Lillian A. Jones/Whyte Museum of the Canadian Rockies Graduate Scholarship | Whyte Museum of the Canadian Rockies | Western Canadian History | $6,000 | Recommended by Program |
| Linda Barry-Hollowell Graduate Scholarship | Family and friends in memory of Linda Barry-Hollowell, Q.C. | Law, Nursing or Counselling Psychology | $5,000 | Recommended by Program |
| Lloyd and Florence Cooper Doctoral Scholarship in Integrative Medicine | Florence Cooper | Integrative health care | $35,000 | Special Awards and Bursaries |
| Lockhart Family Graduate Scholarship In Computer Science | May and John Lockhart | Computer Science | $1,000 | Recommended by Program |
| Lorne and Pat Gordon/YWCA of Calgary Graduate/Undergraduate Award | Anonymous | Social Work | $1,250 | Special Awards and Bursaries |
| Lorraine M. Wright Family Nursing Scholarship | Endowed by the friends and family of Dr. Lorraine M. Wright | Family Systems Nursing | $500 | Recommended by Program |
| Luke Bridgewater Memorial Scholarship | Endowed by the family and friends of Luke Bridgewater | Greek & Roman Studies | $5,000 | Recommended by Program |
| Lynda R. Hodges-Zwerman Memorial Scholarship | The Lynda R. Hodges-Zwerman Memorial Scholarship Fund endowed by family and friends, in honour and memory of Lynda and matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Specialization in Media Studies or Social Contexts of Technology | $4,500 | Recommended by Program |

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|---|---|---|---|---|
| M. Lilian Dick Graduate Scholarship in Social Work | M. Lilian Dick | Clinical Practice | $750 | Recommended by Program |
| Margaret (Peg) Brown Award In Wildlife Management | Endowed by Mrs. Margaret (Peg) Brown | Environmental Design | $2,500 | Recommended by Program |
| Margaret P. Hess Graduate Scholarship | Margaret P. Hess; matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Environmental Protection, Land Use, Ecology | $3,500 | Special Awards and Bursaries |
| Marion Janet and Ian Stormont Forbes Graduate Scholarships | Endowed by the estate of Marion Janet and Ian Stormont Forbes | Finance, Haskayne School of Business | Two awards of $6,000 in the MBA program and Two awards of $10,000 in the PhD program | Recommended by Program |
| Maritime Awards Society of Canada Graduate Scholarship | Endowed by the Maritime Awards Society of Canada | Any subject that deals with improving the national awareness of the importance of maritime affairs to Canada's future, which could include economic, environmental, historic, political, scientific, and sociological issues | TBA | Special Awards and Bursaries |
| Martha Biggar Anders Memorial Award | Endowed by relatives, friends and colleagues in honour of the late Martha Biggar Anders | Archaeology | $2,200 | Recommended by Program |
| Martha Whitney Langford Memorial Graduate Scholarship | Dr. Cooper Langford and family and friends | Social Aspects of Science or Technology | $1,000 | Recommended by Program |
| Masonry Contractors Association of Alberta Award | Endowed by the Masonry Contractors Association of Alberta,Southern Region | Architecture | $1,200 | Recommended by Program |
| Maunders R. McNeil Award | Maunders R. McNeil Foundation Inc., matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Business Administration | $5,550 | Recommended by Program |
| Mavis Marteinson Graduate Scholarship in Social Work | Mavis Marteinson | Social Work | $800 | Recommended by Program |
| Meloche Monnex Alumni Graduate Scholarship | Endowed by Meloche Monnex Inc. | Business | $2,000 | Recommended by Program |
| Mildred Shaw Book Prize | Endowed by Mildred L.G. Shaw | Science or Engineering | $300 University of Calgary Bookstore certificate for purchase of books | Special Awards and Bursaries |
| Military and Strategic Studies Graduate Scholarship | Centre for Military and Strategic Studies, Security and Defense Forum | Military and Strategic Studies | $15,000 annually in the recommended allotment of: Up to three awards at $1,000 each, up to seven awards at $2,000 each or up to three awards at $4,000 each | Recommended by Program |
| Mogens Smed Scholarship in Sustainable Interior Architecture | Endowed by the SMED Group | Environmental Design | $500 | Recommended by Program |
| Murray L. Davis Graduate Scholarship | Endowed by Sam and Ida Switzer and the family and friends of Murray L. Davis | Management | $1,000 | Recommended by Program |

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| Murray W. Waterman Architectural Awards | Endowed by the estate of Murray W. Waterman | Architecture | Variable, depending on funds available and qualified candidates | Recommended by Program |
| Murray W. Waterman Architectural Entrance Scholarship | Endowed by the estate of Murray W. Waterman | Architecture | up to $10,000 | Recommended by Program |
| Murray W. Waterman Senior Architectural Awards | Endowed by the estate of Murray W. Waterman | Architecture | Variable, depending on funds available and qualified candidates | Recommended by Program |
| Murray W. Waterman Study Abroad Awards | The estate of Murray W. Waterman | Architecture | Variable, depending on funds available and qualified candidates | Recommended by Program |
| N. Bruce Spankie Architectural Scholarship | Endowed by BKDI Architects, friends and colleagues of Bruce Spankie | Architecture | $1000 | Recommended by Program |
| Nat Christie Fellowship in Accounting | Nat Christie Foundation | Management | $3,000 | Recommended by Program |
| Nora and Ken Green Graduate Scholarship | Data-Line Realty Ltd. | English Literature | $1,000 | Recommended by Program |
| Norlien Foundation Bursary | Norlien Foundation | Music Performance | $1,000 | Special Awards and Bursaries |
| Norman J. Kennedy Graduate Scholarship | Doris Kennedy | Music | $2,000 | Recommended by Program |
| North West Group Graduate Scholarship | North West Group | Digital Photogrammetry | $5,000 | Recommended by Program |
| Offshore Artic Engineering Graduate Scholarship | Derek Mayne | Arctic Engineering | $10,000 | Recommended by Program |
| OMAE Calgary Chapter Graduate Scholarship in Engineering | Endowed by the American Society of Mechanical Engineers Offshore Mechanics and Arctic Engineering Division Calgary Chapter | Engineering | $4,200 | Special Awards and Bursaries |
| Paul F. Gans Scholarship | Endowed by PCL - Braun - Simons Ltd. | Project Management | $2,000 | Special Awards and Bursaries |
| Penn West Energy Graduate Scholarship | Penn West Petroleum Ltd. | Chemical Engineering, Petroleum Engineering, or Engineering, Energy & Environment Interdisciplinary Specialization, with thesis research related to enhanced oil recovery, reservoir fracturing, and/or CO2 sequestration and storage. | $10,000 | Recommended by Program |
| Penn West Energy Trust Graduate Scholarship In Geology and Geophysics | Penn West Energy Trust | Geoscience | $10,000 | Recommended by Program |
| Pepsi Bottling Group Graduate Scholarship | Pepsi Bottling Group | Unrestricted | $4,000 | Open Doctoral Scholarship |
| Peter C. Craigie Memorial Scholarship | Endowed through the Peter C. Craigie Memorial Scholarship Fund, endowed by friends, family, and colleagues, matching funds provided from the Province of Alberta's Advanced Education Endowment Fund | Humanities | $4,500 | Special Awards and Bursaries |

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| Peter Valentine, FCA, Graduate Scholarship | Chartered Accountants Education Foundation | Management | $2,500 | Recommended by Program |
| Petroleum History Society Graduate Scholarship | Petroleum History Society | Petroleum History | $1,500 | Special Awards and Bursaries |
| Petroleum Society of Canada Scholarship | Petroleum Society of CIM | Petroleum-related research | $2,500 | Recommended by Program |
| Phil Libin Graduate Scholarship in Business Administration | Harriet Libin, Sheryl and Howard Ackman, Toby and Stuart Libin and families | Business Administration | $500 | Recommended by Program |
| Philip E. Vernon Award | Endowed by Dorothy Vernon, colleagues, former students and friends of Dr. Philip E. Vernon; matching grant from the Province of Alberta's Education Endowment Fund | Humanities, Social Sciences, Educational Psychology, Fine Arts with especial reference to Music and Genetics | $2,000 | Special Awards and Bursaries |
| Pine Creek Research Centre Scholarship | The Organizing Committee of the International Water Association 2005 Watershed and River Basin Management Specialty Conference, Calgary 2005 | Innovation in Watershed Management/Water-related research | $4,000 | Special Awards and Bursaries |
| Pipeline Engineering Centre Graduate Scholarship | Endowed by Dr. Mike Yoon and friends of the PEC | Pipeline Engineering | $1,500 | Recommended by Program |
| Polyna Savridi Memorial Foundation Scholarship | Endowed by the Polyna Savridi Memorial Foundation with matching grant provided by the Province of Alberta's Advanced Education Endowment Fund | Vocal Performance, or Vocal Composition, or Vocal Study | $1,400 | Recommended by Program |
| Professor Allan Gordon Bell Distinguished Faculty Achievement Graduate Scholarship in Music | Endowed by the Distinguished Faculty Achievement Award Fund | Music | $1,000 | Recommended by Program |
| Queen Elizabeth II Graduate Scholarships | Province of Alberta | Unrestricted | Master's level - up to $10,800 and Doctoral level - up to $15,000 | Recommended by Program |
| Richard Hirabayashi Award | Endowed by family, colleagues, and friends of Richard Hirabayashi | Education, specializing in Early childhood education, ethnic diversity, human rights, or multicultural and First Nation issues | $1,000 | Recommended by Program |
| Richard J. Schmeelk Canada Fellowship | Schmeelk Canada Foundation | Unrestricted | $10,000 per term | Medals and Prizes |
| Richard Johnston Award in Chamber Music Composition | Award endowed through a bequest of the estate of Richard Johnston | Music | $1,000 | Recommended by Program |
| Richard R. Singleton Bursary in Architecture | Mrs. Donald L. Dunklee | Architecture | $1,250 | Special Awards and Bursaries |
| RKA Graduate Scholarship in Sustainable Architecture | Riddell Kurczaba Architecture Engineering Interior Design Ltd. | Architecture | $3,000 | Recommended by Program |
| Robert A. Willson Doctoral Management Scholarship | Haskayne School of Business | Management | Up to $10,000 | Recommended by Program |
| Robert B. Paugh Memorial Scholarship in Engineering | Family of Robert B. Paugh, a former student of the University of Alberta | Engineering | $750 | Open Doctoral Scholarship |
| Robert G. Kellaway, Mervyn G. Graves, C. Sheldon Buckles, Gordon J. Cummings Scholarship | Endowed by C. Sheldon Buckles, Gordon J. Cummings and Mervyn G. Graves | Environmental Design | $1,200 | Recommended by Program |

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| Robert M.S. Owen Award | Endowed by Mrs. R.M.S. Owen in honour of her husband, Mr. Robert M.S. Owen and matching grant provided from the Province of Alberta | Applied Psychology | $4,000 | Recommended by Program |
| Robert T.D. Wickenden Memorial Scholarship | Endowed by Lyla E. Wickenden in honour of her late husband, Robert T.D. Wickenden | Micropalaeontology, Geology | $1,700 | Recommended by Program |
| Ron Ghitter Award in Human Rights | Endowed by the Honourable Ron Ghitter and Myrna Ghitter | Advocacy and exploration of human rights | $2,500 | Special Awards and Bursaries |
| Ron T. Clare Memorial Fellowship | Endowed by family, Colt Engineering, W.Y. Svrcek, T.V. Vysniauskas, W.D. Sim, extended family, friends and colleagues of Ron T. Clare | Chemical Engineering | $2,500 | Special Awards and Bursaries |
| Ronald P. Mathison MBA Fellowship | Endowed by Ronald P. Mathison | Management | $10,000 | Recommended by Program |
| Roslyn McCowan Memorial Scholarship In Music | Endowed by family, friends and colleagues of Roslyn McCowan | Music Performance | up to $2,500 | Special Awards and Bursaries |
| Royal Trust Graduate Scholarship in Social Work | Endowed by the Royal Trust Corporation of Canada and a matching grant provided from the Province of Alberta's Education Endowment Fund | Social Work with a specialization in the study of families with special needs | $3,025 | Recommended by Program |
| Ruth Hilland Graduate Scholarship in Social Work | Ruth Hilland | Social Work | $1,000 | Recommended by Program |
| S.P. Cran and Family Graduate Scholarship | Susan and Tyler Cran | Master of Disability and Community Studies | $1,000 | Recommended by Program |
| Safiya Fathi Graduate Scholarship | Anonymous | Contemporary social, cultural, development, economic, political or modern historical studies of women in the Middle East. The scope of the region of the Middle East shall be as defined by the International Journal of Middle East Studies. | $6,000 | Special Awards and Bursaries |
| Saint Lazarus Graduate Bursary in Religious Studies | The Military and Hospitaller Order of Saint Lazarus of Jerusalem | Religious Studies: The Study of Christianity | $1,000 | Special Awards and Bursaries |
| Sarla Sethi Graduate Scholarship | Endowed by Dr. Sarla Sethi, family and friends | Nursing | $1,500 | Recommended by Program |
| ScotiaMcLeod Scholarship | Award endowed through a gift from Mcleod Young Weir Limited; matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Business, Management and related areas | $4,000 | Recommended by Program |
| Shanti Swarup & Shanti Devi Chugh Graduate Scholarship in Nursing | Dr. Sarla Sethi, in memory of her parents | Nursing | $1,500 | Recommended by Program |
| Sharon Aikenhead Waugh Memorial Scholarship | Endowed by Dr. & Mrs. J.D. Aikenhead and the Calgary & District Council of the International Reading Association, in memory of Sharon Aikenhead Waugh | Curriculum and Instruction | $2,000 | Recommended by Program |
| Sharon Wilkens Graduate Scholarship | Endowed by family, friends and colleagues of Sharon Wilkens | Biological Sciences | $1,250 | Recommended by Program |
| Shirley Bird Memorial Award | Endowed by Muriel and Eric E. Wiedman (parents of Shirley Bird) | Architecture | $1,800 | Recommended by Program |

