

Senate Committee on Academic Development Report to Senate - Meeting of January 14, 2012

Proposal to introduce a PhD in Environmental Studies

Introduction

The proposal to introduce a PhD Program in Environmental Studies in the Faculty of Arts and Science and the School of Graduate Studies (SGS) was reviewed by the Senate Committee on Academic Development (SCAD) at its meeting of December 5, 2012. D. Rappaport (Associate Dean, SGS), B. Cumming (Director, School of Environmental Studies) and L. Winn (Professor, School of Environmental Studies) attended the SCAD meeting to speak to the proposal and to answer questions from members of SCAD. Members of SCAD were also provided with background documentation provided by the School of Environmental Studies and the SGS including the Review Team Report submitted by the two external reviewers and the internal responses from the relevant Director and Deans.

Analysis and Discussion

The following highlights are noted:

- The proposed PhD in Environmental Studies received strong support from the external reviewers, is fully backed by current faculty members within the School and cognate academic units, and is enthusiastically anticipated by potential students;
- The program will provide an opportunity for the three full-time faculty members within the School of Environmental Studies to supervise students at the PhD level which will satisfy student need and enhance faculty scholarship through expanded teaching and research funding opportunities;
- The modest number of students to be admitted may be increased if the applicant pool is strong, there is supervisory capacity and as funding is available;
- In keeping with the enhanced interdisciplinary approach to the teaching and study of environmental sustainability at Queen's, doctoral students will have access to a number of cross-appointed faculty from cognate departments;
- It was confirmed by the Budget office that the delivery of the program is not dependent upon receiving BIU funding from MTCU. Given Queen's current enrolment however, it is anticipated that this program, once approved, will fall within Queen's doctoral quota.

Motion

that Senate approve the establishment of a PhD in Environmental Studies in the Faculty of Arts and Science and the School of Graduate Studies, to commence September 2013 pending approval by the COU Quality Council.

Respectfully submitted,

Laeeque Daneshmend, PhD, DIC

Chair, Senate Committee on Academic Development

Committee Members:

L. Anstey, PhD'15, Education

M. Baird, Chemistry

L. Daneshmend, Deputy Provost (Chair)

J. Emrich, Faculty of Law

D. Garvie, Economics

A. Gill, BCom'15

I. Johnsrude, Psychology

L. Long, BComp (Honours)'13

 $K.\ Mc Auley,\ Chemical\ Engineering$

P. Oosthuizen, Academic Colleague



NEW GRADUATE PROGRAM PROPOSAL

Submission Form

This template is to be used when seeking approval for new Graduate programs of study leading to a degree. New program submissions must receive the approval of the Graduate Studies Executive Council (GSEC) prior to being externally reviewed. The submission, external review, and the internal response to the review will, as a package, be submitted by GSEC to the Senate Office for referral to the Senate Committee on Academic Development (SCAD) which will then make their recommendations to Senate. Academic Units are strongly advised to contact the Director of the Office of the Vice-Provost and Dean SGS or the appropriate Associate Dean in the SGS with any questions that arise during this proposal development. Refer also to the QUQAP website at: http://www.queensu.ca/provost/responsibilities/qualityassurance.html

Part A – General Summary

Name of Proposed Program:	PhD Environmental Studies
Unit(s):	School of Environmental Studies
Proposed Start Date:	September 2013

	Contact Information (1)		Contact Information (2)
Name:	Louise M Winn	Name:	Graham Whitelaw
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			Graduate Program Committee
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Executive Summary (1 page maximum suggested – Minimum font size 11 pp)

Briefly summarize the rationale for introducing this new program and how it fits with the academic goals of the Faculty/School and University. Briefly describe: the educational goals and learning outcomes; internal or external collaboration required to deliver this program; how the relevant stakeholders (e.g. faculty, staff, students) were consulted in preparing the proposal; and additional resources required to deliver this program.

