



Interdisciplinary Graduate Program in Environmental Science
Memorial University of Newfoundland
Handbook of Guidelines for Graduate Students and Supervisors
June 2016

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Table of Contents

	Page
A. Foreword	4
B. Graduate degrees offered in Environmental Science	5
Master of Environmental Science, M.Env.Sci.	
M.Sc. (Environmental Science)	
PhD (Environmental Science)	
C. Application and admission	5
1. Application procedure	
2. Minimum academic requirements	
3. Recommendation for admission	
4. Acceptance	
5. Fees and payment plans	
D. Financial information	7
1. General principles of SGS fellowships	
2. Teaching assistantships	
3. Minimum financial support of M.Sc. and PhD students	
E. Academic requirements for completing the degree	9
1. Coursework and research	
2. Duration of program	
3. Leave of absence	
4. Withdrawal	
5. Changes in program of study	
6. Transfer from M.Sc. to PhD	
7. Comprehensive examination procedure	
F. Environmental Science Program courses	14
G. Program faculty.....	16
H. Administration and oversight of the Program	18
1. Board of Study	
2. Program Chair	
3. Program Administrator	
4. Student Supervisory Committee	
5. Annual Supervisory Report	
6. Advice to graduate students	
7. Office space for Environmental Science Graduate Students	

Appendix A – Scholarships, Travel Funds and Convocation Awards	21
Appendix B – Detailed Comprehensive Examination Procedure	24
Appendix C – Submission of Thesis or Project Report, Review and Notification	27
Appendix D – List of Forms	29

A. Foreword

Welcome to the **Interdisciplinary Graduate Program in Environmental Science** at Memorial University of Newfoundland (MUN) in St. John's, Newfoundland and Labrador. The Canadian Province of Newfoundland and Labrador has relatively pristine boreal and sub-arctic terrestrial and marine environments. With natural resource developments currently taking place both offshore and onshore, there are many opportunities for research by Environmental Science graduate students. The rugged coastal landscape of the province offers a bounty for the spirit.

Professors at Memorial University of Newfoundland (MUN) are conducting Tri-Council (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, Social Sciences and Humanities Research Council), Natural Resources Canada and provincially funded (Research Development Corporation of NL) multidisciplinary or interdisciplinary research on environmental issues, and training undergraduate and graduate students in environmental science. The Interdisciplinary Graduate Program in Environmental Science encompasses studies within a wide range of disciplines in the Faculty of Science, the Faculty of Arts, the Faculty of Medicine and the Faculty of Engineering and Applied Sciences.

This Handbook of Guidelines for Graduate Students and Supervisors presents a general outline of the administrative requirements of the Environmental Science Program, as well as other information that will be useful for students and supervisors. Standardized forms that must be completed by students in the program are listed in Appendix D.

Please note: These guidelines are only a summary of the official regulations and procedures published in the **Memorial University Calendar**, available on the MUN web site, <http://www.mun.ca/regoff/calendar/>.

Other important web sites:

Memorial University School of Graduate Studies, <http://www.mun.ca/sgs>

SGS Thesis Guide,

http://www.mun.ca/sgs/go/guid_policies/Guidelines_for_theses_and_reports.pdf

Environmental Science Program,

<http://www.mun.ca/science/graduate/interdisciplinary/envs/>

Environmental Science Graduate Student Society, (link in preparation)

University Directory for phone and e-mail, http://www.mun.ca/people_departments/

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B. Graduate degrees offered in Environmental Science

The Environmental Science Program described at its website <http://www.mun.ca/science/graduate/interdisciplinary/envs/> offers three graduate degrees:

- M.Env.Sci.** – course-based Master of Environmental Science
- M.Sc.** – thesis-based Masters of Science (Environmental Science)
- PhD** – dissertation-based Doctor of Philosophy (Environmental Science)

Acceptance into these programs requires the approval of the Dean of Graduate Studies at MUN, following recommendation from the Board of Study.

The M.Env.Sci., M.Sc. and PhD degrees are offered through **part-time** or **full-time study**.

The **M.Env.Sci.** degree requires the successful completion of course work and a project report. The program is offered with two options:

- Option A: 15 credit hours in program courses
- Option B: 15 credit hours in program courses plus a one semester work term

Details of the specific requirements for the M.Env.Sci. degree can be found in the University Calendar, <http://www.mun.ca/regoff/calendar/sectionNo=GRAD-1543>.

The **M.Sc.** degree requires the successful completion of course work and a research thesis. Details of the specific requirements for the M.Sc. degree can be found in the University Calendar, <http://www.mun.ca/regoff/calendar/sectionNo=GRAD-0277>.

The **PhD** degree requires the successful completion of course work, a comprehensive examination, a research dissertation (acceptable to proceed to oral defense) and an oral defense of the dissertation. Details of the specific requirements for the PhD degree can be found in the University Calendar, <http://www.mun.ca/regoff/calendar/sectionNo=GRAD-4018>

C. Application and admission

C.1 Application procedure

Admission to the Graduate Environmental Science Program is through application to the MUN School of Graduate Studies, <http://www.mun.ca/become/graduate/apply/>

When the applicant's file at the School of Graduate Studies is complete (application with statement of interest, grade transcripts, two letters of appraisal, proof of English proficiency, etc.), the file is sent by campus mail to the Environmental Science Program Administrator in the Office of the Dean of Science, for review by the Admissions Committee, composed of members of the Board of Study.

The application deadline is February 1 for a graduate student's program starting in the fall semester. For a student's program starting in the winter semester, the application deadline is April 1.

Late applications may be processed in time, but this cannot be guaranteed.

C.2 Minimum academic requirements

Normally, students must have at least a second class (upper) standing undergraduate degree from a recognized university to be admitted to the School of Graduate Studies at MUN. Further information can be found in the University calendar, <http://www.mun.ca/regoff/calendar/sectionNo=GRAD-0277>.

The minimum academic requirements for the Environmental Science Program are set by the Board of Study.

C.3 Recommendation for admission

The **Admissions Committee** examines the applicant's file and considers whether:

- i.** the applicant has the minimum academic requirements set by the School of Graduate Studies,
- ii.** the applicant has the minimum academic requirements set by the Environmental Science Board of Study, e.g. a successful applicant to the M.Env.Sci. or M.Sc. program will normally have a BSc Honours degree or a Bachelor's degree in Engineering; a successful applicant to the PhD program will normally have a M.Sc. degree,
- iii.** the applicant has completed background coursework or has employment experience in the research area of interest to the applicant,
- iv.** the letters of reference are supportive of the application,
- v.** the necessary laboratory and office space will be available,
- vi.** the applicant is eligible for a student stipend and funding is available.

