

Science Grad Studies University Circle

May 9, 2004

1) The following Graduate Programme Proposals are being considered for development:

Biochemistry (MSc & PhD)
Biology (MSc & PhD)
Chemistry (MSc & PhD)
Computer Science
Optimization – jointly with Math, Stats, & Physics
Earth & Environmental Sciences (MSc & PhD)
Engineering (M.A.Sc. & PhD)
Mathematics & Statistics (MSc & PhD):
Algebra, Number Theory and Combinatorics
Environmetrics & Ecological Modelling
Optimization – jointly with Computer Science, Physics
Physics & Astronomy (MSc & PhD)
Others can be added where there is interest.

2) The circle/group has been carefully considering a wide range of issues pertaining to grad programs, particularly as they apply to Science & Engineering:

a) Administration

The members have heard many disparaging comments about the Faculty of Grad Studies at UBC-V. Sources for many of these comments were attributed to UBC-V faculty members. It is clear from these comments that UBC-O should develop a fundamentally different administrative structure for grad program administration. Members of our group favour a School & Director of Grad Studies, which would have minimal bureaucracy. The school would serve the needs of administering the grad programs (e.g., applications, acceptance, registration, record keeping), but would exercise little control over the programs or their development. The School would neither establish nor control research centres, institutes or infrastructure. The school would not be involved in hiring faculty.

b) Disciplinary vs. Interdisciplinary Degrees

We need disciplinary programs in each of the major science disciplines. Interdisciplinary programs should be in addition to, not instead of, disciplinary programs. Interdisciplinary programs will be developed where interest is sufficient. As we develop disciplinary and interdisciplinary degrees we should ponder mechanisms to take advantage of, and develop, our interdisciplinary strengths. We can build on our interdisciplinary strengths very effectively by establishing "clusters/institutes/centres" (these must not be entities of the faculty

of grad studies) that provide a home to students enrolled in several allied disciplinary degree programs. For example students enrolled in Biology, Chemistry, or EESC degrees could all participate very effectively in a wine institute or freshwater institute. This interdisciplinary aspect can be strengthened via shared courses, and interdisciplinary grad seminar courses - also, perhaps by requiring that one member of each supervisory committee be from a different department than the supervisor.

c) Structure of degrees

We will want to discuss this further, but people generally were happy with the structure of the degrees at UBC-Vancouver. Staying with the current UBC-Vancouver structure is probably a pragmatic approach. People tended to favour a candidacy exam/proposal defense over a "comprehensive exam". "Comprehensives" have acquired a negative connotation. We are primarily interested in research, thesis-based masters. There may be some parts of the university or the faculty where course based masters might be appropriate. We need to establish common minimum requirements for grad programs - individual departments could have more stringent requirements. These minimum requirements should be flexible enough to allow for innovation in programmes across the faculty and university. If people want to do something creative, this is the time to do it. Once the structures are in place, it may be much more difficult to make changes (especially in university-wide regulations).

d) Support for faculty

Faculty will require some assistance (teaching load, money, infrastructure, money, space, money, etc.) to jump-start grad studies and research here.

e) Support for students & Postdocs

Financial support is essential for students in thesis-based masters and PhDs. Course-work masters (like an MBA) are a different situation. Students in thesis-based masters need to find a supervisor before they can be accepted to grad studies. Thesis supervisors and/or departments must be able to guarantee adequate support for students (apart from part-time students already employed elsewhere) for the normal duration of their programme (e.g., 24 months for MSc, 36 months for PhD; from TAs, bursaries, scholarships, stipends (e.g., from grants), and/or other funding sources, as long as the student is making satisfactory progress), but during first year, students should be funded largely via TAs and scholarships. We need to set minimum (departmental?) standards of financial support for students. These standards must protect students, but must also be within the financial means of our faculty (probably lower than those currently at UBC-V or SFU). The minimum support could be derived from a variety of sources (scholarships, TAs, stipends) Current OUC TA wages are

inadequate for grad students. We also need a mechanism to pay grad students stipends. Currently OUC does not have an appropriate post-doc classification. OUC isn't in line with the situation at other universities.

f) Faculty, Infrastructure & Resource Considerations

When proposing each grad program, we must realistically assess current resources, and what new resources might be needed to mount the program. We shouldn't hesitate to ask for new resources (including new faculty members), but must keep requests realistic.