Interdisciplinary studies involving the environment continue to be an increasingly important area of advanced study and is identified as a priority research area in the Queen's University Strategic Research Plan. The School of Environmental Studies (SES) intends to increase its participation in environmental studies research and teaching through the expansion of its graduate program to include doctoral studies. Our Masters in Environmental Studies (MES) has been highly successful in attracting qualified applicants and consistently producing graduates who contribute to the field through employment in government, the private sector and NGOs. Each year external applicants, as well as our strongest MES students, express interest in pursuing doctoral research in environmental studies at Queen's and they must be directed to other institutions. Furthermore, MES graduates wishing to pursue doctoral studies at Queen's are currently faced with a dilemma. Switching to a PhD program in a cognate department may require additional coursework outside of their main interests to pursue a more interdisciplinary approach in which they have been trained. There is a clear need for a PhD program to address increasing complex socio-ecological issues through interdisciplinary

research, the hallmark of the SES, and as stated above as a strategic research area highlighted in the Queen's University Strategic Research Plan. Worldwide and in Canada, there is a rapid movement/crystallization of environmental studies as a unique discipline and a requirement for PhD graduates trained in interdisciplinary approaches. We are in a position to make significant contributions to the academic growth in 'sustainability' through publishable results of advanced graduate work in a variety of media. In fact, our proposal addresses all four core pillars identified in the 2011 Queen's University Academic Plan. The pillars include: 1) an inquiry-based student learning experience; 2) disciplinarity and interdisciplinarity; 3) reaching beyond: globalism, diversity and inclusion; and 4) health, wellness and community.

Faculty members in the school include established researchers who wish to engage in interdisciplinary research with doctoral students. The ability of these faculty members to attract funding to support the expansion of their research activities will be enhanced with the addition of a PhD program. There are three faculty members in the SES who have active research programs but are not able to supervise PhD students. One is a full-time faculty member in Environmental Studies (currently there is no PhD program), another is joint with The School of Urban and Regional Planning (currently there is no PhD program) and the other is a joint appointee in Philosophy, and in Philosophy a Masters in Philosophy is a requirement for admission to the PhD program.

The educational goals of the program are: 1) to provide research opportunities for students to conduct in-depth research on complex socio-ecological issues and sustainable approaches to addressing environmental issues; 2) to train students to critically evaluate the broader implications of applying knowledge they generate to address socio-ecological issues related to the environment; 3) to engage students by facilitating advanced research opportunities that require intellectual curiosity and independence; and 4) to develop students' communication skills to enable them to communicate complex ideas and issues clearly and efficiently in a variety of forums. The learning outcomes include: depth and breadth of knowledge in the field of sustainability, original research results in the field of sustainability, the understanding and practice of the methodologies required for advancement of our understanding of sustainability and sustainable practices, the ability to communicate research findings, the demonstration of responsibility, integrity and intellectual independence and the ability to understand the limitations of the knowledge generated through their doctoral work.

The intention to create a PhD program has been a stated goal for the SES for several years and has been emphasized as such at several School retreats. This proposal was developed by the SES Graduate Program Committee, which includes two graduate student representatives. At each stage of development, the proposal was circulated for comment to all faculty members and discussed and revised to reflect their input. As such, this proposal reflects the interests and ambitions of all SES faculty members. New resource needs are anticipated to be minimal, as we do not anticipate a significant increase in total graduate student enrolment over what our current MES numbers are. There is existing office space for these PhD students and supervisors would be expected to provide laboratory or other research space. Our faculty members whose students require laboratory space already have that space in the School of Environmental Studies in the Biosciences Complex. Research expenses will be expected to be provided by supervisors and administrative support is available within the School.

Part B – Evaluation Criteria

Part B is to be completed by the Unit/Faculty.

In accordance with Queen's University Quality Assurance Processes (QUQAPs), the criteria should be regarded as the minimum criteria upon which the new program submission will be assessed. Further information can be found in the Senate Policy on Quality Assurance:

https://qshare.queensu.ca/Groups/VPA/Quality%20Assurance/QUQAPsFinalApr28-11.pdf?ticket=t 30hxGrsb.

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1. Introduction

1.1 Describe how the Program is consistent with the University's mission and values as well as the academic goals of the Faculty(ies) and Unit(s).

The MANDATE for the School as stated in the proposal to the Senate (1994) stated: The School of Environmental Studies will, through collaboration with appropriate academic units at Queen's: a) offer undergraduate programs in environmental sciences with strong emphasis on the basic disciplines; b) conduct research and graduate supervision on topics related to the environment; c) foster interdisciplinary research by promoting collaboration among faculty in the natural and social sciences and humanities departments and in other Faculties and Schools; and d) be a focus within the Faculty of Arts and Science for future expansion of teaching and research related to the environment, especially in science, social sciences and humanities.

The proposed PhD program in Environmental Studies would provide graduate training in environmental studies, emphasizing interdisciplinarity and focusing on the concept of sustainability and sustainable practices. The theme of sustainability emphasizes the long-term nature and impacts of environmental change, the connections between today's decisions and tomorrow's welfare, and the strong dependence of human well-being on environmental quality. The program responds to widespread perceptions and concerns about society's future in a world of finite resources, and there is a growing demand for this program as demonstrated through the increasing number of inquiries from students about PhD opportunities in our School.