If an applicant is considered acceptable, the next step is to match the applicant with a faculty supervisor. It is the applicant's responsibility to find a **potential supervisor**. Faculty members interested in supervising a particular applicant should discuss the applicant's file with the Program Chair. A recommendation by the Admissions Committee is recorded in the applicant's file.

Where agreement is reached between the Admissions Committee and a potential supervisor to recommend acceptance of a MSc or PhD applicant, the faculty member normally asks two other faculty members to serve on a Supervisory Committee. In consultation with the Program Chair, the Supervisory Committee submits to the School of Graduate Studies the Program of Study form (Appendix D).

The applicant's file is then reviewed by the Dean of Graduate Studies, who recommends acceptance, or not, into the Environmental Science Program. The final decision rests with the Dean of the School of Graduate Studies.

Applicants for whom there is no potential supervisor are not accepted into the Environmental Science Program, and the Program Chair will notify the School of Graduate Studies that the applicant's file should be closed.

C.4 Acceptance

Following acceptance by the Dean of Graduate Studies, the applicant is sent an official letter of acceptance giving details of the proposed program along with the link to an accept/decline form to be returned to the School of Graduate Studies. Where documentary proof that the candidate has obtained the necessary entrance qualifications is still awaited, the candidate may be sent a provisional letter of acceptance.

C.5 Fees and payment plans

Fees are payable at the time of registration. All graduate students must be registered in each of the three semesters of the academic year throughout the period of their program, until all academic requirements are met and they have been deemed eligible to graduate by the School of Graduate Studies.

D. Financial information

There are a variety of mechanisms by which graduate students can be financially supported. Students may hold external (e.g. NSERC) fellowships, external scholarships, MUN scholarships (see Appendix A) or MUN School of Graduate Studies fellowships. Students may earn income from MUN teaching assistantships or a work term. Stipends are paid by a supervisor's grants.

Full-time graduate students cannot work more than 24 hours per week at other employment. If a student works more than this, he/she is considered to have full-time employment, and the student's academic program must be changed from full time to part time status using a Change of Program form (see Appendix D).

M.Env.Sci. students are not eligible for a SGS fellowship, but are eligible to hold particular scholarships and MUN teaching assistantships.

A *scholarship* is based on academic performance and is usually awarded to the student with the highest grade point average, while also meeting the other conditions of the scholarship.

A *School of Graduate Studies fellowship* (see Section D.1) may be supplemented by a teaching assistantship. To be eligible for a SGS fellowship upon admission, students holding degrees from North American universities must normally have an overall average of 75% in the last 20 courses completed (including post baccalaureate courses). Graduate students continuing their program at MUN must maintain an average of 75% in their graduate program courses, i.e. a GPA of 3.75 out of 5 (for details see Student Eligibility Criteria, Section 2 at the SGS website, http://www.mun.ca/sgs/support_guidelines.pdf).

An *award* is offered to recognize special achievements or to assist with special projects or travel (see Appendix A). Awards may be given to students with a minimum of clear

standing (as defined by the University) and meet all the other conditions of the award.

Some scholarships and awards may be held for more than one year, but are renewable only if the student maintains scholarship standing. For the majority of the scholarships and awards, students are required to be engaged full-time on their graduate research when they hold the award. However, there are some awards available to part-time students. The student should confirm his/her eligibility by checking the guidelines for the awarding of School of Graduate Studies fellowships and other forms of graduate student support which can be found online at the University Calendar website, <http://www.mun.ca/regoff/calendar/sectionNo=SCHO-0881>.

D.1 General principles of SGS fellowships

School of Graduate Studies baseline funds for the awarding of SGS fellowships are allocated to academic units at MUN by the Dean of Graduate Studies on a fiscal-year (April 1- March 31) basis for the support of graduate students according to the “Guidelines for the Awarding of SGS Fellowships to Graduate Students” (http://www.mun.ca/sgs/support_guidelines.pdf).

The School of Graduate Studies does not specify minimum levels of financial support for graduate students in various academic units at MUN. Rather, individual academic units within MUN design funding norms that combine School of Graduate Studies fellowship support with other sources (external or internal scholarship, student stipend paid by the supervisor’s grants or contracts, etc.) in order to achieve financial packages that reflect estimated cost of living in St. John’s. The policy for using SGS fellowships to support graduate students in the Environmental Science Program is established by the Board of Study.

Recommendation for awarding a SGS fellowship must be forwarded to the School of Graduate Studies for approval and disbursement according to the criteria and procedures below:

- i.** Student eligibility criteria - Students must be registered as full time in a baseline-supported master’s or doctoral program in order to receive a School of Graduate Studies fellowship. (Note: M.Env.Sci. students are not eligible for SGS baseline funding.)
- ii.** Academic standard - On admission, students holding degrees from North American universities must normally have an overall average of 75% in the last 20 courses attempted (including post baccalaureate courses).
- iii.** Time in program – M.Sc. students must be within the first 24 program-months of the M.Sc. program, excluding any leave period. Ph.D. students must be within the first 48 program-months of the PhD program, excluding any leave period.

A student who was the recipient of an external fellowship or scholarship, and as a result was ineligible for a SGS fellowship (see School of Graduate Studies Fellowship Limitations section at http://www.mun.ca/sgs/support_guidelines.pdf) may be recommended in exceptional circumstances for a SGS fellowship for one semester beyond the periods outlined above.

D.2 Teaching assistantships

All graduate students (M.Env.Sci., M.Sc. and PhD students) in the Environmental Science Program can apply in the supervisor's home Department for teaching assistantships, in the same manner as other graduate students in that Department. Students may apply for teaching assistantships which are allocated in units of \$1,244 at present. Each TA unit is the teaching of one laboratory slot, plus preparation and marking for one semester (approximately 56 hours). Allocations of up to 4 TAs per year to a graduate student are permitted.

D.3 Minimum financial support of M.Sc. and PhD students in Environmental Science

Currently, the Board of Study has set \$18,000 per annum as the minimum financial support of a M.Sc. student, and \$20,000 per annum for minimum financial support for a PhD student. This support is sought for two years for the M.Sc. program and four years for the PhD program. However, funding is only guaranteed for one year at a time. Funding beyond this one year time-frame is at the discretion of those providing the funds. Still, financial support to a graduate student should not be withdrawn for trivial reasons. University fellowship monies terminate after two years for M.Sc. students and after four years for PhD students. In the case of a M.Sc. student who transfers to the PhD program, that student is eligible for fellowship money for a total of five concurrent years.