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| Smith Mack Lamarsh Graduate Scholarship | Smith, Mark, Lamarsh, Barristers and Solicitors | Master of Business Administration with a specialization in Entrepreneurship Studies | $2,000 | Recommended by Program |
| Solar Energy Society of Canada Inc. (SESCI) '84 Scholarship | Solar Energy Society of Canada Inc., Calgary Chapter from proceeds of the 1984 national conference held at the University of Calgary | Environmental Design or Engineering | $850 | Recommended by Program |
| SSEF Excellence Award in Steel Design | Steel Structures Education Foundation | Architecture, focusing on use and design, utilizing steel products. | $3,000 | Recommended by Program |
| Stantec / Faculty of Environment Design Scholarship | Stantec & the Faculty of Environmental Design | Environmental Design | $2,500 | Recommended by Program |
| Stephen G. Peitchinis Memorial Graduate Recruitment Scholarship | Endowed by students, friends, family and colleagues of the late Stephen Peitchinis | Economics | $5,000 | Recommended by Program |
| T. Chen Fong Doctoral Entrance Scholarship in Medical Imaging Science | T. Chen Fong, colleagues and friends | Imaging Science | $30,000 (50% increase over base Tri-Council award, if no awards held) or an additional award of 50% of the value of the peer-reviewed external award held. The recipient will also receive a $3,500 research allowance. | Special Awards and Bursaries |
| T. Chen Fong Doctoral Research Excellence Scholarship in Medical Imaging Science | T. Chen Fong, colleagues and friends | Imaging Science | 50% of the value of the peer-reviewed external award held | Special Awards and Bursaries |
| T. Chen Fong Postdoctoral Fellowship in Medical Imaging Science | T. Chen Fong, colleagues and friends | Imaging Science | $60,000 A holder of a peer-reviewed award will receive the difference for a total of $60,000 or, if the primary award is greater than $60,000, an additional award equalling 15% of the primary award | Special Awards and Bursaries |
| Talisman Energy Graduate Scholarship in Energy & Related Studies | Talisman Energy | Energy-related studies | $10,000 per year | Special Awards and Bursaries |
| Terry and Sue White Doctoral Scholarship | Endowed by friends and family of Sue and Terry White on the completion of Dr. White's term as President | Unrestricted | $11,000 per year | Open Doctoral Scholarship |

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| Terry Douglas Memorial Graduate Scholarship | Calgary Directors Education Program Class 3, 2006, members of the Canadian Tire Dealers Association, Canadian Tire, the Institute of Corporate Directors, family, friends and colleagues of Terry Douglas | Management | $3,100 | Recommended by Program |
| The Gerald L. (Jerry) Weber - Cosmopolitan International Club of Calgary Graduate Scholarship | The Cosmopolitan International Club of Calgary | Diabetes mellitus | $21,000 | Recommended by Program |
| Thomas Dick Graduate Scholarship in Humanities | Endowed by the family of Thomas S. Dick | Humanities with a focus on cultural diversity, and a goal of increasing tolerance in religious and racial relations | $1,500 | Special Awards and Bursaries |
| Tom Baldwin Memorial Graduate Scholarship in Planning | Community Planning Association of Alberta | Planning | $1,000 | Recommended by Program |
| Trevithick Book Prize | Endowed through a gift from the Gordon Roy Trevithick Family; matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Interdisciplinary Graduate Program (IGP) and Resources and the Environment Program (RESR) | $300 | Recommended by Program |
| Tsinghua University Doctoral Scholarship | Office of the Vice-President - Research & International, University of Calgary | Control, Automation, Nano/MEMS; Design & Manufacturing; Applied Mechanics; or Thermal-Fluids, Energy Systems and Environment | $4,000 per year | Recommended by Program |
| University of Calgary Alumni Association Graduate Scholarship | Endowed by Alumni of the Faculty of Graduate Studies at the University of Calgary | Unrestricted | $4,500 | Open Doctoral Scholarship |
| University of Calgary Board of Governors Graduate Scholarship | Endowed with contributions from friends and associates of the Board of Governors as a tribute to the University of Calgary's 40th anniversary | Unrestricted | $5,000 | Open Doctoral Scholarship |
| University of Calgary Faculty Women's Club Graduate Scholarship | University of Calgary Faculty Women's Club | Unrestricted | $1000 | Special Awards and Bursaries |
| University of Calgary Nursing Alumni Scholarship | Endowed by the University of Calgary Nursing Alumni (First Graduating Class, 1974) | Any area or discipline at the Master's level related to Nursing | $1,500 | Recommended by Program |
| University of Calgary Ruby Doctoral Scholarship | Faculty of Graduate Studies | Unrestricted | $16,000 | Open Doctoral Scholarship |
| University of Calgary Silver Anniversary Graduate Fellowships | Endowed by an anonymous Donor and matched by the Province of Alberta | Unrestricted | Up to $20,000 but in no case less than $16,000 | Open Doctoral Scholarship |
| University Technologies International Inc. Fellowship - UTI | University Technologies International Inc. | Medicine, Engineering, and Science | $15,000 per fellowship, annually | Recommended by Program |
| Ursula & Herbert Zandmer Graduate Scholarship | Endowed through a bequest from the Estate of Ursula & Herbert Zandmer | Applied Energy & Science-Based Research | $10,000 | Recommended by Program |
| Ursula and Herbert Zandmer Graduate Recruitment Scholarship | Endowed through a bequest from the Estate of Ursula & Herbert Zandmer | Applied Energy & Science-Based Research | $10,000 | Recommended by Program |

| Award Name | Donor | Field of Study | Value | Nomination Method |
|---|---|---|---|---|
| Vedanta Society Graduate Scholarship | Endowed by the Vedanta Society of Calgary, The Ragamala Performing Arts of Canada, and the Hindu Society of Calgary, along with a matching grant from the Province of Alberta | Eastern Religions | $1,400 | Recommended by Program |
| Vera A. Ross Graduate Scholarship | Vera A. Ross | Health and Wellness | $4,125 | Recommended by Program |
| Ves Thomas Memorial Scholarship | Endowed by Mrs. Ainslie Thomas, family and friends of Veslof Thomas | Curriculum and Instruction (Language Education) | $2,000 | Recommended by Program |
| Vétoquinol Canada Veterinary Graduate Scholarship in Bovine Reproduction | Vétoquinol Canada Inc. | Bovine reproduction | $1,000 | Recommended by Program |
| Vétoquinol Canada Veterinary Graduate Scholarship in Swine Production Medicine | Vétoquinol Canada Inc. | Swine production medicine | $1,000 | Recommended by Program |
| W. Frank Johns - Calgary Real Estate Board Award | Endowed by the Calgary Real Estate Board Cooperative Limited, in honour of W. Frank Johns, F.R.I.; matching grant provided from the Province of Alberta's Advanced Education Endowment Fund | Business Administration | $1,200 | Recommended by Program |
| W.R. Unruh Scholarship | W. R. Unruh | Applied Psychology | $10,000 | Recommended by Program |
| Walter Dilger Graduate Scholarship in Structural Engineering | Endowed by Dr. Walter Dilger | Structural Engineering | $2,500 | Recommended by Program |
| Warren Veale Doctoral Entrance Scholarship | Colleagues of Warren Veale, and the University of Calgary | Unrestricted | $1000 | Open Doctoral Scholarship |
| Waugh Scholarship in Architecture | Endowed by James P.M. Waugh, Calgary | Architecture | $7,000 | Recommended by Program |
| Werner Graupe International Fellowship in Engineering | Antje Graupe Pryor Foundation | Geomatics Engineering, Petroleum Engineering, Electrical, Computer and Software Engineering, and Mechanical and Manufacturing Engineering | $25,000 | Recommended by Program |
| West Canadian Scholarship in Architecture | West Canadian, Calgary | Architecture | $500 | Recommended by Program |
| Wigham Family Scholarship | Endowed by Darol and Ev Wigham | Greek and Roman Studies, or Archaeology with a proven interest in Mediterranean Studies | $2,500 | Recommended by Program |
| William H. Davies Medical Research Scholarships | Award endowed through a bequest of the late William H. Davies | Medical Sciences | $3,000 to $11,000 depending upon the candidate's qualifications, experience, and graduate program | Recommended by Program |
| William T. Perks Scholarship in Sustainable Community Design | Professor W.T. Perks and the Faculty of Environmental Design | Environmental Design | $800 | Recommended by Program |
| Worley Parsons Geomatics Graduate Scholarship | Worley Parsons Geomatics | Geographic Information Science | $1,000 | Recommended by Program |
| Zandmer Graduate International Educational Experience Award | Endowed through a bequest from the Estate of Ursula & Herbert Zandmer | Chemical and Petroleum Engineering | up to $5,000 | Recommended by Program |

# Student Services

## Student and Enrolment Services

"will enhance the student experience by providing high quality service and support for all aspects of student life at the University of Calgary, particularly for the educational priorities detailed in our Academic Plan, "*Raising our Sights*"."

Associate Vice-Provost (Student Services): Jim Dunsdon, BEd, MBA
Telephone: (403) 220-3922
Fax: (403) 210-3889

Acting Associate Vice-Provost (Enrolment) and Registrar: David Johnston, BA, MA
Telephone: (403) 220-7993
Fax: (403) 220-0762
Location: MacKimmie Library Block 117

## Prospective Students Recruitment and Admissions

Director: Elaine Wong

The Recruitment and Admissions Office acts as the first point of contact for prospective students who are interested in attending an undergraduate program at the University of Calgary.

Services for prospective students include:

- Application and admissions advising
- Presentations at Canadian high schools
- Attendance at education or career fairs
- Hosting application and admission workshops.

Other services provided are:

- Centralized undergraduate application and admission services for both domestic and international applicants to programs offered by twelve faculties.
- Evaluation of domestic and foreign credentials for purposes of admission and transfer credit.
- Coordination and facilitation of requests for transfer credit agreements from other Alberta post-secondary institutions.

Telephone: (403) 210-ROCK (7625)
Fax: (403) 220-0762
Location: MacKimmie Library Block 117
Website: www.ucalgary.ca/futurestudents

## International Recruitment and Admissions

Telephone: (403) 210-7625
E-mail:

Prospective International Undergraduate Students:
international.students@ucalgary.ca
Website: www.ucalgary.ca/intlundergrad/

Prospective Graduate students:
graduate@ucalgary.ca
Location: Earth Sciences 720
Website: www.grad.ucalgary.ca

## Career Services

Director: Martina Payette

Career Services facilitates on-campus recruitment activities and career development programs for students and alumni both on-line at http://www.ucalgary.ca/careers and in person.

Programs and services at Career Services include:

- JobLink provides online access to full-time, summer, part-time and co-op and internship positions, on-line interview sign-up, company profiles, an event calendar and more
- Peer advisors and resume and cover letter review are available by appointment, at drop-in sessions, or online with OptimalResume
- Meet potential employers at career fairs, information sessions, and networking events. Event listings and on-line sign-up are found on JobLink.
- Online workshops and resources provide career and job search information.
- Dedicated faculty specific advisors and the *Will it WRK 4U?* Series industry panels help students define career options within specific areas of study
- The Career Education Program (CEP) provides students with the knowledge, tools and confidence to successfully manage all aspects of job search and allows them to add credits to their Co-Curricular Record
- Administration and information about Co-operative education and Internship programs

Employers' peak hiring times are in September, October and January through to March.

Telephone: (403) 220-8020
Fax: 403.282.8342 or 403.284.1755
Recruiting: recruit@ucalgary.ca
Co-operative Education and Internship:
coop@ucalgary.ca
Location: MacEwan Student Centre 188
Web site: http:/www.ucalgary.ca/careers/

## Centre for International Students and Study Abroad (CISSA)*

Director: Glynn Hunter, BA, MA

The Centre for International Students & Study Abroad (CISSA) provides support to international students related to their adjustment to the university and Canada, and promotes an understanding of international issues among Canadians by involving them in programs (study abroad, work and volunteer overseas), which develop a global experience.

Programs and services at CISSA include:

- Study/work/volunteer abroad resource library
- Selection and administration for Student Exchange Programs and Group Study Programs (semester, spring and Summer)
- International student advising and support
- Bridging programs (bringing Canadians and international students together): Global Friends, Language Bank
- Volunteer opportunities in CISSA and referral to others in Canada and abroad
- Handbooks for international students and study abroad students
- Arrival orientations and workshops for new international students and a term long Mentorship/Buddy Program to assist new students
- Workshops to prepare U of C students going abroad and returning home: Risk and Safety; Academic Issues, Cultural Differences and Culture Shock and Re-entry - Coming Home.

Telephone: (403) 220-5581
Fax: (403) 289-4409
E-mail: cissa@ucalgary.ca
Location: MacEwan Student Centre 275
Web Site: http://www.ucalgary.ca/cissa/

*CISSA reports to the Vice Provost International

## Centre for Community Service-Learning and Student Engagement

The Centre for Community Service-Learning and Student Engagement offers programs and services to support the institutionalization of service-learning and civic engagement and to link the university to the greater community. Our programs seek to enhance the student experience in and out of the classroom.

The Centre's services include:

- Co-curricular service-learning programs including Calgary Serves Canada, an 'alternative' Reading Week project
- International service-learning programs
- Support to faculty developing service-learning courses
- Events to foster enhanced civic consciousness
- A place of contact for community organizations
- Peer Helper positions and a Peer Helper work space

Telephone: (403) 210-6509
Fax: (403) 210-.3889
Location: 4th Floor, MacEwan Student Centre
Website: http://www.ucalgary.ca/servicelearning

## Counselling Centre

Programs and services at the Counselling Centre include:

- Individual and couples counselling provided by registered psychologists and counsellors-in-training
- Workshops including managing time, stress and sleep; managing test anxiety; overcoming procrastination; making educational, personal wellness and career decisions
- Career Clinic, drop-in times to assist with your educational and career decisions
- Academic Clinic, appointment bookings to assist you with educational success strategies
- Counsellor Training Program for provisionally registered psychologists and graduate level practicum placements
- Website information including FAQ's, tip sheets and useful links to personal, academic and career information

Telephone: 403.210.9355(WELL) #1 for Counselling
Fax: 403.284.0069
Location: MacEwan Student Centre 370
Website: http://www.ucalgary.ca/counselling/ and http://www.ucalgary.ca/wellnessguide

## Disability Resource Centre

Director: Johanne Tottle, PhD

- Advising and support for students seeking academic accommodations
- Arranging assistive services such as learning strategists, note-takers, and sign language interpreters
- Guidance and information regarding student funding
- Referrals to on-campus services and community/government agencies
- Access to a variety of adaptive technologies such a voice-recognition and speech synthesis
- Assessment of students encountering learning difficulties

- Accommodated exam support

Telephone: (403) 220-8237
Fax: (403) 210-1063
E-mail: jusmith@ucalgary.ca
TTY: (403) 220-2823
Location: MacEwan Student Centre 293
Website: www.ucalgary.ca/drc

## The Multi-faith Chaplain's Centre

The Multi-Faith Chaplains' Centre invites you to enjoy the gift of one another, the richness of ideas, the celebration of faith, and to join in serving the world together. There are chaplains from a variety of religions,--Catholic, Protestant, Muslim, Jewish, Zen Buddhist, and Hindu--who endeavor to connect students to their chosen faith tradition, create community, deepen religious understanding, and provide spiritual counselling. Space for prayer and meditation is provided within our offices

A separate Prayer Room and Chapel at the other end of MacEwan Student Centre is also available for prayer and meditation. All are welcome to drop in and visit in our location as part of the SU Wellness Centre.