Our vision is that Queen's University will develop an outstanding PhD program in environmental sustainability that is integrated and coordinated across Queen's faculties to meet the needs of students and society. This program will facilitate interdisciplinarity, and will meet the challenge of establishing ways that Queen's Faculty members can work across disciplinary and institutional boundaries to develop collaborative and integrated programs of teaching and research. This vision is consistent with and directly addresses four of six stated objectives (objectives 3-6) of the Queen's University Strategic Research Plan (2012-2017).

¹Objectives 3-6 of the Queen's University Strategic Research Plan (2012-2017): Objective 3: Promote and enhance opportunities for collaboration and interdisciplinary initiatives between faculty across the university and with other universities and institutions. Objective 4: Promote and enhance research partnerships that expand on our research strengths, increase support for the research, and enhance the delivery of research to stakeholders and partners locally, regionally, nationally and globally. Objective 5: Advance diversity and inclusivity through research that leads to increased understanding of cultures and communities within Canada and abroad, and research that enables connections to people and the quality of their lives. Objective 6: Encourage and support the translation and transfer of research outcomes, new knowledge and innovation for the betterment of society.

1.2 List the Objectives of the Program (or Programs) and specify the anticipated learning outcomes and career paths [Refer to Graduate Degree Learning Outcomes GDLE, page 34 of QUQAPs]

Learning Objectives of the Program:

- 1. To foster a research environment focused on complex socio-ecological issues and sustainable approaches to addressing environmental issues.
- 2. To train students to critically evaluate the broader implications of applying knowledge they generate to address socio-ecological issues related to the environment.
- 3. To engage students by facilitating advanced research opportunities that require intellectual curiosity and independence.
- 4. To develop students' communication skills to enable them to communicate complex ideas, issues and conclusions clearly and efficiently in a variety of forums academic, political, mass media.

Anticipated Learning Outcomes Include:

- 1. Students graduating from the PhD program will have depth and breadth of knowledge in environmental studies and the field of sustainability, which will support the student's future academic activities or professional practice with government, private or civil society sectors.
- 2. Through research and scholarship in sustainability, graduates will understand the requirements needed to conceptualize, design and produce original research or advanced scholarship, or artistic and other creative products that can satisfy peer review and publication in both academic and popular media. Graduates will be capable of critically examining and potentially extending a variety of methods through their research. Graduates may have chosen to explore and extend emerging integrative research approaches based on systems thinking such as resilience, sustainability assessment, and social innovation.
- 3. Through the application of knowledge, graduates will have built on their science/social backgrounds and will have incorporated methods from a variety of disciplines (politics, sociology, geography etc.) to ensure their results are meaningful to society and contribute to solutions to the environmental challenges we face.
- 4. Graduates will be capable of communicating their research findings in a variety of public forums.
- 5. Graduates will consistently demonstrate responsibility, integrity and intellectual independence as measured through their course work, their independent research and participation in the seminar series.
- 6. Graduates will be able to demonstrate the limits of their own knowledge generation through understanding the assumptions upon which their research is based and accepting that there are always different ways of understanding based on the perspectives we bring to research. A clear example of this issue involves research in Canada's north (an area of increasing interest among our faculty). Graduates will understand that their research, if based on western science, may be viewed by First Nation and aboriginal groups with skepticism, as these communities rely on a different knowledge system based on oral and traditional knowledge.

Anticipated Career Paths:

Students graduating from the PhD program may find employment in:

1. Academia (i.e. Post-Doctoral fellow, Professor, Research Associate, Scientist, Administrator).

- 2. Professional practice with government (i.e. Ministry of the Environment, Health Canada, Environment Canada, Agriculture Canada, Ministry of Natural Resources, other international governmental agencies).
- 3. Professional practice with non-governmental organizations (i.e. Dream Corps International, EcoSpark,
- 4. Professional practice in the private sector (i.e. Oil companies, consulting firms, tourism).
- 1.3 Explain how the objectives will be achieved (e.g. course work, teaching and research seminars, independent research, laboratory and technical training, internships, practica, major research papers, and thesis)

The objectives will be achieved by a combination of courses, independent research, seminars, readings, a comprehensive examination and a thesis.