The Board of Study currently sets **SGS baseline fellowship funding** at \$9,000 per annum for M.Sc. students and \$10,000 per annum for PhD students. The SGS fellowship must be **supplemented** by a student **stipend** from the supervisor which equals or exceeds the SGS baseline fellowship.

A student will not be accepted into the program unless the stipend from the supervisor is confirmed as available by MUN financial administration. In the event that a baseline fellowship is not available, a supervisor who wishes to accept a student is responsible for providing funding for the entire minimum financial support.

E. Academic requirements for completing the degree

The required graduate courses in Environmental Sciences (see Section F) are offered on an annual basis. A graduate student should consult with his/her supervisory committee to determine the elective courses that will be required to complete that individual's graduate program.

All course requirements should normally be completed within one year from the date of first registration in the degree program.

Failure to attain a final passing grade of at least 65% in a graduate course shall lead to termination of a student's program. For full regulations regarding grading, see the University Calendar at <http://www.mun.ca/regoff/calendar/sectionNo=GRAD-0015#GRAD-0022>.

E.1 Coursework and research

The **Master of Environmental Science (M.Env.Sci.)** course-based **Option A** requires eight courses and a project report. The required courses are:

- ENVS 6000 (Environmental Science and Technology)
- ENVS 6009 (Project)
- ENVS 6010 (Environmental Seminar)
- plus two courses from:
 - ENVS 6001 (Earth and Ocean Systems)
 - ENVS 6002 (Environmental Chemistry and Toxicology)
 - ENVS 6003 (Applied Ecology)
- plus three graduate courses related to the student's research specialty offered by the Faculty of Science, the Faculty of Arts, the Faculty of Medicine or the Faculty of Engineering and Applied Science.

The **project report** provides an opportunity for the student to create an original perspective on a selected environmental issue through the reading of appropriate literature and reinterpretation of other sources of information (e.g. existing data). Normally the project will be multidisciplinary or interdisciplinary in nature. The project report will be equivalent to a review article in a journal, or a consultant's report on a particular environmental issue. Collection of new data from the field or laboratory and analysis of this new data is permitted, but not required for the M.Env.Sci. degree.

The **Master of Environmental Science (M.Env.Sci.)** with work-term **Option B** requires eight courses (one of which is the work term ENVS 601W) and a project report. The required courses are:

- ENVS 6000 (Environmental Science and Technology)
- ENVS 6009 (Project)
- ENVS 6010 (Environmental Seminar)
- plus two courses from:
 - ENVS 6001 (Earth and Ocean Systems)
 - ENVS 6002 (Environmental Chemistry and Toxicology)
 - ENVS 6003 (Applied Ecology)
- plus two graduate courses related to the student's research specialty offered by the Faculty of Science, the Faculty of Arts, the Faculty of Medicine or the Faculty of Engineering and Applied Science. In addition, students will be required to complete the 3 credit hours course ENVS 601W (work term).
 - a. ENVS 601W is a paid work term of one semester (13-18 weeks) duration. General management of the work terms is the responsibility of Academic Staff Members in Co-operative Education (ASM-CEs) for the Faculty of Science in consultation with the Program Chair and the student's Supervisor (an Application Form is required). The ASM-CEs are responsible for recruiting potential employers, organizing competitions for Work Term employment, arranging student-employer interviews and facilities, counselling and supporting students, and evaluating the work term.
 - b. Work terms are not guaranteed but every effort is made to ensure that appropriate employment is made available.
 - c. A student who is admitted to Option B gives permission to the University to provide a copy of the applicant's resume, university transcript and work term evaluations to potential employers.
 - d. A student who has been accepted to Option B may obtain his/her own work term placement outside the competition. Such employment positions must be confirmed by the employer, and must be approved by the ASM-CE.

- e. Salaries paid to co-operative students are determined by employers based on their internal wage structures.

The on-site employment supervisor and the ASM-CE evaluate the work term based on the student's performance on the job and on a written work term report submitted by the student. The topic of the work term report must be related to the work experience and will be chosen by the student in consultation with the on-site employment supervisor and the ASM-CE. The work term experience and the information gathered during the work term may become the foundation for the project report for ENV5 6009 (Project) which is required for the M.Env.Sci. degree. The Program Chair, on the advice of the ASM-CE with input from the on-site employment supervisor, will recommend to the Dean of Graduate Studies a grade of Pass with Distinction, Pass or Fail. Should a student fail to complete a work term successfully, the graduate student's M.Env.Sci. Supervisor and the Program Chair may submit to the ASM-CE a proposal for a different work term placement (only once). Or the student may apply to the Board of Study for a change to the course-based M.Env.Sci. Option A, or to the thesis-based M.Sc. (Environmental Science).

The **M.Sc. (Environmental Science)** requires four courses and a research thesis. The required courses are:

- ENV5 6000 (Environmental Science and Technology)
- ENV5 6010 (Seminar)
- plus one course from:
 - ENV5 6001 (Earth and Ocean Systems)
 - ENV5 6002 (Environmental Chemistry and Toxicology)
 - ENV5 6003 (Applied Ecology)
- plus one graduate course related to the student's research specialty offered by the Faculty of Science, Faculty of Arts, Faculty of Medicine or the Faculty of Engineering and Applied Science.

Original field, laboratory or modeling research is required for the M.Sc. degree. The research should be multidisciplinary or interdisciplinary in nature.

The **PhD (Environmental Science)** requires two courses, passing a Comprehensive Examination and completing a research dissertation.

The required two courses for students entering with a disciplinary M.Sc. are:

- ENV5 6000 (Environmental Science and Technology)
- ENV5 6010 (Environmental Seminar)
-

The required two courses for students entering with an interdisciplinary M.Sc. are:

- ENV5 6010 (Environmental Seminar)
- plus an in-depth, specialty graduate course offered by the Faculty of Science to broaden the student's perspective.

Original field, laboratory or modeling research is required for the PhD degree. The research should be multidisciplinary or interdisciplinary in nature. A formal **PhD research proposal** should be written by the student and presented to the supervisory committee within the first year of the student's program. The supervisory committee should have one faculty member from outside the supervisor's home department.