Where a critical mass of researchers may not exist, we should hire new faculty to build the required strength. We should continue to build strategic ties (e.g., adjunct positions) with DRAO, PARC and other partners, to our mutual benefit. Plans must incorporate space for grad student offices, visiting researchers, and computer facilities - in addition to additional research labs.

g) Thesis formats

We should allow some flexibility with regard to the thesis format. The collection-of-papers model is good, but there may be situations where the more traditional thesis format is better. This can be left to grad students, their supervisors, and their committees to discuss. (Perhaps we should consider having all theses posted as electronic documents by the library, or by departments???) Flexibility should be allowed for innovative ways of presenting research, without compromising the necessity for maintaining archival quality.)

h) Grad student supervision

Each student should find a thesis supervisor in advance of being accepted into thesis-based science grad programs. Students can always change supervisors later, if necessary. The supervisor would chair a supervisory committee. The committee would consist of at least three members (including the supervisor, and at least one other UBC-O non-adjunct faculty member). In instances of student/supervisor conflicts the committee will be chaired by the director of the school of grad studies, or a designate.

i) Approval process

We now have an approval process we can try to work with for most graduate programs (i.e., through the normal approval process for OUC programs - beginning at the departmental level, and subsequently through the faculty of science & education council). It is unclear how well this mechanism will work - but it is currently the only one available. The approval process is not yet clear for programs that do not fit within the realm of existing departments. Perhaps these should be submitted directly to the faculty of science (or other body as deemed appropriate). The timeline for approval of programs for September 2005 is very,

very tight. It might be possible for some degrees with an expedited process (e.g., with more meetings of departments, faculty, etc.)

j) Other issues under discussion:

Laddering from MSc to PhD M.Phil???

Qualifying students

Entrance requirements

Etc.

3) Once we have fully (or largely) worked through each of these issues, we will have a good framework for development of each degree programme. At that point we will break out into departmental/programme groupings to develop full proposals for consideration. We will continue to communicate to ensure standards, and share and make efficient use of resources and advice during programme development.

Biochemistry

Program Overview

The biochemistry program at UBC-O offers a wide breadth of interdisciplinary research areas to a potential student. Faculty members study topics as varied as apoptosis, natural products biosynthesis, mycorrhizal-root interactions, plant biochemistry, wine biochemistry, cell signaling, and more. UBC-O has committed to a new research centre where these faculty members will conduct their work in a well equipped molecular laboratory environment. UBC-O also has a suite of modern microanalytical instrumentation, including LC/MS/MS, GC/MS/MS, isotope ratio MS, and a pulsed field gradient NMR spectrometer.

Doctor of Philosophy

Candidates are required to hold a Master of Science or equivalent in biochemistry, biology, chemistry, or a related field. A student with a Bachelor of Science with an 'A' average in an honours or combined honours biochemistry, biology, or chemistry program or equivalent may be admitted directly into the Ph.D. program, and would be required to complete the master's degree coursework. Students in the Master of Science program may transfer into the Ph.D. program at the end of their first year provided they meet the transfer requirements set out by the biochemistry program and the School of Graduate Studies. Course work in the Ph.D. program is assigned in accordance with the recommendation of the program and the candidate's Ph.D. committee.

Master of Science

An honours degree in biochemistry, biology, chemistry or a related field, or biochemistry, biology, or chemistry single major with second class standing is required for admission. The program requires a thesis and 18 credits in graduate or advanced courses in chemistry and/or related subjects. The courses required will vary depending on the field of specialization and will be outlined by the biochemistry degree program.

Biology

Biology Department faculty conduct research in such diverse fields as Animal Behaviour, Conservation Biology, Mycorrhizal Dynamics and Forest Community Ecology, Paleoecology, Population Biology, Neurophysiology, Toxicology and Physiology of Salmonids, Microbial Ecology, Development and Molecular Biology. In addition to this Biology Department members have developed fruitful collaborations with faculty in the Chemistry, Earth and Environmental Sciences and Mathematics and Statistics Departments. The department offers a M.Sc. and a Ph.D. degree.