Courses: The course requirements are: <u>ENSC 801</u> Methodological and Conceptual Basis for Environmental Studies, and <u>ENSC 802</u> Global Environmental Problems: Issues in Sustainability. Students who have already taken these courses during a SES MES program at Queen's will be exempt from these courses and will not have additional coursework requirements. In the event that similar courses have previously been taken by a student at another University, a thorough evaluation of the course outlines by the Graduate Admission Committee <u>may</u> also exempt a student from taking these courses. In addition, all students will be required to register for ENSC 897 Seminar in Environmental Studies.

Independent research: PhD candidates will come from a variety of disciplines including – biology, sociology, geography, geology, chemistry, engineering, planning, philosophy, environmental studies and others. Students will study a diverse range of topics all fitting under the broad umbrella of Sustainability. Topics of research will be similar to those of our Masters students in the MES program but will be of much greater depth, innovation and originality (e.g. environment and health, urban sustainability, tourism, northern development, environmental justice, aboriginal studies, agriculture). The research component will require students to demonstrate intellectual independence, as their topics will involve participation with diverse communities (for example communities in Nunavut, rural Canada as well as a variety of communities in countries outside of Canada). Students will be required to understand local and regional context to ensure their work is relevant and of use to decision-makers. In many cases, student research, both course based and their dissertation work will require ethics clearance providing first-hand experience with ethical behaviour and the use of appropriate guidelines and procedures for responsible research. As indicated earlier the PhD program will address several identified research priorities in the University's Strategic Research Plan, including environmental sustainability and Canada's North.

Students will be required to produce original research, advanced scholarship, or other creative products that can satisfy peer review and publication in both academic and popular media. Traditional journals such as *Environmental Monitoring and Assessment*, and *Arctic* are accepting environmental studies research and new journals have emerged to service the needs of environmental studies researchers such as *Local Environment*, and *Society and Environment*. Less traditional work will include art, websites, blogs, video and other social media which examine the social aspects sustainability.

Readings: Through frequent interactions with primary supervisors and supervisory committees, students will become familiar with existing literature, publications, and professional networks related to their selected area of interest. They will acquire an understanding of both the potential advantages and difficulties in applying different research methods and models from the humanities, the social, health and the natural sciences, to issues of sustainability. A key intellectual aim is to foster students' abilities to speak about sustainability using an interdisciplinary approach and also to foster a student's ability to speak to an interdisciplinary audience. To this end, the program also emphasizes the importance of transferable skills such as critical thinking and communication skills including written

and oral presentation, and the use of appropriate computer software and information technology.

Comprehensive examination: PhD students will be required to complete a comprehensive examination within 18 months of initial registration (see below for format). The purpose of the comprehensive exam is to confirm the eligibility of the candidate to continue their graduate studies in the area of suitainability by demonstrating depth and breadth of knowledge outside of their specific research area. Preparation for the comprehensive examination will encourage students to diversify and explore sustainability.

Seminars: The SES has a bi-monthly seminar series covering a diverse range of environmental issues, with speakers from the humanities, social sciences, health sciences, and natural sciences. PhD students will be required to attend these seminars and present in this series once during their program, ideally towards the end of their PhD in preparation for their PhD oral examination (see course work and ENSC 897). This presentation is in addition to the annual presentations made by students during the School's annual Research Day (see Section 5.2)

Doctoral thesis: Students will conduct doctoral research resulting in their dissertation. Topics of research will be similar to those of our Masters students in the MES program but will be of greater depth, innovation and originality (e.g. environment and health, urban sustainability, tourism, northern development, environmental justice, aboriginal studies, agriculture).

1.4 Identify and provide descriptions for any Fields (academic plan) associated with the new Program(s). [degree programs only]

We propose a doctoral program in the Field of Sustainability. Sustainability is emerging as an important area of research in response to numerous socio-ecological problems faced by humanity. Popularization of the term was first achieved by United Nations Brundtland Commission in the document "Our Common Future" that defined sustainable development in March 1987 as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Subsequent research and practice has focused on socio-ecological integrity, equity and justice, technological innovation to improve efficiency, issues ranging from local-through-global action and links to, and influence on decision-making. This attention to sustainability encourages collaboration and innovative interdisciplinary and transdisciplinary research methods working with society. For example, with First Nation communities in their pursuit of community-based land-use plans, biosphere reserves including the Frontenac Arch Biosphere Reserve on a range of sustainability research, National Parks, private-sector companies such as ecotourism companies.

The SES at Queen's University has already contributed to the understanding of sustainability through the application of science, both natural and social, to address real-world issues and problems in areas such as: 1) Ecosystem and Human Health (the application of a systems approach to understanding the impact of human activities on climate change, biodiversity, ecosystem functions and human health); and 2) Society and Culture (finding solutions to environmental problems and sustaining living resources involving the investigation of systems of cultural values and social justice); and 3) Environmental Chemistry and Toxicology (analysis of chemicals, their fates in the environment, and pathways for exposure and effects in plants, animals, and humans).