The **PhD Comprehensive Examination** adheres to the General Regulations of the School of Graduate Studies for Comprehensive Examination procedures, at <http://www.mun.ca/regoff/calendar/sectionNo=GRAD-0024>.

The exam is both written and oral. The exam will be held no later than the seventh semester of the student's doctoral program. The candidate must demonstrate a *mastery of sub-disciplines* in the research area. The candidate must *relate his/her research specialization to the larger context of subdisciplines* in the research area (see Appendix B).

E.2 Duration of Program

The M.Env.Sci. Option A degree in the Environmental Science Program requires the completion of coursework and writing a project report. As the student is not required to conduct original research for the project, it is expected that a M.Env.Sci. Option A student will spend one year (three semesters) completing the degree requirements.

The M.Env.Sci. Option B degree in the Environmental Science Program requires the completion of coursework, a work-term and writing a project report. As the student is required to complete a work-term of one semester duration, it is expected that a M.Env.Sci. Option B student will spend one year and four months (four semesters) completing the degree requirements.

The M.Sc. and PhD degrees in the Environmental Science Program require the completion of coursework, conducting original research, and writing a thesis. It is expected that a M.Sc. student will spend a minimum of two years (six semesters) completing these requirements and that a PhD student will spend a minimum of four years (12 semesters) completing these requirements. The maximum period of study for a student's graduate program (full time or part-time) at MUN is seven years beyond the first registration.

E.3 Leave of Absence

Graduate students may apply for a Leave of Absence from their graduate programs. A Leave of Absence may be granted for academic reasons (Supervisor absent from the University, courses not offered, equipment failures, etc.), family circumstances (pregnancy, unusual or exceptional family care responsibilities, etc.), employment (relocation, etc.), medical (medical certificate of inability to continue in program) or financial reasons. Information on Leaves of Absence can be found in the University Calendar at <http://www.mun.ca/regoff/calendar/sectionNo=GRAD-0018#GRAD-6509>.

During a Leave of Absence the student is not required to register. No fees will be applied and the time granted in the leave is not counted in the period of study. Students are required to apply for a Leave of Absence using the form appropriate for this purpose which can be obtained from Graduate Studies or downloaded from http://www.mun.ca/sgs/current/general_forms.php.

E.4 Withdrawal

A student who wishes to withdraw from the Environmental Science Program should notify the Supervisor, the Program Chair and the ASM-CE in writing. The Program Chair will notify the Dean of the School of Graduate Studies.

E.5 Changes in Program of Study

Any proposed change from the program as detailed in the letter of admission must have the prior approval of the Program Chair and the Dean of the School of Graduate Studies. Forms for this purpose (covering changes in courses to be taken (including changing “to be decided” to course numbers, full-time/part-time status, supervisor, supervisory committee members, thesis title, as well as extensions of the program or withdrawal from the program)) are available from the Program Administrator (Appendix D). The completed form, signed by the student and/or supervisor should be returned to the Program Administrator. The Program Chair will forward the recommendation to the Dean of Graduate Studies, with whom the final decision rests.

E.6 Transfer from M.Sc. to PhD

Normally, students entering the PhD program in Environmental Science will have an M.Sc. degree. Students in the M.Sc. program in Environmental Science, after a minimum of 12 months in the M.Sc. program, may request a transfer to the PhD program. This is normally done in the first half of the second year of the M.Sc. program (between the 3rd and 5th semesters). The change to PhD status will be considered to be effective on the date of the actual transfer.

Guidelines for transfer from M.Sc. to a PhD program in Environmental Science are as follows:

- i.** The request for transfer will normally be done between the 3rd and 5th semesters.
- ii.** The student and Supervisor should notify the Program Chair of the intention to request a transfer from the M.Sc. to the PhD program.
- iii.** The Supervisor should explain to the student the requirements in completing a PhD degree, in contrast to those for completion of the M.Sc. degree.
- iv.** The student should submit a written PhD research proposal and give an oral presentation of this proposal to the supervisory committee. Based on this, the Supervisory Committee will determine if the student is eligible for transfer to the PhD program. Normally this would be done during the annual supervisory committee meeting.
- v.** The Supervisory Committee will indicate on the Supervisory Report Form that “based on the written PhD research proposal and presentation,” the student is recommended for transfer from the M.Sc. to the PhD program.
- vi.** A Program of Study Form must be submitted along with the Supervisory Report indicating the change in status.
- vii.** The Associate Dean of Science (Research and Graduate Studies) must support the transfer request.
- viii.** Final decision for transfer from the M.Sc. program to the PhD program rests with the Dean of the School of Graduate Studies.

E.7 Comprehensive examination procedure

The comprehensive examination procedure for doctoral students in the Environmental Science Program is discussed in detail in Appendix B. The sub-discipline upon which the candidate will be examined is made known to the candidate in writing (preferably by email with copy to the Program Administrator) no later than three months prior to the examination.

Briefly, the comprehensive examination procedure is as follows:

- i.** The student is given a topic related to his/her research specialization by the Comprehensive Examination Committee at least four weeks in advance of the scheduled exam. The student writes a paper which positions this topic within the larger context of interdisciplinary environmental science concepts and practices; the student orally presents the paper; followed by a question period on the paper.
- ii.** There is a second round of questioning by the Examination Committee, where the student demonstrates a mastery of the sub-discipline appropriate to his/her research area.

It is recommended that the comprehensive examination be held as soon as possible after the student completes the required courses, but no later than the 7th semester of the student's doctoral program. If the examination identifies weakness in the student's academic background, the Committee may assign more coursework to the student.

F. Environmental Science Program courses

ENVS 6000 Environmental Science and Technology
ENVS 6001 Earth and Ocean Systems
ENVS 6002 Environmental Chemistry and Toxicology
ENVS 6003 Applied Ecology
ENVS 6004 Environmental Pollution and Mitigation (cross-listed as ENG 9601)
ENVS 6007 Environmental Risk Assessment (cross-listed as ENG 9609)
ENVS 6008 Air Pollution (cross-listed as ENG 9624)
ENVS 6009 Environmental Science Project
ENVS 6010 Seminar
ENVS 6201-6210 Special Topics in Environmental Science
ENVS 601W Work Term

Environmental Science relevant graduate courses taught at MUN (elective courses)

- **Biochemistry**
BIOC 6630 Marine Biochemistry

- **Biology**
BIOL 6000 Research Topics Microbiology
BIOL 7220 Quantitative Methods in Biology
BIOL 7535 Research Methods in Marine Science