Telephone: (403) 220-5451
Email: chaplain@ucalgary.ca
Website: www.ucalgary.ca/chaplain

## The Native Centre

Director: Shawna Cunningham, BA, MA

The primary mandate of The Native Centre to provide a culturally appropriate learning environment that encourages and supports the success of Aboriginal students in their pursuit of knowledge and higher education at the University of Calgary. The Native Centre provides academic, personal, and cultural support services and programs to prospective and current Aboriginal Students, and is welcome and supportive learning environment for the whole campus community.

### Services

- Pre-Admission Advising
- Program Advising for Open Studies
- Advocacy for academic and non-academic student issues
- Information and Referrals to Campus-wide services
- Advising and Advocacy for Aboriginal student funding
- Peer Tutoring and remedial support
- Retention Workshops
- Cultural and Spiritual Advising

### Programs

- NAPI Ambassador Aboriginal Youth Outreach Program
- LYNX Aboriginal Student Career and Employment Program
- Peer Assistant for Student Services (PASS Social Events Program)
- Student Volunteer Opportunities
- Aboriginal Student Access Program
- Old Sun Community College Academic Outreach Program

### Events

- Pipe Ceremonies
- Women's Tea Ceremonies
- Red Lodge Speakers Ceremonies
- Potlucks
- Recreational Field Trips and Social Events
- TNC Annual Graduation Banquet and Pow-wow
- First Nations Student Association's Annual Native Awarenessa Days

### Facilties

- The Red Lodge, Student Lounge
- First Nations Student Association Offices
- Computer Lab
- Study Space

For more information, please contact us at:

Telephone: (403) 220-6034
Fax: (403) 220-6019
Location Room 390z MacEwan Student Centre
Website: http://www.ucalgary.ca/nativecr/

## Office of the Student Experience

Through exceptional campus-wide programming, service and research, the Office of the Student Experience supports the success and leadership development of students through the different stages of their university experiences.

The OSE offers:

- Orientation and advising assistance (Summer Orientation, Fall Orientation Week, New Student Registration Assistance)
- Co-Curricular Record (CCR);
- University of Calgary Leadership Program (UCL);
- Emerging Leaders Program (ELP);
- Ongoing workshops and communications (Student Success Seminars);
- Peer Helper Program;
- Services for graduate students (Graduate Student Orientation);
- Volunteer and leadership opportunities.

Telephone: (403) 220-2277
Fax: (403) 220-0190
Email: theose@ucalgary.ca
Location: MacEwan Student Centre 460
Website: www.ucalgary.ca/ose
Hours: Monday to Friday, 8:30 am - 4:30 pm

## Campus Ticket Centre

The Campus Ticket Centre (2nd Floor, MacEwan Student Centre) provides tickets for events on and off campus, ticket printing services, phone cards (cell and long distance) and complete Ticket Master and Lottery Services. This outlet is also the location for UPass sticker distribution.

## Residence , Food and Conference Services

Director Residence Services: Randy Maus

Residence at the University of Calgary is designed to help students connect to one another in a community where people matter. It provides easier access to campus resources and opportunities, and support for students academically as they work toward their degree. Residence is open to all full-time students, and we have accommodations that meet a variety of needs from first year to graduate to students with families. To apply or find out more about the residence experience, facilities and services, please explore our website http://www.ucalgary.ca/residence.

### Single Student Housing

Single student housing is located on the southwest corner of the University Campus, consists of nine buildings (with an additional residence opening in the fall of 2011) and offers a variety of accommodation styles.

Rundle and Kananaskis Halls are newly renovated traditional style residences accommodating approximately 720 students in double and single rooms (Please note thre are a limited number of single rooms available). Housing consists of single-gender and co-ed wings or floors to best meet the needs of individual students. Laundry facilities, recreational lounges and academic lounges are all available for student use. Meal plans are required for students living in these buildings. More information on meal plans can be found at http://www.dineoncampus.ca/uofcalgary.

Cascade Hall, Norquay Hall, Brewster Hall and Olympus Hall accommodate new and returning undergraduate students in furnished, studio, one bedroom (single occupancy), two bedroom and four bedroom apartments.

Glacier Hall and Castle Hall are designated as graduate student apartment style buildings with the same services as our undergraduate buildings.

Two living learning communities are also available. Global Village houses 125 students (50% international, 50% Canadian) in suite style rooms and is focused on multicultural, global, and local awareness as well as leadership in a multicultural community. The Scholars' Advantage floor is focused on academic success and excellence and available to students accepted under the SUCCESS Program.

Each building has a highly trained staff of Community Advisors and Residence Life Graduate Program Directors that is available 24 hours a day to assist students with the challenges faced in university. They are specifically trained in responding to personal crisis, directing students to appropriate university resources, academic learning strategies, and community building. In addition, each building also has its own academic lounge and recreational lounge.

Students who have specific accessibility, mobility or medical needs are asked to indicate these needs on their application. Residence Services will work with students to meet their specific needs where possible.

Students must apply online at http://www.ucalgary.ca/residence. First-Year Undergraduate Students are guaranteed a space in residence if their application is received prior to April 30 of each year. All other new students are encouraged to apply as soon as possible, as demand for residence is high, and student housing assignments are completed on a first-come, first-served basis. Returning students are assigned based on a lottery system, with applications due by February 15th. Applications are available each year in November for first year students and December for all other students.

Telephone: 403.220.3210
Email: residence@ucalgary.ca
Location: Dining Centre 018
Website: http://www.ucalgary.ca/residence

### Student Family Housing

Student Family Housing consists of 250 townhouses, arranged in a garden court setting that is ideal for students with families. In addition to the facilities offered, Residence Education Staff facilitate programs and services to meet all family members' needs, including community barbecues, summer camps, ESL conversation groups, and the Jenna Change Children's Resource Library.

Space is limited in Student Family Housing, and the waitlist is processed based on date of application. To apply online or to learn more about student family housing, please visit our website.

Telephone: 403.220.7227
Location: 3735 - 32 Avenue N.W., Calgary, Alberta T3B 2X1
Website: http://www.ucalgary.ca/residence

## Student Awards and Financial Aid

Director: Claudia Barrett

### Awards

Administers Scholarships and Bursaries:

- Awards for entering undergraduate students: University of Calgary Automatic Admission Scholarships , Dean's Merit Admission Awards, High School Awards, Outstanding Achievement Awards, Seymour Schulich Scholarships and Awards, IB Diploma Scholarships
- Transfer Awards
- Awards for continuing undergraduate students: Undergraduate Awards
- Faculty of Law Awards
- Faculty of Medicine Awards
- Alberta Scholarship Programs: Louise McKinney Scholarships, Jimmie Condon Athletic Scholarships, Jason Lang Scholarships, Laurence Decore Awards, Lois Hole Humanities and Social Sciences Scholarship
- Canada Millennium Scholarship Foundation: Millennium Excellence Awards including National In-Course Awards, World Petroleum Congress Awards
- External awards administration
- Liaison with donors; establish new awards

### Student Loans

- Liaison between students encountering difficulties with their financial assistance and the appropriate government funding agencies
- Emergency loans and bursaries administration

For further information on financial aid, refer to the Awards and Financial Assistance section of this Calendar.

Telephone: (403) 210-7625
Fax: (403) 282-2999
Questions: www.ucalgary.ca/currentstudents/asktherock/
Location: MacKimmie Library Block 124
Website: www.ucalgary.ca/awards/

## University Health Services

Wellness Centre Director: Debbie Bruckner
Unversity Health Services offers the following services to students and their families:

- Confidential health services from family physicians with extensive experience in collegiate health care- including family medicine and walk-in services
- Physician referrals to specialists as indicated
- Health promotion and education
- Immunization programs
- Psychiatric services
- Chiropractic services (Traditional, ART, Acupuncture and Graston)
- Massage therapy
- Nutritionist services

For faculty and staff:

- Walk-in clinic hours for urgent care only
- Massage, chiropractic and nutrition services

Telephone: 403.210.WELL(9355)
Fax: 403.282-5218
Location: MacEwan Student Centre 370
Website: http://www.ucalgary.ca/wellnesscentre

## Enrolment Services

Director: Vanessa Wood

Enrolment Services assists students in carrying out their administrative requirements at the University of Calgary. Enrolment Services provides front-line services for the Fees Office, Student Awards and Financial Aid, Admissions, and Registrations. Enrolment Service Advisors are available to support students with any questions in these areas. Advisors can be accessed as follows:

### By Telephone

- 1-403-210-ROCK (7625):*General student inquiries
- Fee/admission/registration inquiries
- Student award and financial aid inquiries

*Limited information and service can be provided on the phone due to the Freedom of Information and Protection of Privacy Act legislation

### In-person

- On demand transcripts
- Proof of Enrolment letters (or forms signed) for undergraduate students (not necessary for in person as long as it is not for government loans)
- Fee payments
- Student loan inquiries
- Undergraduate registration issues
- Undergraduate adding/dropping/withdrawing from courses
- Undergraduate award/scholarship inquiries

Online (Available 24 hours a day, 7 days a week):

- Request transcripts in advance
- Pay fees using online banking
- Add/drop/swap courses
- Update personal information
- Print T2202A tax receipt (available online only)
- Print Proof of Enrolment letters (not for government student loans)

Telephone: 1-403-210-ROCK(7625)
Fax: 1-403-289-1253
Location: MacKimmie Library Block 117
Website: http://www.ucalgary.ca/registrar
Hours of Operation: Monday to Friday – 09:30-16:30, and Thursday – 10:00 – 16:30*
*Enrolment Services may stop generating tickets prior to 4:30 depending on service demands

Enrolment Services may experience temporary closures throughout the year for staff training and professional development. For current updates on closures and wait times please visit: http://www.ucalgary.ca/currentstudents/serviceinformation

## Bookstore

The Bookstore is proud to be owned and operated by the University. A portion of every dollar spent at the Bookstore is re-invested towards the improvement and maintenance of the campus community.

The main Bookstore is located centrally on campus, on the ground floor of the MacEwan Student Centre. We offer required and recommended textbooks for courses at the publisher's list price and make every effort to obtain the least expensive options for students. We also provide a used textbook buyback service, a free online classified service, and a buyback alert service. In our digital world, books can be located from a variety of sources, however your campus Bookstore offers the advantage of having exactly the books you need, in stock for the beginning of classes, all with a hassle-free returns policy.

We are more than just textbooks! The main Bookstore carries one of Calgary's largest selections of general reading books, and we can special order any book still in print. We are also pleased to offer University of Calgary clothing and souvenirs, Dinos merchandise, and a wide selection of stationery and art supplies. We also operate Seasons Card and Gift shop (one stop gift shopping!) and are proud to brew Starbucks coffee in our café.

The Bookstore has a secure online store that features the required and recommended textbook list each semester, online ordering for textbooks, clothing, gifts, and select general reading titles. Order your textbooks online, with the option of in store pick-up or delivery and avoid the back-to-school rush! Check out our site at www.calgarybookstore.ca.

The Bookstore operates 5 other satellite locations. The Medical Bookstore located in the Health Sciences building serves the Faculty of Medicine and the general Medical community by offering textbooks, general medical reference, stethoscopes and other instruments, and electronic media. Stuffs Food and Convenience Store is located in the Dining Centre to serve the residency community. The Art Store is located in the Art Building, with easy access for all Art students. The Microstore is located across from the main Bookstore, and offers the campus community academic pricing on computer hardware and software. The Loft, located on the 4th floor of MacEwan Student Centre, is a comfortable gathering point with wireless internet and includes a Café that brews Starbuck's coffee.

Hours*:
Main Bookstore: 09:00 to 18:00 Monday to Friday, 10:00 to 17:00 on Saturdays
Seasons Card and Gift Shop: 08:00 to 18:00 Monday to Friday, 10:00 to 17:00 on Saturdays
Medical Bookstore: 09:00 to 17:00 Monday to Friday
Microstore: 09:00 to 17:00 Monday to Friday
Art Store: 09:00 to 14:00 Monday to Thursday, September to April

Stuffs Convenience Store: 08:00 to 21:00 Monday to Friday, 12:00 to 21:00 Saturday, 12:00 to 18:00 Sunday
The Loft: 09:00 to 20:00 Monday to Friday

*Special extended hours apply during back-to- school periods, during the summer months (May through August), and the above hours may be subject to change, so please call or check our website for the most current information.

Telephone: (403) 220-5937
Toll free: 1-877-220-5937
E-mail: bkstore@ucalgary.ca
Website: www.calgarybookstore.ca

## Campus Recreation

Campus Recreation at The University of Calgary provides a diverse range of programs and services to satisfy the physical and recreational needs of both the University and the community at large. All students become All Access members of Campus Recreation through a fee assessed with their tuition. Students may also purchase family memberships at special student rates. Memberships are available to alumni, staff, and faculty at a discounted rate. Memberships are also available to the general public.

The following is an overview of what Campus Recreation offers. Complete information may be obtained from the Kinesiology Client Services Office (Kinesiology A 104) and from the GoActive, Active Kids, Camps for Kids, Intramural and Outdoor Centre Program Guides in display racks located around campus.

Telephone: (403) 220-7749
Website: www.ucalgaryrecreation.ca

### Open Recreation Hours

A listing of all facilities and a schedule of activities are available from the Kinesiology Client Services Office or by calling (403) 220-6942 (24 hours) or at the above web site.

## Facilities

### The Fitness Centre

This 10,500 square foot weight training facility features Olympic and free weights, multi-station and individual strength training machines, treadmills, rowing ergometers, electronic stair climbers, bikes, a Super Circuit and a 6 lane 200 meter indoor track. Certified staff are available for fitness appraisals, fitness and nutrition counselling, and customized programs.


FITNESS AND LIFESTYLE CENTRE

### The Racquet Centre

As Calgary's largest racquet facility, it features 12 international squash and 4 international racquetball courts; 6 to 10 badminton courts; and 4 outdoor tennis courts. Computerized and on-line web booking services allow students and members to book 3 courts up to 21 days in advance. There are no court fees. The Racquet Centre provides instructional lessons for all levels of players.

## The Aquatic Centre

This centre features an Olympic size pool and diving facility. Aquatic instruction and certification is available for both adults, and children and youth. Programs include Red Cross and Royal Life Saving Society.

## The Outdoor Centre

The Outdoor Centre offers the broadest possible range of outdoor recreational opportunities.

Equipment Rental: Features over 10,000 items of quality outdoor equipment. Members and non-members may rent this equipment. Equipment is available for both summer and winter activities.

Programs: Courses are available to get you started in a variety of outdoor pursuits. There are also hundreds of trips, ranging from day hikes or skiing in Kananaskis Country to week-long sea kayak tours along the B.C. Coast. There are hundreds of adventure outings to choose from.

Indoor Climbing: The climbing wall is specifically designed for climbing instruction. There are a variety of routes to satisfy all climbing abilities. Orientation sessions are required and instruction is available. An on-line web booking service allows participants to book climbing times.