We are proposing to enhance the understanding of sustainability through the introduction of a PhD program with the **defined field of sustainability**.

1.5 Address the appropriateness of the proposed nomenclature (e.g., MA, MSc, MEng). [degree programs only].

"PhD" is the appropriate designation of a doctoral degree at Queen's University.

2. Program Regulations

2.1 Admission Standards - Provide the Program's admission standards, including degree, diploma or certificate and course requirements and any other specific standards with reference to the learning outcomes and expectations of the Program. Provide the rationale for standards that are in addition to those set by the School of Graduate Studies. If applicable, indicate policies/procedures to encourage applications from qualified under-represented groups (e.g. Aboriginal people, visible minorities or persons with disabilities).

The admission standard will be a Master's degree in any related field. We anticipate that PhD candidates will come from a variety of disciplines including – biology, sociology, geography, geology, chemistry, engineering, planning, philosophy, environmental studies and others, studying a diverse range of topics fitting into the field of sustainability. Applications will be reviewed by an admission committee headed by the Graduate Chair (faculty member). Recommendations for acceptance will be based on academic strength (as indicated by marks, letters of application outlining education and career goals, letters of reference), availability of an appropriate supervisor, availability of financing and space, and possibly an interview assessment if there are large numbers of applicants. These admissions standards are in accordance with the SGS standards. We will encourage applicants from underrepresented groups by using plain and concise language in all our program advertising including the SES web site. We also intend to develop a mechanism whereby exceptional students in our MES program can be promoted to the PhD without completing the Master's degree.

2.2 **Language Requirements** - If applicable, indicate any language requirements and provide rationale for standards that exceed the minimum set by the School of Graduate Studies. Information about SGS' English language requirements are available at: http://www.queensu.ca/sgs/forstudents/InternationalStudents/admissionreqs.html

No additional language requirements.

3. Program Structure and Requirements

Describe the Program under the following headings (where applicable)

3.1 General Program Requirements – Describe the program duration and rationale (max 24 months for Master's; 48 months for PhD), total number of courses, examinations (e.g. comprehensive, thesis defense, competency), progress reports, advisory committee)

The typical duration will be 48 months. The first twelve months will involve course work if required and development of a research proposal. In many cases, research may also begin during the first year. Preparation for, and completion of the comprehensive examination will occur within 18 months of initial registration. In-depth interdisciplinary research on a chosen topic of sustainability and thesis writing will continue after the completion of the comprehensive examination. Advisory committees, which will consist of the supervisor and at least two other members, will be formed within the first semester of the student's term and are chosen by the student in consultation with the supervisor. Members include all regular and cross-appointed faculty members of the School of Environmental Studies, provided they are recognized as eligible by SGS. Advisory committee meetings (see below) must occur at least once a year and be documented with a mandatory progress report. There will be a final thesis examination.

3.2 Course Requirements – In Table 1 below, list core (required) courses (including project or thesis), optional courses (e.g. select X from the following list) and elective courses (indicate level and disciplines). Specify by field (academic plan) if appropriate. Identify those courses that are also offered to undergraduate students and are listed in the undergraduate calendar. Explain the rationale for including them in the graduate Program and confirm that at least 2/3 of courses taken to fulfill degree requirements are offered exclusively at the graduate level.

Table 1. Course requirements (add additional rows as needed)

Course/Credit (number and name)	(C)ore, (O)ptional or (E)lective	Field (if applicable)	Undergraduate Enrolment (Y/N)	Proposed Instructor(s)	Academic Unit
ENSC 801: Methodological and Conceptual Basis for Environmental Studies	С	Sustainability	N	M. Smith, P. Hodson or other SES faculty	SES
ENSC 802: Global Environmental Problems: Issues in Sustainability	С	Sustainability	N	S. Brown, A. Goebel or other SES faculty	SES
ENSC 897: Seminar in Environmental Studies	С		N	SES faculty	SES

3.3 **Course Descriptions** - For each graduate course that is part of the proposed Program, provide a calendar description and append the course outline; also indicate if the course currently exists.

These courses already exist but will be enriched to meet the needs of PhD students and enhance the learning of the students in the MES Program.