- **Chemistry**
CHEM 6110 Analytical Chemistry II
CHEM 6151 Analytical Separations and Organic Mass Spectrometry
CHEM 6152 Electro-analytical Techniques

CHEM 6190-9 Selected Topics in Analytical Chemistry

- **Cognitive and Behavioural Ecology**
CABE 6351 Behavioural Ecology and Sociobiology

- **Earth Sciences**
EASC 6210 Genesis of Mineral Deposits
EASC 6410 Advanced Engineering and Environmental Geology
EASC 6500 Stable Isotope Geochemistry
EASC 6510 Trace Element Geochemistry
EASC 6520 Methods in Advanced Research in Geochemistry
EASC 7300 Changes in Global Paleo-environment

- **Geography**
GEOG 6100 Research Techniques in a Selected Field of Geography I
GEOG 6101 Research Techniques in a Selected Field of Geography II
GEOG 6250 Conservation and Sustainability of Natural Resources
GEOG 6400 Fluvial Geomorphology
GEOG 6401 Glacial Geomorphology
GEOG 6402 Coastal Geomorphology
GEOG 6410 Climatology
GEOG 6420 Quaternary Geography

- **Mathematics and Statistics**
MATH 6100 Dynamical Systems
MATH 6102 Mathematical Biology
MATH 6520 Linear Models
MATH 6561 Categorical Data Analysis

- **Physics and Physical Oceanography**
PHYS 6200 Nonlinear Dynamics
PHYS 6310 Physical Oceanography
PHYS 6316 Ocean Measurements and Data Analysis
PHYS 6317 Ocean Acoustics
PHYS 6318 Numerical Modeling
PHYS 6319 Climate Dynamics
PHYS 6321 Coastal Oceanography

- **Engineering and Applied Science**
ENG 9420 Engineering Analysis
ENG 9501 Finite Element Analysis with Engineering Applications
ENG 9601 Environmental Pollution and Mitigation (cross-listed as ENVS 6004)
ENG 9609 Environmental Risk Assessment (cross-listed as ENVS6007)
ENG 9621 Soil Remediation Engineering
ENG 9622 Environmental Statistics
ENG 9625 Environmental Impacts of Offshore Oil and Gas Operations
ENG 9626 Environmental Management Systems
ENG 9627 Environmental Systems Engineering
ENG 9628 Environmental Laboratory
ENG 9629 Environmental Policy and Regulations

ENG 9630 Pollution Prevention
ENG 9713 Stochastic Hydrology

G. Program faculty

Professors involved in the Environmental Science Program at MUN include faculty members from the Faculty of Science (Departments of Biochemistry, Biology, Chemistry, Earth Sciences, Mathematics and Statistics, Ocean Science, Physics and Physical Oceanography, and Psychology), the Faculty of Arts (Departments of Geography and Sociology), the Faculty of Engineering and Applied Science, the Faculty of Medicine, the Fisheries and Marine Institute, and Grenfell Campus (Corner Brook). Adjunct professors within these academic units can co-supervise graduate students.

Graduate students in the Environmental Science Program are encouraged to network with the **Canada Research Chairs** at MUN, especially with the chair holders in the research area of environment sustainability:

Dr. R. Chuenpagdee, Department of Geography
Dr. M. Rise, Department of Ocean Sciences
Dr. P. Snelgrove, Department of Ocean Sciences
Dr. L. Tarasov, Department of Physics and Physical Oceanography
Dr. S. Ziegler, Department of Earth Sciences

Faculty currently associated with the Interdisciplinary Graduate Program in Environmental Sciences as thesis/project supervisors, are:

- A. Aksu (Earth Sciences, MUN)
- M.R. Anderson (Fisheries and Oceans Canada)
- T. Bell (Geography, MUN)
- N. Cadigan (Fisheries and Marine Institute, MUN)
- C.E. Campbell (Environmental Science, Grenfell Campus, MUN)
- N. Catto (Geography, MUN)
- B. Chen (Engineering and Applied Science, MUN)
- Q. Chen (Chemistry, MUN)
- R. Chuenpagdee (Geography, MUN)
- C. Coles (Engineering and Applied Science, MUN)
- B. deYoung (Physics and Physical Oceanography, MUN)
- E. Demirov (Physics and Physical Oceanography, MUN)
- R. Devillers (Geography, MUN)
- E. Edinger (Geography & Biology, MUN)
- B. Favaro (Fisheries and Marine Institute, MUN)
- J. Finnis (Geography, MUN)
- A. Foster (Math and Statistics, MUN)
- K. Gamperl (Ocean Science, MUN)
- R.S. Gregory (DFO)
- J. Hanchar (Earth Sciences, MUN)
- K. Hawboldt (Engineering and Applied Science, MUN)
- R. Helleur (Chemistry, MUN)
- L. Hermanutz (Biology, MUN)

- T. Husain (Engineering and Applied Science, MUN)
- A. Igamberdiev (Biology, MUN)
- F. Khan (Engineering and Applied Science, MUN)
- K. LeDez (Medicine, MUN)
- S.J. Leroux (Biology)
- M. Libiron (Sociology, MUN)
- P. Marino (Biology, MUN)
- McGaw (Ocean Science, MUN)
- W. Montevicchi (Psychology, MUN)
- C. Parrish (Ocean Science, MUN)
- K. Poduska (Physics and Physical Oceanography, MUN)
- C. Purchase (Biology, MUN)
- M. Rise, (Ocean Science, MUN)
- R. Rivkin (Ocean Science, MUN)
- D. Schneider (Ocean Science, MUN)
- P. Snelgrove (Ocean Science, MUN)
- L. Tarasov (Physics and Physical Oceanography, MUN)
- Unc (Environmental Science, Grenfell Campus, MUN)
- I. Warkentin (Environmental Science, Grenfell Campus, MUN)
- Y. Wiersma (Biology, MUN)
- P. Winger (Fisheries and Marine Institute, MUN)
- J. Wroblewski (Ocean Science, MUN)
- J. Wu (Sustainable Resource Management, Grenfell Campus, MUN)
- L. Zedel (Physics and Physical Oceanography, MUN)
- S. Ziegler (Earth Sciences, MUN)

H. Administration and oversight of the Program

Overall responsibility for graduate studies at MUN lies with the Dean of the School of Graduate Studies. The **Academic Council** is a committee of the School of Graduate Studies with representation from all academic units, the Registrar's Office and the Graduate Student Union. The Academic Council is chaired by the **Dean of Graduate Studies** and oversees all business, academic and administrative matters related to graduate studies for the University. Academic Council approves regular course offerings for all the University graduate programs and approves all new programs of study. There are a number of sub-committees of Academic Council which deal with fellowships and awards, appeals, etc.