Doctor of Philosophy

Normally, students will apply to the Ph.D. program after having first obtained a Masters of Science degree. However, Students who are in the Master of Science program may be granted permission to transfer into a Ph.D. program provided a first class performance has been obtained in course work and there is clear evidence of research ability. Exceptional students may be admitted straight to the Ph.D. program after having obtained a Baccalaureate degree. Although there are no formal course requirements, courses may be taken by a Ph.D. candidate in accordance with the recommendation of the department and the candidate's Ph.D. committee.

Master of Science

Students who have obtained a Baccalaureate degree in any academic discipline may apply to the M.Sc. program in Biology. This program requires a minimum of 30 academic credits with the thesis counting for 12 credits. Courses will be selected in consultation with the research supervisor and the candidate's committee. These may be selected from the Biology Department's offerings, or students may wish to take advantage of the opportunities for interdisciplinary studies available within the Faculty of Science by registering in other department's graduate courses.

Chemistry

Program Overview

The chemistry department at UBC-O is well equipped with modern research instrumentation, including a recently developed Okanagan Regional Chemical Analysis Centre. The ORCAC is well supplied with modern instruments, including GC/MS/MS, LC/MS/MS, several ionization methods including photoionization, APCI, EI, and electrospray, preparative and analytical HPLC, isotope ratio MS, and AES. The department is also equipped with a 400 MHz pulsed field gradient NMR spectrometer. The department offers a wide variety of research programs, including studies in wine chemistry, plant natural products, trace analysis, environmental analysis, transition metal spin state chemistry, and natural products biosynthesis.

Doctor of Philosophy

Candidates are required to hold a Master of Science or equivalent in chemistry or a related field. A student with a Bachelor of Science with an 'A' average in an honours or combined honours chemistry program or equivalent may be admitted directly into the Ph.D. program, and would be required to complete the master's degree coursework. Students in the Master of Science program may transfer into the Ph.D. program at the end of their first year provided they meet the transfer requirements set out by the Department of Chemistry and the School of Graduate Studies. Course work in the Ph.D. program is assigned in accordance with the recommendation of the department and the candidate's Ph.D. committee.

Master of Science

An honours degree in chemistry or a related field, or a chemistry single major with second class standing is required for admission. The program requires a thesis and 18 credits in graduate or advanced courses in chemistry and/or related subjects. The courses required will vary depending on the field of specialization and will be outlined by the Department of Chemistry.

Graduate Studies

Department of Earth and Environmental Sciences

University of British Columbia - Okanagan

Introduction

The Department of Earth and Environmental Sciences at UBC - Okanagan, is one of the fastest-growing multidisciplinary research groups in Canada. Our Department's research extends from studies of the formation of surficial deposits, to water quality and quantity investigations of forested watersheds, a world-class paleoenvironmental lab and fundamental geochemical and mineralogical research on evolution of the solid Earth. Research tends to be interdisciplinary and cross-disciplinary and draws on a broad base of knowledge from biology, chemistry, mathematics and physics. An appreciation for the wide range of topics actively studied by our faculty can be obtained from the department's web site and by looking at individual faculty pages.

Admission Information

Admission requirements for both the M.Sc. and Ph.D. programs are largely regulated by the Faculty of Graduate Studies. Please see admission requirements and graduate information under their web pages. Admission normally requires a B+ average in 3rd and 4th year level university courses. International students will in addition submit TOEFL or GRE results.

Program Overview – M.Sc. and Ph.D. Degrees

The Department offers both Masters and Ph.D. degrees in Earth and Environmental Sciences. British Columbia and the Canadian Cordillera offer exceptional opportunities for combined field and laboratory research. Areas of interest include environmental studies of the quality and quantity of water in forested watersheds, soil hydrology, the biogeochemistry of freshwater lakes, streams and groundwater, Pleistocene geomorphology, GIS investigations of biogeoclimatic zones, soils and Pleistocene sediment deposits, Neogene paleoenvironmental and paleoclimatological studies, environmental Earth sciences of water, slope stability, urban development and natural hazards, the origin and differentiation of volcanic and plutonic rocks, early-Earth evolution, mineralogical geoarchaeology and planetology, and the formation of gold and platinum-group-element ore deposits. Although research is concentrated on British Columbia it is of international significance, and faculty members have active research programs in Europe, Asia, the Middle East, the Pacific Ocean basin, and all over Canada. Cooperation with other departments, notably the Departments of Geography, Biology, and chemistry enables students to take advantage of facilities, instruction and advice in neighboring fields. Similarly, ties with the provincial departments of Forestry, Fisheries and Mines and Energy; and analogous associations with the mining and forestry industries provide opportunities for research of economic and societal importance. Facilities at our disposal include stable isotope mass spectrometer, inductively coupled plasma – mass spectrometer and emission spectrometer, atomic absorption, a carbon analyzer, polarizing, reflected light, dark-field and dissecting microscopes. Established

collaboration with other Canadian labs open the door to projects using just about any type of analytical data presently used in Earth and Environmental research including laser ICP-MS and thermal ionization mass-spectrometry used in geochronology. In addition, students may have access to the wide range of analytical facilities at UBC – Vancouver.