ENSC-801* Methodological and Conceptual Basis for Environmental Studies The course examines methodological and conceptual issues arising from Environmental Studies position as an inter-, multi- and/or trans-disciplinary practice. It will focus on the inherent difficulties in overcoming disciplinary fragmentation in approaches to studying complex issues in environmental sustainability that require integrated understandings of the inter-relations between social and natural systems. The course will promote methodological literacy beyond student's own area of expertise, develop critical and reflexive thinking about how environmental studies might approach issues of sustainability, and encourage and facilitate communication across disciplinary paradigms. The course precedes and complements ENSC-802, familiarizing students with the historical origins, philosophical underpinnings and practical deployment of key approaches within the social and natural sciences and humanities. Three term-hours; Fall;P. Hodson, M. Smith. Field trip \$25 (2011-12). See appended course outline.

ENSC-802* Global Environmental Problems: Issues in Sustainability
This course focuses on real-world environmental problems analyzing their social, ethical, and biogeochemical origins, economic ramifications, and institutional frameworks for their mitigation and resolution in the context of environmental sustainability. This course would logically follow or run concurrently with ENSC-801*, and will deepen and continue the themes through consideration of the intellectual history of theories and concepts relevant to environmental studies, with a focus on the concepts of "sustainability" and "sustainable development". Three term-hours; Winter; S. Brown, A. Goebel.
See appended course outline.

ENSC-897* Seminar in Environmental Studies

This half-credit course requires students to attend a minimum of 30 seminars, chosen from among those offered by the School of Environmental Studies (at least 18) and other units in any faculty at Queen's. Within the School's annual seminar series, they must also present one seminar on their own project.

3.4 **Exam Requirements** – Describe the structure of comprehensive and Master's/Doctoral thesis examinations.

PhD students will be required to complete a comprehensive examination within 18 months of initial registration. The purpose of the comprehensive exam is to confirm the eligibility of the candidate to continue their graduate studies in the area of suitainability by demonstrating depth and breadth of knowledge outside of their specific research area. Preparation for the comprehensive examination will encourage students to diversify and explore sustainability.

The oral exam will consist of two parts (Also see Section 4.2). The first will be a series of questions based on a previously-distributed reading list on environmental sustainability, and the second part being questions based on the specific PhD proposal submitted by student. The intention is that the first part will be common to all students and the second part being unique to each student's specific area of research.

The structure of the Doctoral thesis examination will follow the process described by SGS.

3.5 **Program Timelines** – In a table or figure, summarize the expected progress through the Program by term, to degree completion.

Table 2. Expected program progression through to degree completion	Table 2. Expected	program progression	through to degree	e completion
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Year 1			Year 2			Year 3				Year 4		
Fall	W	SS	F	W	SS	F	W	SS	F	W	SS	
801 Literature review; Research proposal develop.	802 Literature review; Research proposal develop; Start of research	999 Literature review; Research proposal; Research; Progress Report; Research Day	Research proposal; Research; Prep for comps	Comps;	Progress Report; Research Day		Research	Progress Report; Research Day	-	Thesis draft; Seminar presentation	Thesis defense	

Part-Time Studies - If the Program is offered on a part-time basis describe how the delivery differs from that of the full-time Program and summarize the pathway to completion.

N/A

3.7 **Progress Report** - Describe the frequency and method of monitoring student progress and how it will be administered.

All students enrolled in the program will report to individual supervisory committees, comprised of at least three faculty members. Each student is required to meet with their supervisory committee at least once during their first semester to review their funding and to approve their course of study. Each student is required to meet with their committee again every year to review progress and the state of their research (typically towards the end of each Fall term). The student must prepare a written summary of progress (usually 2-4 pages) to be distributed to the committee members at least five working days prior to each meeting.

A committee report (available form the Graduate Assistant or online) must be filed with the Graduate Assistant after each committee meeting, summarizing the student's academic and research progress and plans for the future. Progress reports must be signed by all members of the committee and dated. On each report the student's progress to date must be indicated as "Satisfactory", "Conditional" or "Unsatisfactory". "Satisfactory" indicates that the student has received an acceptable grade on graduate courses and that the thesis research is progressing well and on schedule. "Conditional" indicates that due to unacceptable course grades or lack of

research progress the student is not performing at a level that would allow the planned program to be completed successfully within the expected period. In such cases, another committee meeting must be held within four months to further evaluate the student's progress and to assess any conditions imposed at the previous meeting. In some cases this follow-up meeting might have to be delayed for up to eight months if a course has to be taken. At this second meeting the student's progress must be indicated as either "Satisfactory" or "Unsatisfactory" only. If an "Unsatisfactory" rating is indicated, another committee meeting must be held within two months to further evaluate the students' progress and again only a "Satisfactory" or "Unsatisfactory" rating can be given. Students receiving a second consecutive "Unsatisfactory" rating will be asked to withdraw from the program. All "Conditional" and "Unsatisfactory" ratings from committee meetings will be brought to the attention of the Graduate Studies Committee which may recommend further courses of action to the student and/or supervisory committee. Examples of possible action include repeating a course, taking a substitute course and/or strigent monitoring of research progress (possibly through the establishment of weekly research updates).