Academic and administrative support for the Environmental Science Program is provided through the **Office of the Dean of Science**. The Faculty of Science recognizes the intrinsic value of graduate programs that are interdisciplinary in nature. Interdisciplinary programs (<http://www.mun.ca/science/graduate/interdisciplinary>) facilitate collaboration and encourage students and faculty to think outside their own area of expertise.

H.1 Board of Study

The Interdisciplinary Graduate Program in Environmental Science is managed by a **Board of Study**. The Board of Study through its **Chair** is responsible to the **Associate Dean of Science (Research and Graduate Studies)** for the quality, delivery and

administration of the program. The Board makes all normal academic decisions, including those related to recommendations for admission of new students to the Program. The Board ensures that Supervisors and Supervisory Committees follow all appropriate guidelines for supervision of graduate students (with respect to holding regular meetings, ensuring deadlines are met, etc.)

H.2 Program Chair

The **Program Chair** represents the Environmental Science Program in all academic matters concerning the School of Graduate Studies. All recommendations to the School of Graduate Studies (such as admission to the program, thesis examiners, comprehensive examiners, fellowships, awarding of the degree, course changes, etc.) are made on behalf of the **Associate Dean of Science (Research and Graduate Studies)** by the Program Chair. In addition, the Program Chair (or **delegate**), will act as the chair for all PhD comprehensive examinations.

H.3 Program Administrator

Administration is provided by the **Program Administrator** in consultation with the Program Chair. The Program Administrator is responsible for enquiries about the Program and day-to-day management of the Program, including distributing information to students regarding registration, fees and funding, awards, course offerings, thesis submission, project report submission, and arrangements for thesis defense and comprehensive examination.

H.4 Student Supervisory Committee

Every graduate student in the Environmental Science Program must have a **Supervisor** at the time of acceptance into the program. It is the responsibility of the Supervisor, together with the graduate student, to identify other members of the Supervisory Committee.

Normally for PhD students, there are three members on this committee: the supervisor plus two other faculty members. One committee member should be from outside the supervisor's home Department. Normally for M.Sc. students, the committee consists of the Supervisor and one other faculty member. Normally M.Env.Sci. students require only a Supervisor.

Members of the Supervisory Committee cannot be examiners of the M.Sc. or PhD thesis submitted to the School of Graduate Studies. The Supervisor of an M.Env.Sci. student serves as one of two reviewers of the project report submitted by the student for ENVS 6009.

Information on graduate student supervision is provided at <http://www.mun.ca/regoff/calendar/sectionNo=GRAD-0025>.

The **function of the Supervisory Committee** is to:

- i.** decide, in consultation with the student, the program of study
- ii.** guide the student in his/her research
- iii.** monitor the student's progress
- iv.** provide an annual supervisory report (Appendix D)

- v. recommend any changes in the program of study (Appendix D)
- vi. recommend the timing of the comprehensive examination
- vii. read the thesis or report and complete forms required for thesis submission (Appendix D)
- viii. recommend, confidentially, to the Dean of Graduate Studies, through the Program Chair, suitable members of the Thesis Examining Board.

Information on the appointment of graduate student supervisors is provided at:
http://www.mun.ca/sgs/grad_sup_guidelines.pdf

Responsibilities of Supervisors and Graduate Students is listed at:
<http://www.mun.ca/sgs/responsibilities.pdf>

H.5 Annual Supervisory Report

The University Calendar, at the URL

<http://www.mun.ca/regoff/calendar/sectionNo=GRAD-0025>, states that a Graduate Student Annual Progress and Supervisory Report form must be submitted to the School of Graduate Studies on an annual basis. Recommendations concerning continuation, amendment, or termination of a candidate's program, are sent to the Dean of Graduate Studies, who shall take appropriate action.

H.6 Advice to graduate students

Within the Environmental Science Program, graduate students can seek advice and guidance from their Supervisor and members of the Supervisory Committee. Questions and concerns about individual programs can be raised with the **Program Chair** and/or the **Associate Dean of Science (Research and Graduate Studies)**. Option B students should contact the Academic Staff Member in Co-operative Education for the Faculty of Science for information and advice on work terms.

In addition, the **Office of Student Life** <http://www.mun.ca/student/DepartmentsUnits/> offers guidance, including counseling, health services. Services for international students are offered by the **International Student Advising Office** <http://www.mun.ca/isa/>.

H.7 Office Space for Environmental Science Graduate Students

Study carrels for Environmental Science Program students who do not have office space in their supervisor's laboratory are available in the University-owned bungalow at 202 Elizabeth Avenue, on the southeast edge of the St. John's campus, http://www.mun.ca/campus_map/index.php. Carrels have internet access. At 202 Elizabeth Avenue there is a meeting/lecture room and also kitchen facilities.

Appendix A – Scholarships, Travel Funds and Convocation Awards

Appendix A.1 Scholarships available

All graduate students (M.Env.Sci., M.Sc. and PhD students) in the Environmental Science Program are encouraged to apply for external fellowships and scholarships.

It is the responsibility of the Supervisor and the graduate student to notify the Program Administrator that they wish to be considered for a scholarship or award, and to ensure that all the required documents are provided to the Office of the Dean of Science well in advance of the deadline. The following are only a few of the scholarships/awards that may be available to Environmental Science graduate students. Further information may be obtained from the Program Administrator and the School of Graduate Studies. For a listing of scholarships, bursaries and awards available and the appropriate deadlines, graduate students should consult the University Calendar website, or go to <http://www.mun.ca/sgs/current/scholarships/> for the School of Graduate Studies' searchable database of awards and scholarships.

F.A. Aldrich Alumni Graduate Scholarship - These scholarships are awarded annually based on academic merit and need. Nominations will be made to the Dean of Science in May of each year. If a graduate student wishes to be considered for this award, all pertinent information should be submitted to the Program Administrator before mid-April.

A.G. Hatcher Memorial Scholarship - Three or more scholarships are awarded annually based on academic merit. Nominations are made to the Dean's Advisory Committee on Scholarships and Awards by early August and all required information should be received by the Program Administrator no later than mid-July. The scholarship can be held for one year only.