### Programs

Intramural Sports
The intramural sports program provides the opportunity to participate in team sports through a variety of leagues and tournaments. Participants can register as a team or as an individual. Most sports are offered at both competitive and recreational levels, allowing all skill levels the ability to participate and compete.

### Sport Clubs

The Campus Recreation Sport Club program provides opportunities for instruction, competition, and social affiliation in a variety of activities not always offered in traditional intramural or adult sport instruction programs. All levels of skill are welcome.

### Adult Instruction

The Health & Recreation Centre offers a wide variety of general interest recreation programs and certifications. Instruction is offered in fitness, first aid and CPR, pre-hospital care, skating, swimming, and court sports.

### Active Kids

Throughout the year, the Active Kids program offers gymnastics, swimming, skating, court sports, outdoor activities and Karate programs for all ages from pre-school to teens.

### Camps for Kids

The University of Calgary hosts a huge range of summer camp programs for kids. These include:

Mini-University PHD Program: an educational program designed to give participants a practical experience in a fun, creative and discovery-based environment. Participants that will be going into grade 2 through 10 will experience a taste of University life in 3 distinctive themes (Science, Social Science and Fine Arts). All three themes involve structural physical activity that maximizes a child's Pedagogical and Health Development (PHD). Mini-University is run in conjunction with 20 faculties and departments on campus. Instructors are graduate and senior undergraduate students and are assisted by a faculty advisor. This program runs in two-week full-day sessions throughout the summer.

Minds in Motion: a series of 1 week comps in the fields of engineering and science.

Computer Camps and Gifted Education SUCCESS Camps.

Dinosaur Development Camps for Junior and Senior High School students.

Outdoor Camps that range from multi-activity camps for younger children to single activity camps for teens and an Outdoor Leaders in Training Program.

## English for Academic Purposes

Interim Director: Dr. Anuradha Sengupta

The English for Academic Purposes Program enables students who qualify for a degree program to meet the University's English language proficiency requirement.

The program has also developed specialized seminars for non-native English speaking graduate students, post doctoral scholars and researchers, as well as visiting professors. EAP Graduate seminars help individuals with academic/scholarly writing and several core aspects of academic oral communication and dissertation, thesis and proposal writing. These seminars have been approved by the Faculty of Graduate Studies.

For more information please contact the EAP Office or see our website.

Location: Education Block, Room 170
Telephone: (403) 220-3485
Fax: (403) 210-8554
Email: eapg@ucalgary.ca
Web site: http://www.education.ucalgary.ca/eap/

## Food Services

Senior Director: John Duncan

The University of Calgary's Food Services operated by Chartwells Education Dining Services is dedicated to providing excellent retail, dining plan and catering services to the campus community. Students, faculty and staff are able to purchase meal options that make it easier to eat on campus and focus on their studies and work.

Food Services operates 20 retail food operations in 9 different buildings on campus. The Alberta Room in the Dining Centre offers the greatest choice of any operation and is available to the entire campus community. Each operation is distinct in menu offerings, operating hours, service style and atmosphere. The Dining Plan Program offers convenience and flexibility to students at any of our operations through use of the ONE card. Impressions Catering is available to provide any type of catering service required. Sit down service is also available in the new Bistro Alma.

Telephone: (403) 220-5541
E-mail: food.services@ucalgary.ca
Location: Dining Centre 110
Website: www.ucalgary.ca/foodservices/

## Healthy U of C

Health and Wellness is a key focus of the University of Calgary Human Resources' People Strategy; it contributes to the University's goal of being an employer that successfully attracts and retains valued staff. A commitment to organizational and individual health and wellness will lend to a supportive environment where faculty and staff feel valued and are proud of their achievements and their contributions to the University's organizational goals. The University of Calgary promotes a healthy learning and work environment for students and University staff members. We offer services and facilities that will help you with your physical, social and mental well-being. When you feel well, you are more resilient and better able to do your best in your studies, work and life.

Healthy UofC coordinates health promotion events throughout the year, Information can be found at www.ucalgary.ca/HealthyUofC.

The Wellness Guide is an online resource for students with everything you need to know about academic success, and emotional, spiritual, physical and social stuff. Visit www.ucalgary.ca/wellnessguide.

### SU Wellness Centre

SU Wellness Centre Director: Debbie Bruckner

The SU Wellness Centre is the collaboration of Student Health, Counselling Services and Chaplaincy to provide wellness in mind, body and spirit to support academic and personal success. Integration has created a culture of wellness on campus – a place where students can truly experience an opportunity to grow in health and wellbeing through partnership with Wellness Centre professionals.

### Smoking Reduction Policy

With its Smoking Reduction Policy, the University strives to provide a safe and healthy work, learning and living environment for all staff, faculty, students and visitors. As a champion of health and wellness, the University believes that a reduction in smoking on campus is beneficial to all. Smoking is not permitted indoors nor within five metres of building entrances and air intake vents. As of January 1, 2009, tobacco product sales will be prohibited on campus in compliance with provincial legislation, the Alberta Tobacco Reduction Act. Please respect everyone's right to clean air and a healthy environment. See the Smoking Reduction Policy at the following website for details – https://pr1web.ucalgary.ca/UofCPandPA_R1/Forms/MainHome.aspx.

### Scent-Free Initiatives

The Scent Free Awareness Campaign "We Share the Air" asks for your support in limiting or eliminating the use of scented personal care products whenever possible. Please see the website www.ucalgary.ca/scentfree for information about the health effects related to scented personal care products and alternatives that you can choose.

Thank you for helping make the University of Calgary campus a healthy environment for everyone.

The University of Calgary was honored to receive the Calgary Chamber of Commerce Gold level H.E.A.L.T.H. (Helping Employees Achieve LifeTime Health) award in 2005 for our workplace health initiatives. We believe that the quality of our workplace influences the quality of student experience.

The University of Calgary is the proud recipient of the Premier's Award for Healthy Workplaces (2006), and received the highest accolade as the recipient of the Award of Distinction for employers with greater than 1000 employees. This award recognizes Alberta employers who demonstrate commitment to improving the health of employees and provide healthy workplace programs that encourage employees to make healthy eating choices and live an active lifestyle to remain healthy at work and beyond.

Healthy U of C recognizes that health and wellness is a shared responsibility between the organization and its people. Health, Safety and Wellness is one of the thirteen portfolios in the Campus Sustainability Plan, and the Sustainability Stewardship Working Group is an interdisciplinary team coordinating initiatives designed to actively engage the campus community in promoting a healthy campus culture. The portfolio's mission is to further understand the interrelationships between quality of life and sustainability, and seek local and global solutions; to enhance awareness of the interrelationships between the built environment, health, and wellness; and to enhance the quality of life on campus and in the community at large. As a post-secondary institution, we have a special responsibility to create a healthy community that enhances the student experience and models healthy choices.

### Use of Alcohol Policy

The Use of Alcohol policy deals with the consumption of alcoholic beverages on the campus and at University functions. No one may bring or consume liquor on campus except as permitted under the University's Institution License from the Alberta Gaming and Liquor Commission. Details regarding the University's liquor policy may be obtained from Ancillary Services.

## ID Card Office (Campus Card)

The Campus ONEcard gives members of the University community (faculty, staff, and registered students) access to a wide variety of information services and technologies. Cardholders who are not part of the academic community may also be entitled to some of these privileges. The Campus ONEcard is an identification card and can also serve as a library card, campus recreation membership card, electronic door access card and debit card (for food, photocopying and laser printer copies).

The Campus ONEcard is issued by the ID Card Office /Campus Security, located in MacEwan Student Centre, Room 260. The office is open Monday to Friday 08:30-16:30 with extended hours (until 18:00) at the beginning of the fall and winter terms. Please check this web site for extended hours of operation: www.ucalgary.ca/security.

To report a lost or stolen card please phone 403.220.7290.

All financial/debit functions of the Campus ONEcard are handled by the Campus Card Office, located in the Dining Centre, Room 01, telephone: 403.220.4922.

For more information on these services please check this website: http://www.ucalgary.ca/campuscard/.

## Information Technologies

Student Centre * E-mail * Web Publishing * Internet * High Performance Computing * Computer Labs * Multimedia * Wireless * Course Management (Blackboard - Elluminate)

University of Calgary Information Technologies (UCIT) http://www.ucalgary.ca/it/ is responsible for providing computing and networking support to U of C students in their learning and research needs via pc computers, Unix and high performance computing facilities.

As a student, you may use UCIT-supported PC and Unix workstation laboratories across campus. Particularly important is the Information Commons http://library.ucalgary.ca/services/informationcommons/ on the second floor of the MacKimmie Library Block, where you will find over 250 PCs, printing/scanning facilities, extensive technical and reference assistance, collaborative work rooms, basic instruction in use of the library catalogue, article indexes, and Microsoft Word, PowerPoint, and Excel, etc. The Information Commons also has access to AirUC (U of C's wireless network) and provides wireless printing. In addition to the IC, the Elbow Room (Room 142 Science Theatres), a "drop-in" microcomputer lab with UCIT staff available to offer technical assistance. It too is a wireless environment with printing available to the student. As well, there are several teaching labs which offer drop in access when not scheduled for credit instruction. For more information, please see http://www.ucalgary.ca/itlabs.

Every student is entitled to a UCIT computing account on the central computing system. More information on getting an account and the benefits of an UCIT account can be found at: http://www.ucalgary.ca/it/getitaccount. You can use this account for Internet access, Web-storage (Webdisk), access to software via the web (Webware), E mail, Web page publishing, course information (Blackboard), wireless access and many other applications. To register online for a UCIT account, go to http://www.ucalgary.ca/it/register.

Students also have access to many web-based applications through the U of C portal, a designated, single sign-on, personalized "desktop". Applications such as, the Student Center and Blackboard are found in the portal. To access these applications, log in to the MyUofC portal with your eID. To register for an eID online, go to https://my.calgary.ca.

UCIT supports many academic applications including Blackboard, Elluminate, Breeze, database management, graphics, printing and e mail, Web tools, statistical analysis, simulation, a comprehensive range of programming languages and scientific applications, and text processing. Documentation, consulting, and non credit courses on software and hardware are also available.

UCITs Com/Media unit provides audio-visual, portable computing and other communications media support for teaching and learning activities. A wide range of educational media technology is available by contacting any of the Com/Media cross campus booking and service centres. Equipment is then scheduled, delivered, set-up and made ready for the class. If you have special media requirements then Com/Media can meet these needs with consulting services for complex integrated video, audio, and control systems, and non credit training in the use of media technology. See http://www.ucalgary.ca/commedia for more information.

Hardware repairs and service for your own computer can be done through UCIT's authorized service centre located in the basement of Math Sciences (057/058) http://www.ucalgary.ca/it/repairs.

For information on purchasing hardware & software (Microsoft Office 2007), through the University's partnership with Dell or Apple, consult the Student Laptop & Software Purchase Program. To purchase Dell desktops, go to http://www.ucalgary.ca/buyadell/

UCIT also co ordinates site-license agreements and volume discounts for specialized software. For more information, go to http://www.ucalgary.ca/it/software.

UCIT distributes site licensed anti-virus software for detecting, removing and preventing computer viruses. Go to http://www.ucalgary.ca/it/virus for more information or a free download.

To provide you with on line access, UCIT operates the campus network with connections to the Internet and the World Wide Web. Additional networking services include: AirUC (the U of C wireless network) available throughout the campus. For more information about wireless service please go to http://www.ucalgary.ca/it/wireless; and RezNet – U of C's high-speed network for students living on campus. Browse the Web, check your e-mail, work

online from almost anywhere in your campus home. For more information, please see http://www.ucalgary.ca/reznet/.

Dialup service provides you with dialup access to University services and the Internet. See http://www.ucalgary.ca/it/dialup. You can also get high-speed access to our services via Shaw Internet (http://www.shaw.ca) or Telus Velocity ADSL (http://www.telus.com/).

Get help from:
IT Support Centre: (403) 220-5555
E-mail: itsupport@ucalgary.ca
Location: 7th Floor, Math Sciences Building

For more information on all Information Technology Services go to: www.ucalgary.ca/it/services

## Parking and Traffic Services

The University has approximately 8,800 parking stalls on campus. A flat rate per entry applies most days and evenings. Hourly parking is also available for short–term visitors. Arrangements can be made to purchase a lot assignment by the year or session. In addition to the on campus facilities, parking capacity for some 700 cars is available just south of the campus at McMahon Stadium.

Further information and applications for parking assignments can be obtained from Parking Services. Lot locations and costs can be found on the Parking Services website.
Before you consider driving to campus, check out our sustainable options at www.ucalgary.ca/parking.

Telephone: (403) 220-6771 or (403) 220-6772
E-mail: parking@ucalgary.ca
Location: Olympic Volunteer Centre (OVC), North end of McMahon Stadium
Hours of operation: 07:30 – 17:00 Monday to Friday
Website: www.ucalgary.ca/parking

## Student Legal Assistance (SLA)

Director: Maureen Mallett

Run by law students, Student Legal Assistance (SLA) is a registered charity that delivers a range of free legal assistance and representation to undergraduate students at the University of Calgary, as well as those in the Calgary area who are unable to afford a lawyer.

Graduate students may be eligible for services of the SLA if they meet the SLA financial guidelines. A one-time nominal dispersement charge applies. (Undergraduate students are exempt from this charge.)

SLA operates a legal clinic on the University campus four evenings per week during the school year, and on a full-time basis throughout the summer months.

SLA can assist in most matters at the Provincial Court of Alberta, as well as some Administrative Tribunals. Most common areas SLA assists with include:

- Student Appeals (Academic and Non-Academic)
- Landlord Tenant Issues
- Employer Disputes
- Traffic Violations
- Bylaw Infractions
- Criminal Law
- Contract Issues
- Family Matters

For appointments call: (403) 220-6637
Fax: (403) 282-0473
Location: Murray Fraser Hall 3390

## University Child Care Centre (UCCC)

Our mandate is to provide and promote childcare services for the children of students, faculty and staff that make up the University of Calgary Community.

At the UCCC we believe that play is imperative during the early years of life. Our goal is to provide an exemplary inclusive program that supports and encourages the unique potential within each child. We do this by promoting the natural process of play in an enriched setting that provides optimal conditions for each child to grow at their own pace.

The Centre is open from 07:30am to 5:30pm Monday thru Friday. We are closed on all statutory holidays, two professional days per year as well as the week between Christmas and New Years.

### Admission to UCCC

Applicants are prioritized within each age group on the basis of their waiting list application date. At our Main Campus location the order of priority placement is first given to University of Calgary full time students followed by University of Calgary faculty, and staff, with the exception of children who have a sibling attending the UCCC, in which case sibling placement takes priority. At our new West Campus location, staff and faculty have priority over full time students. To be on our waiting list you must turn in a completed waiting list application form accompanied by a non-refundable registration fee and confirmation or your University Affiliation. Being placed on the Wait List does NOT guarantee you a spot at the centre. On average, most children are on the waitlist 1 to 3 years.