A final meeting is required prior to the submission of their thesis, to ensure that sufficient progress has been made to approve submission of the thesis. At any time during the student's degree, the Graduate Chair may require additional meetings to discuss any issues that have arisen due to performance in courses or problems encountered with theses or reports.

3.8 **Other** - Comment on any special matters and innovative features (e.g., the Program will be fully accredited by Canadian Association of Schools of Nursing).

The feature that makes this program unique at Queen's is its interdisciplinary approach to the teaching and study of environmental sustainability. Interdisciplinarity is an increasingly common goal among traditional academic disciplines. It recognizes the need to combine knowledge from different disciplines to solve problems. The Committee on Facilitating Interdisciplinary Research, National Academy of Sciences, National Academy of Engineering, Institute of Medicine in 2004 defined interdisciplinary research as "a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or field of research practice." The second core "Pillar" of Queen's new academic plan features interdisciplinarity as a goal for the University in both teaching and research.

The School of Environmental Studies has been at the forefront of advancing interdisciplinary efforts at Queen's for the past 15 years, bringing together faculty in areas such as biology, geology, geography, chemistry, and urban and regional planning to create an undergraduate program that provides students with fundamental knowledge in these various disciplines while also providing them the opportunity to integrate this knowledge in fields such as toxicology and pollution abatement, natural resource management, environmental policy and planning.

Faculty research and training in our MES program strives to achieve an enhanced interdisciplinary approach. This enhanced approach recognizes the interconnected nature of environmental problems and the accompanying need to address multiple issues in their resolution. In this sense, the enhanced interdisciplinary approach draws on knowledge from both the natural sciences and social sciences. Topics of analysis are frequently applied in nature through increasingly participatory approaches involving stakeholders from beyond academia to inform and participate in the research process. The approach recognizes the role and need for traditional disciplines, but embraces the integration of knowledge in pursuit of sustainability. Examples of interdisciplinary approaches of current interest to a number of our faculty are based on principles of systems thinking, including sustainability assessment, resilience, and scenario planning.

A unique strength of the proposed PhD is its specific requirement for a thesis that integrates two

or more disciplines, contributing to the development of interdisciplinary techniques, tools, and/or perspectives. Interdisciplinarity is already a strong component of graduate training conducted by SES faculty members. For example, there are strong interactions between chemistry and biology students in Brown's and Hodson's lab as part of collaborative research on oil pollution. These students are enrolled in the home departments of Biology and Chemistry. A second research group headed by Gary vanLoon (Chemistry) is studying sustainable land management in hilly regions of North and South India, and involves environmental scientists, engineers and economists at Queen's and in India. Another example includes an International Development Research centre (IDCR) funded program focused on environment and development in Africa. This program included School faculty members associated with a variety of home departments: Allison Goebel (Principal Investigator), Gary vanLoon (Chemistry), Louise Winn (Biomedical and Molecular Sciences), and Heather Jamieson (Geological Sciences) plus collaborators from S. African Universities. The research program of Ryan Danby (Geography and Environmental Studies) focuses on the study of ecosystem change and involves multiple stakeholders from government, first nations and civil society. The research program of Graham Whitelaw (Environmental Studies and Urban and Regional Planning) deals with environmental planning, management, assessment and monitoring with a focus on translating scientific and traditional knowledge for use in equitable decision-making.

4. Assessment of Teaching and Learning

4.1 **Degree Level Expectations** (**DLE**)* – In Table 3 below, summarize how the Program's structure and requirements address each DLE listed as well as any additional program-specific DLEs (Refer to Graduate Degree Learning Outcomes GDLE, page 34 of QUQAPs for more information about graduate DLEs).