School of Graduate Studies F. A. Aldrich Fellowship - This is a university-wide competition open to all incoming full-time graduate students. The SGS deadline for application is about the 3rd week of February and applications should be submitted to the Program Administrator by the end of the 1st week of February. Subject to certain restrictions, these fellowships are renewable for one year for PhD students. They are awarded for exceptional academic achievement.

The Maritime Awards Society of Canada (MASC) Maritime Studies Scholarship - This can be awarded to a Canadian citizen studying in a “maritime based” program at MUN at either the M.Sc. or PhD level. It may be renewed once.

Geological Association of Canada Postgraduate Scholarship in Environmental Sciences - Guidelines and applications are available from the School of Graduate Studies.

The Leslie Tuck-Avian Ecology Award - This award is awarded based on a 500-word essay on the student's research and its relevance to avian ecology and ecosystem preservation in Newfoundland and Labrador.

The George Weston Graduate Scholarships - Two awards may be made annually to full-time graduate students. One of these is given in the field of Marine Biology. Applicants must have been born in one of the Atlantic Provinces.

Royal Bank Fellowship in Marine Studies - The award is based on academic merit and is open to full-time graduate students in marine studies.

Natural Sciences and Engineering Research Council of Canada (NSERC) Postgraduate Scholarship/ Alexander Graham Bell Canada Graduate Scholarships- Master's/Doctoral Scholarship/ Industrial Postgraduate Scholarship - The annual competition for these awards commences in the Fall semester of each year.

Dr. Joe Brown Graduate Research Award in Aquatic Ecology and Aquaculture - This award supports the research activities of a graduate student in the areas of aquatic ecology or aquaculture. Based on scholarly merit and quality of research, the award will be made by the Dean of the School of Graduate Studies upon recommendation from the Head of the Department of Ocean Science.

Appendix A.2 Financial support for conference travel

Full and part-time students may apply for funding for travel to meetings to present their research. Information is available at <http://www.mun.ca/sgs/current/scholarships/travel.php>

- i. The School of Graduate Studies may provide funds for travel only once during a graduate student's program.
- ii. The Graduate Student Union may provide funds for travel only once during a graduate student's program.
- iii. Supervisors may allocate travel money from a research grant for a graduate student to attend meetings. Students in the Environmental Science program are eligible to receive travel support for conference presentations from the Department of their Supervisor, in the same manner as other graduate students in that Department.

Appendix A.3 Prizes and medals awarded at MUN convocation

Convocation Medals and Awards are given at the Spring Convocation each year. However, students who graduated at the previous Fall Convocation will also be considered for these awards. The "scholarship year" is defined as May 1 to April 30. For a listing of prizes and awards at convocation, graduate students should consult the University Calendar website, <http://www.mun.ca/regoff/calendar/sectionNo=SCHO-0695>

The *Moire A. Wadleigh Graduate Award For Excellence in Environmental Science* is awarded once per academic year. One award is to a student having completed the M.Env.Sci. degree, and another award is to a student having completed the M.Sc. Further information is provided at http://www.mun.ca/science/graduate/interdisciplinary/envs/wadleigh_award.php

Fellow of the School of Graduate Studies - This title will be awarded to a graduate student based primarily on academic merit and will be indicated on the transcript. This title does not have a financial prize attached to it. The nominations are sent to the School of Graduate Studies by early April for the Spring Convocation, and any graduate student wishing to be considered must have all information to the Program Administrator no later

than the end of the second week in March. The nominations for the Fall Convocation are sent to the School of Graduate Studies by early October, and any graduate student who wishes to be considered must have all information to the Program Administrator no later than the third week in September.

Appendix B – Detailed Comprehensive Examination Procedure

The purpose of a doctoral program is to provide the student with the opportunity to gain a high degree of competence in conducting original research at an advanced level. This should result in a significant advance in knowledge in the field of study. The program of research should be aimed at completion within a four year time span for a full-time student. A student successfully completing a PhD program should not only be a competent researcher in his/her field, but also be a person able to communicate and evaluate technical information. These latter skills can be acquired and demonstrated by attending and participating in various seminars, discussion groups, graduate courses, scientific meetings and undergraduate laboratory teaching.

MUN regulations now require a PhD comprehensive examination to be completed within 7 semesters of the first registration,
<http://www.mun.ca/regoff/calendar/sectionNo=GRAD-0024>.

The procedure shall be initiated by the Supervisor who shall notify the Program Chair, in writing, of the candidate's readiness. NOTE: A **sub-discipline** must be determined no later than three months before the examination. The sub-discipline is normally what is listed as the '**Area of Concentration**' on the '**Program of Study**' form filled out when the student was recommended for admission (Appendix D). The sub-discipline upon which the candidate will be examined should be made known to the candidate no later than three months prior to the examination.

The Examination Committee:

According to the regulations in the University Calendar, the number of voting members shall be an odd number. The examination committee will consist of five voting members. They are the Program Chair (or Delegate), the Supervisor, and three other members of which only one may be a member of the Supervisory Committee. A Co-supervisor can serve as the other member of the Supervisory Committee on the Examination Committee.

The Program Chair (or Delegate) chairs the comprehensive exam. At least two members of the Board of Study must be on the Examination Committee. The Head of the Department of the supervisor (or delegate) is invited to serve on the Examination Committee. The Supervisor recommends the five names to the Program Chair, and the Board of Study reviews the suggestions. These recommendations should be made on the form listed in Appendix D. The Board of Study may recommend changes. Once approved, the recommended examiners' names are submitted to the Dean of Graduate Studies for appointment to the Comprehensive Examination Committee. The Dean of the School of Graduate Studies (or Delegate) is a non-voting member of the Examination Committee.

Once the committee is appointed, it shall meet and select a **seminar topic** within the student's previously determined **sub-discipline**. The seminar topic will generally be broad in scope and related to, but distinct from, the thesis research. During the meeting that determines the seminar topic for the examination, the Examination Committee should also set a date for the examination. This date should be set with the following in mind:

- a) the candidate must be notified in writing not more than six and not less than four weeks before the examination date;
- b) two weeks should be allowed for the transmission of the recommendation of the Examination Committee and the approval by the Board of Study.

The Program Chair will communicate the seminar topic and guidelines to the student six weeks, if possible, but not less than four weeks before the examination. The student, upon receiving the topic, will prepare a **20 page (approximately) paper** on the seminar topic, which will include references. This shall be double-spaced in font of 12 cpi size type. Figures and tables can be included in the text or appended at the end of the text. The subsequent seminar will be based on this paper. The paper will be given to each examiner plus an additional copy to the Program Administrator to be forwarded to the SGS representative at least one week before the examination. This paper is not graded; it is intended to inform the Examination Committee with regards to the approach the student has taken.