Doctor of Philosophy

If deemed appropriate, courses in Earth and Environmental Sciences and related fields will be selected in consultation with the candidate's Advisory Committee.

Master of Science

Courses include a 12-credit thesis and 18 credits in graduate or advanced courses in Earth and Environmental Sciences and related fields selected in consultation with the candidate's committee.

Contact Information

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Graduate Program Requirements and Procedures:

A) Advisory Committee: M.Sc. and Ph.D. Programs

1. The Graduate Studies Committee in the Department of Earth and Environmental Sciences will in consultation with the student, and in consideration of the area of proposed research, assign a Supervisor.
2. The Student's supervisor will assemble an Advisory Committee with expertise in the area of research. The Advisory Committee will normally consist of the Supervisor and two other tenured or tenure-track members of the Department of Earth and Environmental Sciences. However, the two other members may be tenured or tenure-track faculty from other departments at the University of British Columbia and one can represent a prominent scholar from government, industry or another Academic institution with a focused capacity to contribute to the research project.
3. The Advisory Committee will recommend courses and provide guidance and supervision for the research project.

B) Defense of Masters Thesis

1. The examination is chaired by one of the members of the Earth and Environmental Sciences Graduate Committee with expertise in the area of research. The person selected as chair is contacted directly by the Supervisor or by the student in consultation with the Supervisor. The Chair will not normally be the Supervisor of the student.

2. In addition to the Chair, the Examination Committee must include the Supervisor and two other tenure or tenure-track faculty members, at least one of whom is not part of the supervisory committee. Additional faculty members or external scientists with specialized expertise can be added to the Examination Committee at the request of the supervisor and with the approval of the chair.
3. The M.Sc. candidate must schedule the date of the defense in consultation with the Supervisor and Examination Committee.
4. At least fourteen (14) days before the scheduled defense the candidate must:
 - a) Give the EESc Graduate Studies Committee a copy of the thesis (public copy).
 - b) Give each examiner a copy of the complete thesis.
 - c) Ask the Graduate Studies Committee to post a notice of defense.
5. The examination comprises:
 - a) A 20-30 minute presentation by the student to an open audience.
 - b) A period of questions from the examiners and other members of the audience.
 - c) At the discretion of the Examining Committee, a period of in-camera questioning by the Examining Committee and other interested faculty.
 - d) Adjudication by the Examining Committee based on the thesis document, the oral presentation and the candidate's ability to defend the thesis.
 - e) A report from the Chair on the Examination results that is submitted to the Graduate Secretary.
6. A suggested breakdown of marks is as follows:
 - a) Thesis Document (80 %), Oral Presentation (10 %) and Defense (10 %).
 - b) Other factors may be considered in assigning a mark such as:
 - i. The length of time of study.
 - ii. Difficulty and novelty of research program.
 - iii. The degree of independent study.
7. M.Sc. students will normally complete and defend their thesis within three years of beginning their M.Sc. studies at UBC – Okanagan. Under unusual circumstances this may be extended.

C) Conversion of a M.Sc. Program into a Ph.D. Program

For exceptional students accepted into the Masters program, there is an option available to convert to a PhD program. The department policy on allowing students, who are accepted into the Masters program, to convert to a PhD stream is as follows:

1. Letters to students accepted into the M.Sc. program must clearly state:

- a) That the student might qualify for conversion from a M.Sc. to a Ph.D. program, and
 - b) The conditions under which the supervisor would consider such a transfer.
2. At the request of the student an Advisory Committee meeting will be held within the first 3 months of completion of the first Academic year of the M.Sc. program in order to interview and guide the student and consider the conversion.
3. The student will be considered for promotion to the Ph.D. program providing that:
- a) The student wishes to convert to the Ph.D. program.
 - b) The supervisor agrees to the conversion.
 - c) The student's performance is consistent with Faculty of Graduate Studies requirements:
 - Demonstrated research promise.
 - First class academic standing.
 - Completion of 18 credits within the first academic year of study.
 - d) The Advisory Committee agrees that the student is ready.
4. To initiate a request for conversion the student's Supervisor will write a letter addressed to the Faculty of Graduate Studies but directed to the Earth and Environmental Sciences Graduate Studies Committee. This letter should summarize, the deliberations of the Advisory Committee leading to the request. If approved and endorsed by the EESc Graduate Studies Committee, the letter will be forwarded to the Faculty of Graduate Studies for a final determination.
5. After the official upgrade the "new" PhD student will take a Candidacy exam.

D) Admission to Ph.D. Candidacy

A Ph.D. student must be admitted to candidacy within a time period specified by the Faculty of Graduate Studies (three years?). For admission to candidacy the student must:

- a) Have completed any course-work required by the Advisory Committee
- b) Prepare a research proposal
- c) Have the research proposal approved by the Advisory Committee
- d) Pass a Candidacy Exam. Guidelines for the Candidacy Exam appear below

E) Ph.D. Candidacy Examinations

1. The candidacy examination is normally held within the first 18 months of a student entering graduate studies at UBC – Okanagan. Students converting a M.Sc. program into a Ph.D. program may have this time extended.
2. The Candidacy Examination Committee will comprise the Supervisor, at least 2 people from the Advisory Committee, at least one person not on the Advisory Committee, and the Chair of the Examination Committee. The Chair of the Candidacy Examination

Committee will be appointed by the EESc Graduate Studies Committee and cannot be a member of the Advisory Committee.

3. The Candidacy Examination Committee must be set at least three weeks prior to the exam. To allow preparation time, the candidate has the right to request that the examination not be held until at least three months after assembly of the Committee.
4. It is the candidate's responsibility to contact members of the Examination Committee to ascertain the breadth of material to be examined defined by textbooks, a reading list or course work.
5. The candidacy examination comprises:
 - a) Preparation of a written thesis proposal (< 30 pages) which must be distributed to the Examination Committee at the time that the examination date is set and at least 2 full weeks prior to the examination date. The purpose is to focus the oral examination of the candidate and to help the Examination Committee advise on the breadth of material to be examined.
 - b) An 20 minute oral presentation on the Ph.D. research plan.
 - c) Open questioning of the candidate by the Candidacy Examination Committee to ascertain the readiness of the candidate to carry out the proposed research.
6. Results of the candidacy exam will declare either:
 - a) A clear pass.
 - b) A pass with conditions
 - c) Failure with the option to retake the exam once, within six months.
 - d) Failure and dismissal.
7. The Chair of the Candidacy Examination Committee will submit a brief written report on the exam to the EESc Graduate Studies Committee with copies to other members of the Candidacy Examination Committee.

F) Ph.D. Thesis Defenses

1. The Ph.D. defense will follow the guidelines set out by [Faculty of Graduate Studies](#).
2. The defense examination procedures will follow those of the M.Sc. defense except that there will be at least one external examiner that is not part of the Advisory Committee.
3. The defense must be completed and any required changes to the thesis made within six years of beginning studies toward the Ph.D. degree.

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Graduate Student Financial Support

The Department of Earth and Environmental Sciences guarantees funding for incoming full-time graduate students in thesis programs effective September 1, 2005 as follows:

Ph.D.	Minimum Funding Guarantee	Tuition Fees	Total less Tuition Fees
Canadian Ph.D. (years 1-4)	\$16,500	\$0	\$16,500
International Ph.D. (years 1-4)	\$16,500	\$0	\$16,500
Canadian Ph.D. (years 5+)	\$16,500	\$3,200	\$13,300
International Ph.D. (years 5+)	\$16,500	\$3,600	\$12,900
Canadian M.Sc.	\$17,700	\$3,200	\$14,500
International M.Sc.	\$18,100	\$3,600	\$14,500
Canadian Students = Canadian citizens and Landed Immigrants.			
M.Sc. students will normally receive two years of support. M.Sc. students converting to a Ph.D. program will receive 4 additional years of funding, as shown for Ph.D. students, beginning at the time of conversion.			