For more information please call us at (403) 220-3303 or email us at waitlist@ucalgary.ca.

## University Library

... connecting people and information

The University Library provides a vast range of information resources, services and research expertise to support the diverse information needs of students and faculty in all disciplines.

Ranked among the largest research libraries in Canada, our collection includes in excess of seven million books, journals and microforms, plus: maps, airphotos, audio recordings, music scores, film, video, CDs, DVDs, purchased digital images, slides, architectural and literary archives, electronic full-text, image and data files. The digital resource base is expanding rapidly and includes more than 42,000 unique electronic journal titles, and close to 620,000 electronic books and over 90,000 locally digitized items.

MacKimmie Library (the 'main library') is located at the centre of campus. Five branch libraries are situated near the faculties or departments that use their services most frequently: Gallagher Library of Geology and Geophysics, Health Sciences Library, Bennett Jones Law Library, the Business Library, and the Doucette Library of Teaching Resources.

The Information Commons is the focal point on campus for information services. It is an integrated learning environment in which information resources and technologies are combined with expert staff who provide research consultation, information navigation, and technological assistance to support scholarly use and production of recorded knowledge. For student convenience, there is 24-hour access (Sunday-Thursday, during term, on Fridays and Saturdays the hours are the same as the rest of the Library) to this state-of-the-art facility, 2nd floor MacKimmie Library.

The University Library is open 90 hours each week, offering access to the resource materials as well as reference assistance, specialized information consulting and instruction in the skills and process of information retrieval and management to equip independent learners for success in the knowledge era.

Library resources and services are also 'delivered to your desktop' via our online information system, featuring the Library catalogue, an extensive selection of networked databases, electronic information resources and services for distance learning.

Telephone: (403) 220-5962
Fax: (403) 292-1218
E-mail: libinfo@ucalgary.ca
Web: library.ucalgary.ca/

## The Writing Centre

The Writing Centre offers free half-hour individual writing tutorials for students at all levels who want to improve their writing. In a Writing Centre tutorial, students can:

- Discuss their writing process and learn strategies to write more effectively
- Review returned papers to understand how to improve their written assignments
- Work with an instructor on an ongoing basis to improve essay structure, paragraph development, sentence structure and style, grammar, and punctuation Get advice on how to use and document sources
- Get advice on how to use and document sources
- Get help with English as a Second Language

Note that Writing Centre instructors will give general advice on papers being prepared for credit courses; however, they will not proofread student papers.

To book a half-hour Writing Centre appointment, please visit http://efwr.ucalgary.ca.
For Writing Centre help via e-mail, write to wconline@ucalgary.ca, describing your writing assignment, questions, and concerns in detail.
Telephone: (403) 220-7789
E-mail: wconline@ucalgary.ca
Location: Social Sciences 106
Effective Writing Office: SS 110
Website: http://efwr.ucalgary.ca

## The Students' Union

### Events

The SU offers fun and exciting events throughout the year including Cinemania, Enviropalooza, Wellness Month along with many great musical acts. There is always something to do! For the latest scheduled events check out the SU web site at http://www.su.ucalgary.ca.

### Advocacy

The organization also fights for quality education by lobbying the municipal, provincial and federal governments as well as university administration on issues that directly effect students. We help sponsor and create large scale public campaigns to highlight the importance of university funding - all in an effort to lessen the financial burden faced by students.

### Lines of Business

The SU operates a full-service restaurant and bar, the Den and Black Lounge. This popular campus hang-out is the most successful operation of its kind

in Canada. The SU also runs the only major convenience store on campus, the Stor, as well as the used consignment bookstore and copy centre, Bound and Copied. In addition, the Students' Union manages MacEwan Hall and MacEwan Student Centre.

## Dinos Athletics (The Interuniversity Athletic Program)

A big part of your University of Calgary experience is Dinos Athletics . There is no better way to feel the proud 43 year history of our school than to join your fellow students in the stands, cheering the Dinos to victory. With a mission of lifting the spirit and pride of all members of the University community, Dinos Athletics belongs to everyone and we encourage you to enjoy the experience.

Dinos Athletics is a full member of the Canada West University Athletic Association. The Canada West is the most competitive conference in Canadian Interuniversity Sport (CIS).

The Dinos compete in Canada West Conference league sports including basketball, field hockey, football, ice hockey, rugby, soccer, and volleyball and in Canada West tournament sports including cross-country, swimming, track and field, and wrestling.

Professional coaches and world-class equipment, facilities and support services are provided for the interuniversity athletic program. Students will find interuniversity athletics challenging and exciting as participants, and interesting and entertaining as spectators.

Don't forget, all undergraduate and graduate students are admitted free of charge to all conference games

upon presentation of proper I.D.

For further information contact:

Dinos Athletics - Faculty of Kinesiology
Kinesiology Complex A 147
Telephone: 403.220.2680
E-mail: goDinos@ucalgary.ca
Website: http://www.goDinos.com

## Womens' Resource Centre (WRC)

The Womens' Resource Centre provides a safe and supportive place to advance women's equality and build community where all experiences are valued, and everyone is offered the resources necessary to make informed choices. The WRC strives to create a more inclusive campus environment where each individual's agency and voice are nurtured to contribute to the collective spirit of a community where citizenship and leadership is made possible for all, regardless of gender. We celebrate diversity based on – but not limited to – gender, ethnicity, race, class, ability age and sexual orientation and we believe that the key to achieving empowerment is through the cycle of reflection and action, creating positive social change. The WRC uses three pillars of work to achieve our goals: Wellness, Leadership, and Diversity.
Programs and services at the WRC include:

### Student Services:

- Peer Support (peer to peer counseling on a diversity of issues)
- Mentorship & Leadership Training Program (for undergrad, graduate and post-grad students in the last phase of their degree)
- Trainings – Diversity Training (race, gender, class, sexuality, etc), Leadership Training
- Workshops (health and wellness, global and cultural issues, etc)
- Online Resource Database (with hundreds of resources accessible through the WRC website)
- Social Gatherings (knitting circles, craft groups, movie nights – all free of charge)
- The WRC Awards - To celebrate women's *W*isdom, *R*esilience and Compassion by identifying and honouring an alumna and a female University of Calgary student
- Special Events - December 6th Memorial: National Day of Remembrance and Action on Violence Against Women, International Women's Day Celebration
- Volunteer Opportunities

### Facilities:

- Lounge
- Study Space
- Resource Library
- Club and group meeting space
- Quiet meeting space for women experiencing challenging situations and faculty or staff wishing to conduct one-on-one meetings.

Telephone: 403.220.8551
Fax: 403.210.7970
Email: women@ucalgary.ca
Location: MacEwan Hall 318
Website: http://www.ucalgary.ca/women/
Hours: Monday to Friday, 8:30am – 4:30p

# About the University

## Highlights in the History of the University of Calgary

The University of Calgary is a comprehensive research university that, in its short 44-year history, has grown to take its place among the finest institutions in Canada. Combining the best of long-established university traditions with the City of Calgary's vibrant energy and diversity, the university aims to provide a research and scholarly foundation for students eager to acquire the knowledge and skills essential for a successful personal and professional life.

Our 213-hectare campus provides a beautiful and dynamic setting for our scholars and students. The U of C has 15 faculties with more than 60 departments and over 30 research institutes and centres. The 15 faculties are: Arts; Continuing Education; Education; Environmental Design; Graduate Studies; Haskayne School of Business; Kinesiology; Law; Medicine; Nursing (Calgary), Nursing (Qatar); Schulich School of Engineering; Science; Social Work; and Veterinary Medicine. Our 2,761 academic staff are actively engaged in research and scholarship. More than 29,000 students, including over 1,500 international students from 100 countries, are enrolled in undergraduate, graduate and professional degree programs. The U of C has more than 135,000 alumni living in 130 countries.

### Research and Education

As one of Canada's top seven research universities and a member of the 13 most research intensive universities in Canada (the G-13), innovation, discovery and learning are at the heart of all that we do. Our relentless pursuit of quality in our teaching and research programs is guided by our mission to contribute to the well-being of the people of Alberta, Canada and the world. Thanks to the sustained efforts of U of C faculty, students, postdoctoral researchers and staff, the U of C's research funding totals $262 million. Research brings significant benefits provincially, nationally and internationally, and is the foundation of Alberta's economic and social vitality. Interdisciplinary research is core to the university's teaching and research mandate.

The university offers a high quality undergraduate education that is characterized by the synthesis of research, teaching and learning. We mean to enhance the undergraduate learners' experience by using a student-centred focus that maximizes opportunities to provide a distinctive learning experience that fully integrates the features of a research university. The university is broadening opportunities for students to take inquiry-based courses that lead to greater critical thinking skills, increased exposure to undergraduate research and greater access to leading edge scholars. The university also offers students a variety of experiential, or hands on learning opportunities, including internships, international travel, coop placements and directed research.

The U of C is the first university in Canada to offer a four-year graduation guarantee to students embarking upon four-year undergraduate degree programs in the faculties of Arts and Science. The guarantee program offers incoming students an agreement that ensures they will be able to graduate within four years, or the university will pay the tuition for any extra courses needed to finish.

Students at the University of Calgary are officially recognized for their involvement in campus activities outside of the classroom. The co-curricular record is an initiative that encourages and fosters a campus culture of volunteerism and community involvement amongst its students.

Our efforts are to raise our global profile, enhance the quality of our undergraduate and graduate programs, promote innovation and excellence in scholarly activity and provide significant returns and tangible benefits to our community and economy.

### Facilities

The MacEwan Student Centre is a hub of activity at the university. There is also a museum and art gallery, four performance theatres, two childcare centres and residences for single students and students with families.

The U of C is pursuing its largest capital expansion ever to add capacity for more students and a host of new teaching and learning spaces. These major developments, including the Taylor Family Digital Library, Downtown Campus, Energy, Environment and Experiential Learning building, and a new residence.

The Faculty of Medicine and the Faculty of Veterinary Medicine are located on the south campus adjacent to the Foothills Hospital. Satellite institutes of the university include, the Kananaskis Biogeoscience Institute, located a short drive from the city on the eastern slopes of the Rocky Mountains, the Rothney Astrophysical Observatory, located in the foothills south of the city and a campus in Doha, Qatar, offering internationally accredited nursing degrees to students in the Middle East. Development of the university's west campus is currently taking place, and is the site of the new Alberta Children's Hospital.

The University of Calgary features some of the finest athletic facilities in the country, The Olympic Oval is an international speedskating facility and houses the Canadian Sport Institute, a high-performance training centre and two Olympic-sized rinks where the reigning women's gold medal hockey team trains. There are also tennis courts, a triple gymnasium, a yoga studio, an Olympic-size swimming pool, weight rooms, jogging tracks, an Outdoor Centre offering equipment rentals, courses and instruction, and a huge indoor climbing wall. Nearby is the home of U of C Dinos football team, McMahon Stadium.

### Governance

The University of Calgary has two governing bodies:

- The Board of Governors is the corporate body charged with the management and control of the University, its property, revenue, business and affairs.
- The General Faculties Council (GFC) is responsible for the academic affairs of the University, subject to the authority of the Board of Governors.

Each Faculty has a Faculty Council empowered to determine the Faculty's programs of study, conduct examinations, provide for the admission of students, determine conditions for withdrawal, and to authorize the granting of degrees, subject to conditions imposed by the General Faculties Council.

The Students' Union and the Graduate Students' Association provide for the administration of the affairs of students and the promotion of their general welfare.
http://www.ucalgary.ca/secretariat

### International Studies - Make Your Degree More International

The University of Calgary is committed to preparing its students for life in an increasingly global economy and society. An International Component will be part of every undergraduate student's degree program at the University when the current curriculum changes are finished, and are already a requirement of many programs. An International Component will provide students with an understanding of international relationships and issues with a particular view to the benefits and challenges of interaction of peoples, cultures and environments around the globe. It provides opportunities to develop an awareness of international, multicultural or aboriginal perspectives.

All students are encouraged to enrich the international component in their program in one or more of the following ways:

By participating in a term-abroad, field school, credit travel study, or student exchange experience in another country. Students should contact their faculty or the Centre for International Students and Study Abroad (CISSA). Visit the CISSA website for more information (www.ucalgary.ca/UofC/students/CISSA)

By including in their program a Major or Minor that focuses on international, aboriginal, or multicultural issues:

African Studies
Anthropology
Chinese
Development Studies
East Asian Studies
East Asian Language Studies
French
Geography
German
International Indigenous Studies
International Relations
Italian
Japanese
Latin American Studies
Russian
South Asian Studies
Spanish

By taking courses where the language of instruction is a language other than English. (Call (403) 220-4000 for a list of such courses offered in French.)
By including several of the following courses in a degree program. Please note that some of the following courses have prerequisites or other registration restrictions. The courses can be taken as part of a major field or minor or among the degree options:

African Studies 301, 400, 501

Anthropology 203, 213, 303, 317, 319, 321, 323, 331, 335, 337, 341, 355, 363, 379, 405, 419, 421, 427, 435, 465, 473, 481, 535, 541

Applied Psychology 323

Archaeology 205, 303, 305, 307, 325, 341, 343, 345, 347, 351, 353, 355, 357, 395, 399, 401, 409, 419, 421, 423, 427, 431, 433, 511, 553

Architectural Studies 457

Art History 323, 325, 357, 359, 365, 367, 369

Astronomy 301

Biology 307, 451

Botany 309

Canadian Studies 309, 311, 313, 315, 333, 351, 353, 361

Central and East European Studies 313

Chinese 205, 207, 229, 301, 303, 311, 313, 317, 331, 333, 355, 421, 431, 461

Comparative Literature 201, 203, 303, 399, 405, 517

Dance 574

Development Studies 201, 375, 485, 501, 591

East Asia 300, 500

East Asian Studies 317, 319, 321

Economics 321, 327, 337, 423, 425, 491, 527, 537

English 385, 392, 450, 462, 492, 507, 511, 513

Film 301

Finance 461

French 209, 211, 213, 215, 217, 235, 237, 315, 317, 323, 333, 339, 343, 349, 359, 369, 399, 415, 439, 449, 459, 479, 499, 515, 539, 549, 557, 599

General Studies 300, 359, 401

Geography 211, 213, 251, 321, 365, 367, 371, 377, 391, 397.01, 397.02, 397.03, 425, 429, 451, 463, 590, 592

Geophysics 375

German 200, 202, 204, 221, 223, 313, 315, 317, 331, 333, 349, 353, 357, 359, 369, 397, 401, 403, 451, 469, 497, 551, 561, 591