Format of the oral comprehensive examination:

The seminar topic is always general and requires the student to provide a brief introduction followed by a more in-depth review of a narrower aspect of the subject. At the beginning of the examination, the student will present a 45-50 minute seminar on the assigned topic. The student must demonstrate an understanding of the development of the subject, the context of the subject, and current knowledge. The student must be able to present a synthesis of the subject and opportunities for future research.

After the oral presentation, the student will be questioned by each Examiner on the seminar topic, lasting approximately 10 minutes per examiner. All Examiners, having had the written paper for a week, will have had an opportunity to develop potential questions for the candidate.

Then a second round of questions will follow. Primarily this round will focus on the broader sub-discipline area. Again, there will be approximately 10 minutes allowed per Examiner. Any Examiner may ask to have an answer elaborated, if it is felt clarification is needed.

The aim of the comprehensive examination is to determine the student's basic knowledge of the field in which he/she is working. Thus PhD students, upon entering a program of study, should prepare for their comprehensive by being familiar with the

general concepts and techniques of their field and be prepared to critically discuss them during the examination.

At the end of the question period the candidate and the audience will leave the examination room while the examiners discuss all facets of the examination and make their decision.

The outcome of the examination can be any one of the following:

- i.** The candidate has either passed or failed the comprehensive examination. A pass requires a majority vote by the voting members of the Examination Committee.
- ii.** If failed, and it is the first examination, the Committee can decide whether the student may be re-examined.
- iii.** If passed, the committee can recommend that the student be 'Passed with Distinction'. This requires unanimous agreement and is awarded to candidates who demonstrate superior knowledge of their chosen field by showing excellence in the written paper and oral presentation, and answering/discussing examiners' questions in a highly competent manner.

The results and subsequent action, if any, will be communicated to the Dean of Graduate Studies and supervisor, in writing, by the Chair of the Examination Committee.

If re-examination (in total or in part) is required, it must take place not less than one month nor more than six months from the first examination. The student may be asked to redo the whole examination or only part of the examination. Re-examination can be in written or oral format. The student can be asked to review assigned literature and/or redo a seminar topic. The nature of the re-examination will be communicated to the candidate in writing.

The outcome of a re-examination is either pass or fail. This is decided by simple majority. If the result is fail, the student will withdraw from the doctoral program, as only one re-examination is permitted.

If outright failure is decided on the first examination, with no option for re-examination, this decision requires a unanimous vote.

Appendix C - Submission of Thesis or Project Report, Review and Notification

The guidelines for preparation of theses and project reports can be found at the School of Graduate Studies website,
http://www.mun.ca/sgs/go/guid_policies/theses.php

The thesis or project report (electronic copy) and appropriate forms are submitted by the graduate student in the Environmental Science Program to the Program Administrator in the Office of the Dean of Science. All program requirements must be complete at the time the thesis is submitted to the School of Graduate Studies through the Office of the Dean of Science. The thesis will not be sent for examination until the program requirements are complete.

Deadlines for submission for each semester for tuition liability are given in the University Calendar. Registration and tuition fees for those students meeting the deadline for a semester will be reversed.

The examination of a thesis or project report is an arm's length process. Therefore, there should be no contact between the supervisor or student and the examiners while a thesis or project report is under examination. There are two examiners (either external or internal to the university) of a M.Sc. thesis or project report. There are three examiners (two internal and one external to the university) of a PhD thesis.

In advance of the submission of a thesis, the supervisory committee should submit, confidentially, the names (and contact information) of potential examiners to the Program Chair. Examiners must not have been involved in the research or in the preparation of the thesis. The Program Administrator will confirm the availability of the examiners. The Program Chair submits the names to the Dean of the School of Graduate Studies. The Dean appoints the examiners.

In advance of the submission, the thesis is to be read by the Supervisor and all members of the Supervisory Committee, as confirmed on the Supervisory Committee Approval Form (http://www.mun.ca/sgs/supervisory_approval.pdf).

Outcome of the review of the M.Sc. or PhD thesis is sent from the School of Graduate Studies to the Program Chair, who notifies the student and the supervisor of the outcome. The possible outcomes of the thesis review are found in the University Calendar website, <http://www.mun.ca/regoff/calendar/sectionNo=GRAD-0026>.

Following corrections to the thesis, the final submission is made back to SGS through the Website link of SGS.

The PhD thesis is first reviewed by the examiners to determine if it is acceptable to proceed to the oral defense. This information is sent from the School of Graduate Studies to the program administrator, who notifies the student and the supervisor of the outcome of the examination. If the thesis is allowed to go forward to the oral defense, the program administrator arranges the date and time of the defense, in consultation with the examiners and supervisor. The PhD thesis may require corrections prior to proceeding to oral defense; the possible outcomes of the thesis review and procedures are found in the University Calendar website, <http://www.mun.ca/regoff/calendar/sectionNo=GRAD-0026>.

Final Submission of the thesis consists of the revised electronic copy and the Recommendation for the Award of Degree form, signed by the supervisory committee and program chair. The date these are received by SGS is the date that completion of all program requirements has been met.

University Convocation

Only students who have completed all the requirements of his/her Program of Study are permitted to proceed to Convocation. Convocation is held in the Fall (October) and in the Spring (May). Students expecting to graduate at any particular convocation must apply to graduate through the Student Self-Service by the deadline set by the Registrar and noted in the University Diary.

Appendix D – List of Forms

Some of these forms are common to all students, as required by the School of Graduate Studies, http://www.mun.ca/sgs/current/general_forms.php. The forms listed below can be obtained from the Environmental Science Program Administrator in the Office of the Dean of Science.

Program of Study (for new admissions/deferrals/transfers)

Graduate Student Annual Progress and Supervisory Report

Recommendation for Thesis Examiners

Recommendation for Composition of the PhD Comprehensive Examination Committee

Recommendation from PhD Comprehensive Examination Committee

Field Research Safety Planning Form

Recommendation for Changes in a Graduate Program (Supervisor and student signatures)

Course Change form (student's signature)

Forms required for thesis submission

Form applying for an extension of Program of Study

Form applying for a Leave of Absence

Application for financial support for conference travel by students

Form available from the Academic Staff Members in Co-operative Education is the Application for Admission to the Master of Environmental Science Co-operative Education Option