All funding is quoted in Canadian dollars. The above funding is provided in the form of teaching assistantships and/or research assistantships, paid from the supervisor's research funds. Students receiving scholarships or other financial support from the Faculty of Graduate Studies or from outside the university, may have their levels of support adjusted accordingly.

Student fees of approximately \$??? per year are levied to all graduate students.

Tuition fees for international students are normally \$7,200 per year. Since the department of Earth and Environmental Sciences takes part in the International Partial Tuition Scholarship program, fees are reduced by 50% to \$3,600.

NSERC PGS- Master's (PGS-M) and PGS-Doctoral (PGS-D) Award Holders

All graduate students in Earth and Environmental Sciences who hold an NSERC PGS-M or PGS-D scholarship will receive a top-up of \$3,000 per year as long as they retain their scholarship.

Engineering

The Department of Engineering in the Faculty of Applied Science at UBC-O offers graduate programs leading to M.A.Sc. and Ph.D. degrees. Current fields of study include RF/microwave communications, RF hardware, antennas and propagation, channel modeling, global navigation satellite systems, properties of metals, semiconductors and heterogeneous materials, devices and real-time systems, color removal from pulp mill effluent and dye wastewater by biosorption of fungal biomass, removal of color and disinfection by-product (DBP) precursors from water sources, endocrine disruptors and water quality, membrane technologies for water and wastewater treatment, wastewater reclamation and reuse.

Opportunities exist to engage in studies in conjunction with the Dominion Radio Astrophysical Observatory (DRAO), the Cancer Center of the Central Okanagan, the Department of Physics and Astronomy at UBC-O, the BC Ministry of Health, the BC Ministry of Water, Land and Air Protection, Environment Canada, Western Economic Diversification and the National Research Council of Canada.

Research collaborations presently exist with Electrical and Computer Engineering and Geomatics Engineering at the University of Calgary, the Department of National Defense, Geoide, the Pollution Control and Waste Management Research Group in the Department of Civil Engineering at UBC-V, and the Departments of Earth and Environmental Science and Chemistry at UBC-O. Faculty members also collaborate with industry in a number of research areas.

The normal entrance requirement is a bachelor's degree in a recognized area of engineering or its equivalent. The application must be supported by a potential graduate supervisor. A research proposal will be required. A minimum TOEFL score of 550 is required from individuals with permanent residence outside of North America. A GRE score may be required.

For a master's degree, 30 credits are needed for graduation, normally consisting of 12 credits for the thesis, 12 credits of core course work from the list of core courses offered within the Department of Engineering and 6 additional credits. Attendance at a weekly graduate student seminar and one presentation per semester is worth 3 credits.

Department of Mathematics and Statistics

UBC Okanagan has an extensive research-oriented Mathematics & Statistics Department. Research areas include Analysis, Combinatorics, Mathematical Biology, Number Theory, Optimization, and Statistics. Currently, opportunities for graduate study are available in Optimization and in Environmetrics and Ecological Modelling (EEM). Admission to these programs will be through the Department where common policies exist regarding financial assistance, advisory and supervisory committees, and the English language requirements for applicants from non-English-speaking countries.

M.Sc. in Environmetrics and Ecological Modelling

The graduate program in Environmetrics and Ecological Modelling (EEM) in the Department of Mathematics and Statistics builds on a core of quantitative courses to develop the skills required to solve problems and to work collaboratively in the environmental and ecological sciences, with emphasis on resource management.

The areas of focus are data collection methods, the modelling of systems, and the analysis of data using quantitative methods. Program requirements are met through a combination of courses, seminars and a thesis. Students can expect to find thesis topics in areas of the environmental sciences, conservation biology, sustainable agriculture and population health and demographics. The first year of the program is designed to present the student with a number of potential thesis topics through Departmental links with programs such as those of the Species at Risk and Habitat Studies (SARAHS) Center, department of Earth and Environmental Sciences (EESC), Pacific Agri-Food Research Centre (PARC), Centre for Population and Health Services Research (CPHSR) and Environment Canada.

Students with a variety of backgrounds will be interested in this program. The EEM program generally expects successful applicants to have a strong quantitative background, and an interest in applications. The quantitative background for applicants interested in statistical topics would normally be the Mathematics and Statistics courses required for a Major in Statistics in the B.Sc. For applicants interested in modeling, a course in ordinary differential equations and in partial differential equations is required. Students with an excellent scholastic record, who do not meet all of the course requirements, may be accepted conditional on completion of a limited number of the required courses.