Greek 201, 203, 301, 303, 401, 413, 525, 551

Greek and Roman Studies 205, 209, 305, 315, 321, 325, 327, 355, 357, 431, 455, 457, 551

Hindi 205

History 201, 205, 207, 209, 303, 307, 309, 311, 315, 317, 331, 333, 345, 361, 365, 367, 385, 387, 389, 391, 401, 403, 405, 407, 411, 412, 413, 415, 421, 427, 445, 447, 457, 461, 463, 465, 467, 469, 471, 473, 487, 491, 499, 503, 513, 515, 517, 529, 543, 553, 565, 569, 583

International Relations 501, 597

Italian 201, 203, 301, 309, 401, 405, 407, 409, 499, 501

Japanese 205, 207, 301, 303, 317, 331, 333, 341, 461

Kinesiology 455, 487

Latin 201, 203, 205, 207, 301, 303, 333, 401, 413, 433, 453, 525, 551

Latin American Studies 201, 203, 301, 303, 401, 501

Linguistics 531

Management Studies 571

Marketing 467

Native Languages 205, 207

Northern Planning and Development Studies 401, 405

Political Science 283, 359, 361, 363, 365, 369, 371, 375, 377, 381, 383, 385, 387, 391, 435, 437, 461, 463, 465, 467, 469, 471, 473, 475, 479, 485, 489, 507, 561, 567, 569, 577, 579, 581, 583

Religious Studies 201, 203, 207, 209, 211, 213, 215, 217, 219, 221, 305, 313, 319, 323, 325, 327, 329, 339, 341, 347, 353, 381, 401, 403, 441, 443

Romance Studies 299, 399

Russian 201, 203, 209, 301, 303, 317, 331, 333, 355, 361, 363, 397, 401, 403, 451, 461, 463, 497, 541, 551, 561

Slavic 355

Sociology 307, 375, 467, 487

South Asian Studies 315, 415

Spanish 201, 203, 301, 303, 321, 323, 405, 407, 421, 423, 441, 471, 473, 475, 499, 505, 553, 555, 557, 565, 571, 581, 583, 593, 597, 599

Strategy and Global Management 571, 573, 575

In addition to the credit opportunities listed above, University of Calgary students can participate in a wide variety of non-credit activities that contribute to the international dimension of university experience. Contact the Centre for International Students and Study Abroad (CISSA) for suggestions.

## Coat of Arms/Logo

The University of Calgary combines the best of long-established University traditions with Calgary's frontier spirit of originality and innovation.
Our logo was designed to reflect that spirit. The logo has two components: the Coat of Arms (including the escroll with our motto) and the wordmark. The coat of arms represents and respects our historical roots while the more contemporary wordmark reflects our focus on the future and leading edge.

The Coat of Arms consists of a shield, an escroll containing the motto and the wordmark in either a horizontal (with the wordmark to the right of the crest) or vertical (with the wordmark below the crest) format.

The shield consists of two parts, the upper part (the chief) separated from the lower (the base) by an arched line symbolizing the Chinook arch. The ground colour of the chief is scarlet, commemorating the North West Mounted Police under whose influence Western Canada was settled. Upon this colour is a pair of open books bound in gold. Between the books is a white rose, symbolic of Alberta. The ground colour of the base is gold, indicative of golden sunshine or golden grain. Upon this is a black bull's head with red horns and crossed staves bearing red flags, reminiscent of the family crest of Lt. Col. J.F. Macleod, the NWMP officer who founded Fort Calgary.

Below the shield, printed on an escroll, is the university's motto, "Mo shuile togam suas" (translated as "I will lift up my eyes"), rendered in Gaelic uncial letters. The scroll is white; the draped ends are red. They were granted to U of C in 1966 by Lord Lyon King of Arms at Edinburgh.

## Official Colours

The university has three official colours that appear in the Coat of Arms.

Red PMS 485; Gold PMS 116 and Black.

## Tartan

The University has an official tartan that incorporates the U of C's official colours of red, black and gold in its design. It was designed by Jim Odell, a U of C Education and Fine Arts graduate and accredited in a ceremony presided over by Duncan Paisley of Westerlea, President of the Scottish Tartans Society and director of the Register of All Publicly Known Tartans.

## The Mace

Certain formal occasions involve the use of special regalia, the significance of which is now symbolic but most of which has practical origins. In early times the mace was used first as a weapon to protect and second as a symbol of authority.

The mace carried into Convocation is a symbol of the authority of the Chancellor. It represents the Crown and the authority vested in the Chancellor to grant degrees. It is always carried in front of the Chancellor at Convocation. One interesting tradition in the use of maces is that if the real authority (the Queen) was present in person, the mace would be inverted.

## Campus Security

Campus Security is dedicated to maintaining the campus as a safe and pleasant place to live, work and study. Campus Security is responsible for the security and protection of people on campus in addition to the buildings and grounds. Close liaison is maintained with police and other security agencies in addition to City of Calgary emergency services. Officers are on duty 24 hours a day, year round, to respond to your security and emergency needs.

Campus Security, in partnership with the Students' Union, provides a Safewalk service to any location on campus including the LRT, parking lots, bus zones and campus housing. Campus Security can be contacted from any of the "Help" phones located around campus or by dialing 403.220.5333.

Telephone: 403.220.5333
Fax: 403.282.2765
Location: MacEwan Student Centre, Room 260
Web site: http://www.ucalgary.ca/security
E-mail: campus.security@ucalgary.ca

## ID Card Office

The Campus ONEcard gives members of the University community (faculty, staff, and registered students) access to a wide variety of information services and technologies. Cardholders who are not part of the academic community may also be entitled to some of these privileges. The Campus ONEcard is an identification card and can also serve as a library card, campus recreation membership card, electronic door access card and debit card (for food, photocopying and laser printer copies).

The Campus ONEcard is issued by the ID Card Office /Campus Security, located in MacEwan Student Centre, Room 260. The office is open Monday to Friday 08:30-16:30 with extended hours (until 18:00) at the beginning of the fall and winter terms. Please check this web site for extended hours of operation: http://www.ucalgary.ca/security.

To report a lost or stolen card please phone 403.220.7290.

All financial/debit functions of the Campus ONEcard are handled by the Campus Card Office, located in the Dining Centre, Room 01, telephone: 403.220.4922.

For more information on these services please check this website: http://www.ucalgary.ca/campuscard/.

## Hotel and Conference Services

Hotel & Conference Services is a department on campus that offers accommodations to individuals or groups visiting Calgary or the University Campus. We offer a variety of accommodations and meeting space, to meet the needs of various guests.

### Summer Housing

Through the summer Months (early May to early August), the student residence buildings open to welcome all types travelers, guests do not need to be affiliated with a group or the University to stay on campus; Summer Housing is perfect for the budget conscious traveler that does not wish to compromise on quality of comfort.

Summer Housing accommodations range from one, two or four bedroom apartments to traditional dormitory rooms. During the summer months Hotel & Conference Services can accommodate groups of up to 1,500 people.

Within Hotel & Conference Services, located in our residence buildings there are two fully furnished two bedroom apartments. These apartments are available for guests seeking accommodations on a month to month basis. Two bedroom fully furnished apartments are available year round.
For more information please contact Hotel & Conference Services at:
Telephone: 403-220-3203
Email: confserv@ucalgary.ca
Website:
http://www.ucalgary.ca/hotelandconference

### Hotel Alma

In addition to the Summer Housing Operation, Hotel Alma was introduced to the UofC in October of 2009. Hotel Alma is one of the first full service hotels in Canada to be located in the heart of a university campus.

Hotel Alma features 96 rooms and suites, a stylish bistro, and conference facilities for up to 125 attendees– all conveniently close to campus activities and amenities. Hotel Alma welcomes guests from the campus community and beyond year round.
For more information, please contact Hotel Alma at:

Telephone: 403-220-3203
Email: stay@hotelalma.ca
Website: http://www.hotelalma.ca/
Location: Hotel Alma – 169 University Gate NW

### Meetings and Special Events

Whether you need to arrange a one day meeting or multi-day event, our meetings and special event staff will assist you in organizing the essential details. Services include:

- Catering and food service arrangements - http://www.dineoncampus.ca/UofCalgary/
- Coordination of audio-visual requirements
- Other event logistics as required

We provide meeting and special event planning for:

- Hotel Alma
- Olympic Volunteer Centre
- The Dining Centre

For more information please contact Meetings and Special Events at:
Telephone: 403-220-6086
Email: hkeen@ucalgary.ca
Website:
http://www.ucalgary.ca/hotelandconference/

### Classroom Bookings

Hotel and Conference Services can book classrooms for guest use, outside of the academic schedule. Classrooms are able to accommodate groups from 10 - 400 people.

For more information please contact Billie Avery at:
Telephone: 403-220-7101
Email: avery@ucalgary.ca
Website:
http://www.ucalgary.ca/hotelandconference/

### Conference Management

One of the many features of Hotel and Conference Services is our Conference Management Packages. These packages are designed to help organize the logistics of planning your next conference. Our experienced staff specialize in everything from conference registration to complete conference management. To ensure the success of your event, we will work with you to select the services and support that you require.

For more information please contact our Conference Management Team at:
Telephone: 403-220-6229
Email: timfukami@ucalgary.ca
Website:
http://www.ucalgary.ca/hotelandconference/

### Residence Services

Please see the Student Services section of this Calendar for further information on Residence Services for students.

## Environment, Health and Safety

The University of Calgary is a leader of educational institutions in Alberta by meeting and exceeding expectations of any applicable piece of health, safety and environmental legislation, as set by the various government agencies. Environment, Health and Safety is a key resource for all members of the University community for any safety related matters or concerns at the University of Calgary.

Students leaving the University of Calgary will take with them the knowledge and behaviours that integrates and accepts good health and safety practices as a value in their everyday activities.

The Environment, Health and Safety website provides information on legislation; policies and procedures; safety courses and on-line registration; as well as other health and safety related information and guidance.

Environment, Health and Safety can be contacted at:
Telephone: (403) 220-6345
Website: www.ucalgary.ca/safety

## Libraries and Cultural Resources

Libraries and Cultural Resources combines the expertise and services of the University's information providers - the University Archives and Special Collections, the University Library, The Nickle Arts Museum, and the University of Calgary Press - to assure provision of full access to the best recorded knowledge and creativity in a variety of formats and media.

## The Archives and Special Collections

The Archives and Special Collections is comprised of three units, Canadian Architectural Archives, Special Collections and University Archives that together acquire, maintain and provide access to print and archival collections of enduring value to support inquiry, learning, teaching, research and effective recordkeeping at the University of Calgary.
Canadian Architectural Archives collects, preserves and ensures access to the records of twentieth century Canadian architects and architectural firms to support learning and teaching through instruction, reference, exhibitions and publications.
Web: http://www.caa.ucalgary.ca/
Email: caaref@ucalgary.ca

Special Collections acquires, preserves and makes accessible print and archival collections with a strong focus on Canadian literature, art, music and Western Canadian history. It includes archives of authors like W.O. Mitchell, Mordecai Richler, and Alice Munro, and rare books and incunabla including a leaf of the Gutenberg Bible.
http://www.asc.ucalgary.ca/sc

The University Archives preserves and builds the institutional, administrative, research and cultural heritage of the University of Calgary by acquiring, maintaining and developing guidelines for the retention of all records of permanent value created and received by university. It also aggressively acquires private records which pertain to areas of research pursued on campus and in the region, including the political development of Western Canada and post-secondary education in Southern Alberta.
http://archives.ucalgary.ca/
uarc@ucalgary.ca

Archives and Special Collections is located on the 12th floor of the MacKimmie Library Tower. Research services are available Monday to Friday, from 10:00 am to 4:30 pm.

Telephone: 403.220.8378
Web: http://www.asc.ucalgary.ca/
Email: archives@ucalgary.ca

## Institutional Repository

The Institutional Repository is a stable, sustainable model for dissemination of research results and accompanying material consistent with the requirements of granting agencies. Collections like the Students' Union Undergraduate Research Symposium and the University of Calgary Theses provide access and exposure for student work alongside faculty research collections. Graduate students may deposit their theses and any accompanying files or other digital material in the repository. Some faculties also deposit senior undergraduate projects and posters.

Email: digitize@ucalgary.ca
Website: http://dspace.ucalgary.ca

## Visual Resources Centre

The Visual Resources Centre provides educational video and image collections and services in support of teaching, learning and research for all University of Calgary programs, including provision of bookable viewing facilities and assistance in identifying and using these resources. The VRC is comprised of a multi-disciplinary video collection of over 10,000 DVD/VHS/film titles and an image collection of over 250,000 slides and 60,000 digital images addressing subject areas from prehistoric civilization to modern gardens. These educational collections can be used by individuals or in classroom situations.

Email : vrc@ucalgary.ca
Location : MacKimmie Library Block 040, Lower Level (downstairs from U of C Service Stop)
Web : http://library.ucalgary.ca/vrc

## University Press

The University of Calgary Press publishes 15-25 scholarly books a year and provides its imprint to ten scholarly journals. Each of our publications is peer-reviewed, and we publish emerging and experienced authors from the University of Calgary and around the world. In the coming year we will be publishing in print, eBooks and open access formats.

Publishing interests include: Art & Architecture; African Studies; Environment and History; Latin American and Caribbean Studies; The West, Northern Studies, Cinema, and Canadian defence and strategic studies.

Journals: Journals currently published under the UC Press imprint are: *ARIEL - A Review of International English Literature*; *Canadian Journal for the Study of Adult Education*; *Canadian Journal of Counselling*; *Canadian Journal of Latin American and Caribbean Studies*; *Canadian Journal of Philosophy*; *Canadian Journal of Program Evaluation*; *Journal of Mind-Body Regulation*; *Currents: New Scholarship in the Human Services*; and *Mouseion - Journal of the Classical Association of Canada*. Many of our journals can now be accessed online through the Synergies project http://synergiesprairies.ca/.

U of C Press offices are located in the basement of the MacKimmie Library Block. Usual business hours are 8:30 am to 4:30 pm Monday to Friday.
Telephone: 403.220.7578
Fax: 403.282.0085
Email: ucpress@ucalgary.ca
Website: http://www.uofcpress.com

## The Nickle Arts Museum

Note: The Nickle will be closed after September 17, 2010 as it prepares for its move to the Taylor Family Digital Library and its grand opening exhibition in September 2011. Please check our website for special events and programming during the transition.

The Nickle Arts Museum (The Nickle) is an outstanding centre for object based learning, academic research and aesthetics. Located on the west campus next to MacEwan Hall, the Nickle offers a full program of exhibitions and events addressing compelling social, historical and contemporary cultural topics. Arguably one of the finest and largest exhibition spaces of any Canadian university museum, the Nickle was built from a bequest to the University of Calgary by the late Calgary oilman Samuel C. Nickle. The later donation by his son, Dr. Carl Nickle, created the base of the museum's exceptional numismatic collection.