A total of 30 credits are needed for graduation, including 27 credits in the core courses numbered 500 and above. These 27 credits include 9 credits for the thesis and 3 credits for the compulsory seminar course.

M.Sc. in Optimization

Optimizations are basic to many aspects of engineering and physics, and use a wide range of sophisticated analytical and numerical techniques. The program is designed to give students a comprehensive understanding of continuous and numerical optimization. It is also intended to give them an in-depth training so as to provide them with the

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computational techniques required to solve real-world problems. Students completing the program are well positioned to take on careers in academics, education, and industry.

The applicants usually are from Mathematics Major (either pure or applied), or from Computing Science Major. The interested applicants need to complete some courses in the following topics at the senior undergraduate level or above: Real Analysis, Continuous Optimization, Linear Programming, Numerical Analysis or Optimization in Graphs and Networks. Students who do not meet all of the course requirements may be accepted conditionally.

A Master's degree in Optimization consists of 30 credits of course work, essay, or thesis. Students can find thesis topics in advanced studies or in practical applications like Designing Radiotherapy Plans through the Department link with BC Cancer Agency or in Image Processing. Further details on the application process and degree requirements may be obtained from <http://www.ouc.bc.ca/math/>.

Physics and Astronomy

The Physics and Astronomy graduate program is very strongly tied to the program for graduate studies in the new Department of Engineering within the proposed Faculty of Applied Sciences. There is a great deal of synergy between the two departments due to the close relationship and high commonality of the disciplines at the graduate level. We have planned to offer core graduate courses in common, share graduate course teaching responsibilities, and serve on program-wide graduate supervisory committees. The loose formal organization of this "super program" is modelled on the Guelph-Waterloo Program for Graduate Work in Physics between the University of Waterloo and the University of Guelph.

Looking at the NSERC 2004-2005 numbers for research grants, including operating grants, collaborative research opportunities, strategic research grants and strategic research opportunity grants, and leaving aside the "research giant" departments of Biology and Earth and Environmental Science, the following statistics, grouped by areas in which graduate programs are being proposed:

Source: <<http://www.ouc.bc.ca/research/ors/docs/external/NSERC2004.htm>>

Graduate Prog. Area	Research \$\$ / year	Active PhD researchers
Engg + Phys	\$35,000	4
Math	\$25,000	3?
Chemistry	\$20,000	3?
Statistics	\$19,000	2
Comp. Sci.	\$0	0?

So apart from the "no-brainer" of going ahead with graduate programs in Biology and EESc, the Engg/Phys "super-program" should be next in the batting order. So we are "on-deck" and should most likely "step up to the plate" in Fall 2006. My impression is that only certain elite areas will be recommended for grad programs in Fall 2005.

Here follows the one-page proposal that you asked for:

The Department of Physics and Astronomy in the Faculty of Science at UBC-Okanagan offers graduate programs leading to M.Sc. and Ph.D. degrees. Current fields of study include general relativity, cosmology, quantum field theory in curved spacetime, nanostructures, inelastic scattering, anisotropic continuum dynamics, and finite difference time domain methods [plus topics from others...]. There are also opportunities to engage in studies in conjunction with the Dominion Radio Astrophysical Observatory (DRAO), the Cancer Clinic of the Central Interior, the Department of Engineering at UBC Okanagan and the Department of Physics and Astronomy at UBC-Vancouver. Research collaborations presently exist with *le Conseil Nationale de la Recherche Scientifique*, the Indira Gandhi Centre for Atomic Research and the Joint Institute for Nuclear Research.

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The normal entrance requirement is a bachelor's degree majoring in physics or its equivalent. The application must be supported by a potential graduate supervisor within the UBC-O Department of Physics and Astronomy. A research proposal is required at time of application. A TOEFL score of at least 550 is required from individuals with permanent residence outside of North America. GRE scores may be required.

For a master's degree, 30 credits are needed for graduation, consisting of 12 credits for the thesis, 12 credits for core courses offered with the Department of Physics and Astronomy, 3 credits for compulsory attendance at a weekly graduate seminar and delivering one seminar each semester, plus 3 other credits taken in an area approved by the student's supervisory committee.