The museum promotes critical thinking, visual literacy, and experiential learning through provocative exhibitions, tours, lecture series and symposia. The Nickle's programming is centred on modern and contemporary Canadian art, numismatics, carpets and textiles and extends to historic and international art, indigenous heritage, archaeology, anthropology, history, and popular culture.

The Nickle Arts Museum is home to outstanding collections of art, numismatics and textiles. The art collection concentrates on Western Canadian art of the twentieth century and extends to artists of national importance. The numismatic collection now comprises approximately 20,000 items, the majority of which are from the ancient Mediterranean region, but also include ethnographic numismatic items from around the world. The carpet and textile collection is the largest in any Canadian museum, consisting mainly of the tribal or cottage woven carpets of Central and West Asia. These collections and exhibitions support teaching and research from across the University of Calgary, and are available to visiting scholars and classes from all disciplines. The Nickle is central to the minor degree in Museum and Heritage Studies offered through the Faculty of Arts.

The Museum Shop offers a wide selection of unique giftware, stationery and jewellery, plus an excellent selection of art publications. Located on the main floor of the museum, admission to the shop is free. Admission to The Nickle is free at all times for University of Calgary students, staff and faculty, $2 for children and seniors, $5 for adults, and free to all every Tuesday, and every Thursday evening during the academic year.

Telephone: 403.220.7234
Fax: 403.282.4742
Email: nickle@ucalgary.ca
Website: http://www.ucalgary.ca/~nickle

## Visiting Scholars

Visiting Scholar Suites offer assistance to those scholars visiting the campus for a limited time period and seeking accommodation on campus. There are eight fully furnished apartments available year round. For more information please contact the Conference Housing Office in Cascade Hall.

Telephone: (403) 220-3203
Email: conference.housing@ucalgary.ca
Website:
http://www.ucalgary.ca/residence/guestaccommodation

## Theatre Services

### The University Theatre

The University Theatre provides seating for 505 persons, with performance facilities for drama, music, dance, films, exhibitions and lectures. After academic needs are met, the University Theatre is available for a wide variety of community uses.

### The Rozsa Centre

The Rozsa Centre houses the 384-seat Eckhardt-Gramatte Hall, a music performance and teaching facility for the Department of Music and the Husky Oil Great Hall, a conference facility for the International Centre. It also houses the Rozsa Recording studio – a state-of-the-art digital audio recording studio capable of producing professional quality recording masters. The Rozsa Centre is available for community booking through University Theatre Services.

### The Reeve Theatre

The Reeve Theatre is the Department of Drama's primary research and public performance facility, a strategic site of experiential learning for both undergraduate and graduate programs in Drama. This facility is an experimental theatre laboratory, a unique concept combining the requirements of performance with responsibilities for experimental instruction in the dramatic arts. The Reeve Theatre is not available for community booking.

### Boris Roubakine Recital Hall

The Boris Roubakine Recital Hall is a 200-seat lecture theatre converted to provide performance facilities for small music recitals, film presentation, slide shows and similar events. It is available for both academic and community use.

Website: http://www.ffa.ucalgary.ca/uts

## University of Calgary Alumni Association

When university students graduate, they officially join a family of alumni–fellow graduates who share similar experiences and memories of a profound time of their lives. At the University of Calgary, we include all students as part of this growing family; after all, undergraduates are alumni in the making.

The U of C's alumni family includes 140,000 graduates who make remarkable contributions to the business, health, social, cultural and political life of Calgary and communities around the world.

Two-thirds of U of C alumni stay in Calgary to live and work after university and our alumni are found in more than 148 countries around the world, expanding the U of C's global reach every year.

The Alumni Association's role is to keep our alumni connected to the university, to each other and to their communities; to support them in their pursuits throughout their lives and to celebrate their achievements.

Each year the Alumni Association is proud to recognize the contributions of three of our finest through the Arch Awards, the highest honour we bestow: the Distinguished Alumni Award and Graduate of the Last Decade (GOLD) Award. An outstanding future graduate is recognized with the Future Alumni Award.

In 2010, our Distinguished Alumni Award recognizes the outgoing dean of the Faculty of Social Work, Dr. Gayla Rogers, BSW'74, MSW'78, for her leadership and commitment to the advancement of social work in Alberta and around the world. Currently the longest serving dean at the University, Dr. Rogers' vision and considerable contributions to social work education have been recognized with numerous honours. Her legacy at U of C will live on.

Our 2010 GOLD Award recipient is TrendHunter.com founder Jeremy Gutsche, BComm'00, and former Chancellor's Scholar. As an innovator, author and sought after keynote speaker at the age of 31, Jeremy's "oracle eye to the future" has made him a trendspotting go-to expert for international media outlets. And even amidst his hectic schedule–57 keynotes on five continents last year–Jeremy always makes time to give back to his alma mater.

For 2010, our Future Alumni Award recipient is Rithesh Ram, an MD/PhD candidate, Leaders in Medicine/Epidemiology, and president of the medical class of 2012. As founding chair of the Community Health Sciences student executive, past-president of the Graduate Students' Association and current President of the Calgary Medical Students' Association, Rithesh continually demonstrates his commitment to his profession, his university, and his community.

Membership in the alumni family has its benefits. U of C alumni get great deals through our affinity partners: Canada Life, MBNA, MedjetAssist, TD Insurance Meloche Monnex and Wellington West. Other perks include savings on resort accommodations, discounts at local retailers and reduced rates on subscriptions, airport parking and more. Alumni also receive invitations to events and free subscriptions to U Magazine and ArchE, our monthly alumni e-newsletter.

Do you have questions or need more information?
Telephone: 403-220-8500
Fax: 403-220-1312
Email: alumni@ucalgary.ca

Website: http://www.alumni.ucalgary.ca/

## Research Institutes and Centres

### University Research Institutes and Centres

Alberta Global Forum

Biogeosciences Institute of Kananaskis

Calgary Centre for Research in Finance

Calgary Centre for Innovative Technology

Calgary Institute for the Humanities

Canadian Centre for the Study of Higher Education

Centre for Advanced Technologies of Life Sciences (includes the Southern Alberta Microarray Facility, Centre for Mouse Genomics and the Sun Centre of Excellence for Visual Genomics)

Centre for Bioengineering Research and Education

Centre for Environmental Engineering Research and Education

Centre for Gifted Education

Centre for Health and Policy Studies

Centre for Information Security and Cryptography

Centre for Mathematics in Life Sciences

Centre for Microsystems Engineering

Centre for Military and Strategic Studies

Centre for Public Interest Accounting

Centre for Radio Astronomy

Centre for Research in the Fine Arts

Centre for Social Work Research and Development

Experimental Imaging Centre

iNFORMATICS Research Centre

Institute for Advanced Policy Research

Institute for Biocomplexity and Informatics

Institute for Gender Research

Institute for Quantum Information Science

Institute for Space Research

Institute for Sustainable Energy, Environment and Economy

Institute for United States Policy Research

Institute of Professional Communication

International Institute for Resource Industries and Sustainable Studies

Julia McFarlane Diabetes Research Centre

Kananaskis Field Stations

Language Research Centre

Latin American Studies Research Centre

Pipeline Engineering Centre

Risk Studies Centre

### Partnership Research Institutes and Centres

Alberta Bone & Joint Health Institute (includes the McCaig Centre for Joint Injury and Health Research)

Alberta Civil Liberties Research Centre

Alberta Gaming Research Institute

Alberta Ingenuity Centre for Carbohydrate Science

Alberta Ingenuity Centre for In Situ Energy

Alberta Ingenuity Centre for Water Research

Alberta Sulphur Research Ltd.

Alberta Synchrotron Institute

Arctic Institute of North America

Bamfield Marine Sciences Centre

Banff International Research Station

Canadian Energy Research Institute

Canadian Institute of Resources Law

Canadian Research Institute for Law and the Family

Centre for Leadership and Learning

Hotchkiss Brain Institute

Institute of Health Economics

Institute of Infection, Immunity & Inflammation

Institute of Maternal and Child Health

Libin Cardiovascular Institute of Alberta

Macleod Institute for Environmental Analysis

Miistakis Institute for the Rockies

Pacific Institute for Mathematical Sciences

Pine Creek Research Centre for Sustainable Water Resources

Prairie Action Foundation

Research and Education for Solutions to Violence and Abuse

Southern Alberta Cancer Research Institute

Telecommunications Research Laboratories

The Centre for Innovation Studies

Van Horne Institute, The

Vocational and Rehabilitation Research Institute

World Tourism Education and Research Centre

### Networks of Centres of Excellence

Advanced Foods and Materials Network

Allergy, Genes and Environment Network

ArcticNet

AUTO21

Canadian Arthritis Network

Canadian Institute for Photonic Innovations

Canadian Language & Literacy Research Network

Canadian Stroke Network

Canadian Water Network

Geomatics for Informed Decisions Network

Institute for Robotics and Intelligent Systems

Intelligent Sensing for Innovative Structures

Mathematics of Information Technology and Complex Systems

PrioNet Canada

Stem Cell Genomics and Therapeutics Network

Sustainable Forest Management Network

## International Education: UC Global Study Abroad and Student Exchange Programs

### International Student Programs & Advising International Partnerships, Projects & Development

"UofCInternational " is committed to raising the profile of the UofC worldwide and making the university an attractive destination for international students, academics and researchers as well as providing options for students to study around the world as part of their University of Calgary degree. Increasingly, problems are international in their dimensions and require global solutions as countries are linked culturally, economically and ecologically. University graduates require skills which enable them to find solutions in a world characterized by a diversity of languages, religions, living standards, technological standards, historical perspectives and cultural values.

> "Recruiting high-caliber students and providing them with excellent and fulfilling academic experiences is essential to our broad mission and to our success as a University in delivering our mandate." (Academic Foundations: Principles to Guide University Planning. page 7)

The University of Calgary has over 2500 international students registered on campus (Fall 2010) from 100 countries. In addition, our alumni, including Canadians, are living in all areas of the world, proving the importance of an international education. The UofC offers major entrance scholarships and awards for 1st year undergraduate international students as well as a number of awards for continuing students. It is a part of the UofC support for internationalization and to international students. The University of Calgary also has agreements to receive funded/scholarship students from a number of countries.

> "A fundamental role of the University of Calgary is to educate our students to appreciate the complexities of the natural and human worlds in which they live and to prepare them to engage actively, thoughtfully and productively both in their careers and as citizens of their communities. …. the option of internationalizing educational experiences through study abroad will enhance our students' adaptability, independence, cultural awareness and communication skills." (Academic Foundations: Principles to Guide University Planning. page 7)

The University of Calgary has an ambitious plan that would have 30% of its graduating class having a study abroad experience. All undergraduate programs provide an international component to the program which may include study abroad (Student Exchange, Groups Study Programs, research, practicum, Internships or independent study). Students may enhance their academic program, employment prospects and personal growth by studying abroad for a term or year. Since 2008, each year we have distributed grants valued at more than $500,000 to UofC students to support study abroad activities, mainly at the undergraduate level.

The University of Calgary offers a variety of study abroad options in more than 50 countries including: Student Exchange Programs for a term or full year; Semester Abroad Programs in India, Czech Republic and Spain with U of C courses taught on site; Field Schools to selected sites which offer intensive study opportunities abroad with U of C faculty members during Spring and Summer Sessions and Block Weeks. Students may also use their initiative to design their own program of study.

While some study programs require knowledge of a language other than English, not all the U of C exchange partners expect a student to be fluent in order to participate. It is possible to combine study abroad with language learning.

Students unable to study abroad may get involved with international activities on campus: volunteering with international offices such as UCI or taking part in events to promote discussion and an international understanding: refer to "Make Your Degree More International" section of University Calendar for more information. In September 2009 the UofC opened the Dr. Fok Ying Tung International House, an international residence for students and visiting scholars as well as a full service hotel with meeting rooms. Senior university students have the opportunity to live in an international setting "Global Village" in the middle of campus.

The U of C has over 250 international alliances that include collaborative research, joint academic and scientific studies, collaborative degrees and student exchanges, training programs, internships and practicums. UofC staff/faculty lead development projects in Water Management in Central and South America, Sustainable Environment, Energy and Economy in Ghana and Child Health in Uganda. UofC students may complete a semester internship/practicum through our agreement with 'Right To Play'.

The University of Calgary opened its first branch campus "UofC Qatar" in Fall 2007 offering a Bachelors of Nursing and post degree diploma programs to residents of the Gulf region. The UofC celebrates it's first graduating class form UCQatar in June 2010.

### U of C offers study abroad opportunities in the following countries (2010/2011):

**Americas**
Argentina
Barbados
Belize
Brazil
Chile
Colombia
Ecuador
Mexico
Cuba
Peru
United States

**Africa/Middle East**
Ghana
South Africa
Tanzania
Turkey

**Asia/Pacific**
Australia
China
Hong Kong (SAR)
India
Japan
New Zealand
Republic of Korea (S. Korea)
Singapore
Taiwan
Thailand
Vietnam

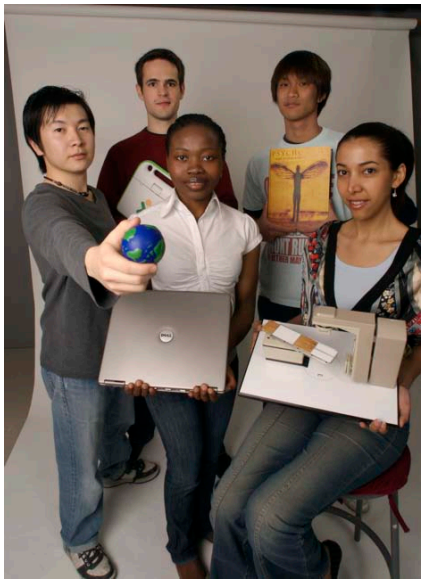
**Europe**
Austria
Belgium
Czech Republic
Denmark
Finland
France
Germany
Greece
Iceland
Ireland
Italy
The Netherlands
Norway
Spain
Sweden
Switzerland
United Kingdom

The University's International education, international development, international business, student exchange and study abroad programs involve many countries around the world. For further details consult the International Directory available at http://www.ucalgary.ca/uci/

UC International is headed by Professor Carol D. Stewart, Vice Provost International
http://www.ucalgary.ca/provost/vp/vpint

## 2010 Highlights (10 facts)

- Each Spring UofC undergraduate students participate in a "Global Leadership and Innovation" program in Shantou, China funded in part by the Li Foundation.
- The UCI Speakers Series featured President Vicente Fox (former President of Mexico, 2000-06) in Fall 2009 and Gwynne Dyer (author/journalist) in Winter 2010
- There are more than 2500 international student s at the UofC and the five countries from which we receive the most international students are: China, Iran, the USA, India and Saudi Arabia
- The University of Calgary has developed a Master's program in energy and the environment offered in Quito, Ecuador.
- Through the Choquette Family Foundation Global Experience Awards, the UofC offers five $10,000 awards each year for students spending an extended period of time studying abroad.
- The Student Refugee Committee of the Students' Union sponsors a new refugee student at the University of Calgary each year through World University Services of Canada (WUSC).
- New student orientation programs assist International students to become comfortable with their new environment. Opportunities include a "Buddy" or "Mentor" program for new students.
- The top destination countries for UofC exchange programs are Australia, the UK, South Korea and the Netherlands.
- The University of Calgary offers Semester Abroad programs for undergraduates in India, the Czech Republic, and Spain. Architecture graduate students may spend the Fall term in Barcelona Spain.
- In 2010, more than 1000 University of Calgary students studied abroad as part of their degree programs. Many participate in spring or summer schools abroad.



Main offices involved in international education:
http://www.ucalgary.ca/international

University of Calgary International
http://www.ucalgary.ca/uci/

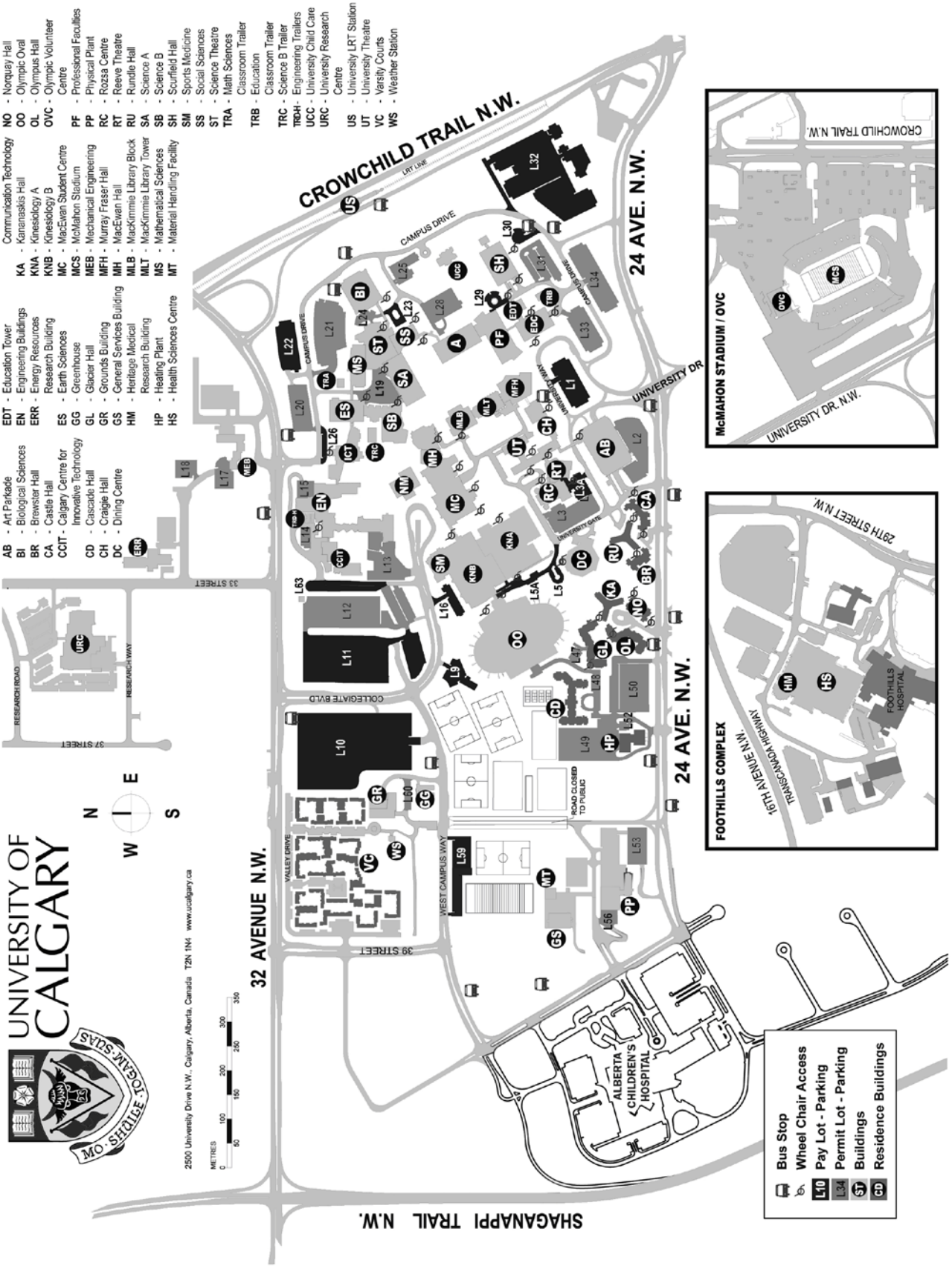
Centre for International Students & Study Abroad (CISSA)
Room 275 MacEwan Student Centre
Tel: 403-220-5581
Fax: 403-289-4409
Email: cissa@ucalgary.ca
Website: http://www.ucalgary.ca/cissa/

International Partnerships and Relationships
Room 14 Dining Centre
Tel: 403-220-7700
Fax: 403-289-0171
Email: jmorgan@ucalgary.ca

International Development Centre
Room 14 Dining Centre
Tel: 403-220-7700
Fax: 403-289-0171
Email: ucintedev@ucalgary.ca

International Recruitment and Propsective Students
Tel: 403-21—7625
Email: international_students@ucalgary.ca
Website: http://www.ucalgary.ca/admissions

## CAMPUS MAP


A - Administration
AB - Art Parkade
BI - Biological Sciences
BR - Brewster Hall
CA - Castle Hall
CCIT - Calgary Centre for Innovative Technology
CD - Cascade Hall
CH - Craigie Hall
DC - Dining Centre
EDC - Education Classroom Block
EDT - Education Tower
EN - Engineering Buildings
ERR - Energy Resources Research Building
ES - Earth Sciences
GG - Greenhouse
GL - Glacier Hall
GR - Grounds Building
GS - General Services Building
HM - Heritage Medical Research Building
HP - Heating Plant
HS - Health Sciences Centre
ICT - Information & Communication Technology
KA - Kananaskis Hall
KNA - Kinesiology A
KNB - Kinesiology B
MC - MacEwan Student Centre
MCS - McMahon Stadium
MEB - Mechanical Engineering
MFH - Murray Fraser Hall
MH - MacEwan Hall
MLB - MacKimmie Library Block
MLT - MacKimmie Library Tower
MS - Mathematical Sciences
MT - Material Handling Facility
NM - Nickle Arts Museum
NO - Norquay Hall
OD - Olympic Oval
OL - Olympus Hall
OVC - Olympic Volunteer Centre
PF - Professional Faculties
PP - Physical Plant
RC - Rozsa Centre
RT - Reeve Theatre
RU - Rundle Hall
SA - Science A
SB - Science B
SH - Scurfield Hall
SM - Sports Medicine
SS - Social Sciences
ST - Science Theatre
TRA - Math Sciences Classroom Trailer
TRB - Education Classroom Trailer
TRC - Science B Trailer
TRDH - Engineering Trailers
UCC - University Child Care
URC - University Research Centre
US - University LRT Station
UT - University Theatre
VC - Varsity Courts
WS - Weather Station
UNIVERSITY OF CALGARY
2500 University Drive N.W., Calgary, Alberta, Canada T2N 1N4 www.ucalgary.ca
METRES
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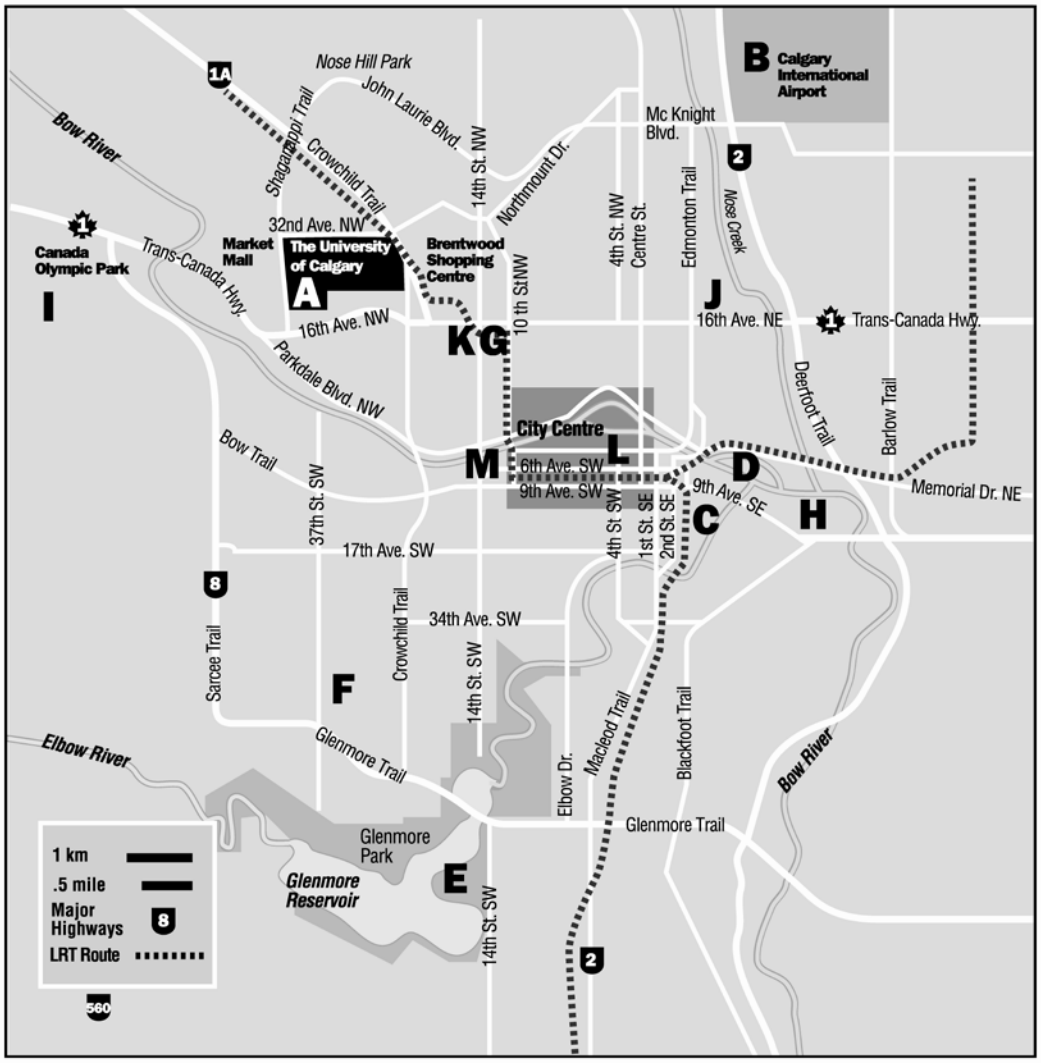
24 AVE. N.W.
CROWCHILD TRAIL N.W.
LRT LINE
CAMPUS DRIVE
UNIVERSITY DR
33 STREET
37 STREET
39 STREET
RESEARCH ROAD
RESEARCH WAY
COLLEGIATE BLVD
VALLEY DRIVE
WEST CAMPUS WAY
UNIVERSITY GATE
ROAD CLOSED TO PUBLIC
SHAGANAPPI TRAIL N.W.
ALBERTA CHILDREN'S HOSPITAL
FOOTHILLS COMPLEX
16TH AVENUE N.W.
TRANSCANADA HIGHWAY
29TH STREET N.W.
FOOTHILLS HOSPITAL
McMAHON STADIUM / OVC
CROWCHILD TRAIL N.W.
UNIVERSITY DR. N.W.
Bus Stop
Wheel Chair Access
L10 Pay Lot - Parking
L34 Permit Lot - Parking
ST Buildings
CD Residence Buildings

CALGARY MAP




Calgary Points of Interest

| | | | | |
|---|---|---|---|---|
| A The University of Calgary is located in the northwest quadrant of the city. It's accessible by bus or LRT. The cost of a one-way fare is $2.75<br><br>B Calgary International Airport is a 25 minute taxi ride to the University; cost is approximately $40-$45. | D The Calgary Zoo, Botanical Gardnes and Prehistoric Park is a world class zoological institution filling roles in public eduction, wildlife conservation, research, captive breeding of endangered speciies and public recreation. | F Mount Royal University Calgary's newest university offers an innovative blend of educational opportunities including bachelor's degrees, applied degrees, university transfer programs, diplomas and certificates. | H Fort Calgary Site, the historic origins of the city. It is now a 40-acre riverside park.<br><br>I Canada Olympic Park. Capture the Olympic spirit and visit the ski jump tower or the Olympic Hall of Fame. Day and evening skiing is available. Check out the bobsled run. | K The Southern Alberta Jubilee Auditorium is a multi-purpose performance space opened in 1957 to commemorate Alberta's 50th anniversary as a province.<br><br>L The Glenbow Museum houses exhibition space as well as an archive and library. It has permanent displays of Western Canadian history. |
| C Stampede Park is the site of the Greatest Outdoor Show on Earth, "The Calgary Stampede", which takes place every year in early July. It is also the site of the Pengrowth Saddledome, which is the home of our National Hockey League team, the Calgary Flames. | E Hertiage Park Historical Village is Canada's largest living historical village. Turn of the century town, team trains and vintage vehicles. Ride the stern-wheeler "S.S. Moyie" around the waters fo the Glenmore Reservoir. | G SAIT. The Southern Alberta Institute of Technology is known worldwide for its quality technical education and hands-on training. The Alberta College of Art and Design is also on this site. | J The Golf Dome at Fox Hollow. This year-round golf driving range has two levels. | M Alberta Science Centre. Learn about the wonders of science and visit the Discovery Dome. |

# ACADEMIC STAFF 2010/2011

## A

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Angyalfi, S.J.; FRCPC, MD (UofA), BSc (UofC); Clinical Associate Professor (Oncology)

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Antle, M.C.; BSc(Hons) (Dalhousie), MA (SFU), PhD (SFU); Associate Professor (Psychology), Adjunct Associate Professor (Physiology & Pharmacology)

Anton, A.R.; BSc, FRCPC, MD, MSc; Clinical Lecturer (Family Medicine)

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Archer, C.I.; PhD (LaTrobe), MA (StonyBrook), PhD (StonyBrook), BA (UVIC); Professor (History)

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Atkins, G.A.; DVM (UofS); Senior Instructor (Production Animal Health)

Atkins, G.L.; BArch (UW); Adjunct Associate Professor (Environmental Design)

Atkinson, L.A.; MArAd (ULiverpool), MA (UWO), BA (UofL); Archivist (Libraries & Cultural Resources)

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