Table 3. Mappin	Table 3. Mapping curriculum and degree level expectations (DLEs) (add rows as needed)											
DLE	Learning Outcomes	Relevant Courses, Academic Requirement	Indicators of Achievement									
1. Depth and breadth of knowledge in the field of Sustainability	This degree is awarded to students who demonstrate a thorough understanding of knowledge of sustainability, which will support the student's future academic activities or professional practice with government, private or civil society sectors. This knowledge would include techiques, tools, perspectives, concepts, and/or theories from two or more disciplines and the ability to integrate this knowledge to advance the understanding of an environmental issue. Students will also demonstrate a critical awareness of the current issues in the area of sustainability.	ENSC 801 ENSC 802 ENSC 897 Successful performance in both parts of the comprehensive exam, courses and finally PhD oral defense. Successful feedback from seminar presentations and committee meetings.	Positive feedback from supervisor and advisory committee on progress. Demonstrated depth of knowledge in sustainability as evidenced by a defendable well written thesis and ability to field questions related to environmental sustainability.									

2. Research and scholarship in Sustainability	This degree is awarded to students who are able to: conceptualize, design, and implement research for the generation of new knowledge, applications, or understanding of sustainability. The unique aspect of this program is that the thesis research must encompass two or more disciplines (i.e. toxicology and sociology; geography and philosophy; geology, biology and chemistry; planning and epidemiology). Students graduating from this program will recognize and appreciate the value of combining research in different disciplines to address problems related to environmental sustainability.	ENSC 801 ENSC 802 ENSC 897 Successful performance in the research proposal part of the comprehensive exam. Successful feedback from seminar presentations and thesis advisory meetings. Thesis research	It is expected that students will have the ability to conceptualize, design, and implement research for the generation of new knowledge, applications, or understanding at the forefront of the sustainability, and to adjust their research design or methodology in the light of unforeseen problems. It is expected that the dissertation research in sustainability will lead to original research, or other advanced scholarship, which merit publication. Positive feedback from supervisor and advisory committee on progress. Successful performance in comprehensive exam, courses and finally PhD oral defense.
3. Application of knowledge and contribution to solutions to environmental challenges	This degree is awarded to students who make informed judgments on complex issues in the area of sustainability. This may include the application of knowledge, whereby graduates build on their science/social backgrounds and have incorporated methods from a variety of disciplines (politics, sociology, geography etc.) to ensure their results are meaningful to society and contribute to solutions to environmental challenges we face.	ENSC 801 ENSC 802 ENSC 897 Thesis research	Successful performance in courses and PhD oral defense. The ability to translate research findings for use by decision making in the form of white briefs and/or other types of publications.
4. Communication skills	This degree is awarded to students who demonstrate the ability to communicate their findings to experts in the area of sustainability via conference presentations and/or peer review publications. Traditional journals such as Environmental Monitoring and Assessment, and Arctic are accepting environmental studies research and new journals have emerged to service the needs of environmental studies researchers such as Local Environment, and Society and Environment. Less traditional work will include art, websites, blogs, video and other social media which examine the social aspects sustainability.	ENSC 801 ENSC 802 ENSC 897 Research Day presentations ENSC seminar presentation Thesis and oral defense	Positive feedback from supervisor and advisory committee on quality of presentations. Successful performance of oral PhD defense. The ability to communicate complex and/or ambiguous ideas, issues and conclusions clearly and effectively in public forums.
5. Autonomy and professional capacity	This degree is awarded to students who consistently demonstrate responsibility, integrity and intellectual independence.	ENSC 801 ENSC 802 ENSC 897 Thesis Research	Demonstration of ethical behavior consistent with academic integrity.

6. Appreciation	This degree is awarded to students who	ENSC 801	Reasoned response to questioning
of the limitations	demonstrate the understanding of the	ENSC 802	during presentations, comprehensive
of their research	limitations of their research methods,	ENSC 897	and PhD oral examinations that
in Sustainability	current literature and interpretation of	Comprehensive	demonstrate a knowledge and
•	results. This will occur through the	examination	understanding of research
	student's understanding of the assumptions	Research Day presentations	limitations and of the potential
	upon which their research is based and	ENSC seminar presentation	contributions of other
	accepting that there are always different	Thesis and oral defense	interpretations, methods, and
	ways of understanding based on the		disciplines.
	perspectives we bring to research. A clear		•
	example of this issue involves research in		
	Canada's north (an area of increasing		
	interest among our faculty). Graduates will		
	understand that their research, if based on		
	western science, may be viewed by First		
	Nation and aboriginal groups with		
	skepticism, as these communities rely on a		
	different knowledge system based on oral		
	and traditional knowledge.		

4.2 Describe how the proposed methods of assessing student achievement relate to the Program learning outcomes and degree level expectations.

The methods of assessing student achievement include:

- 1. Performance in Course Work: Course work in ENSC 801 and ENSC 802 will involve a mix of assessment methods including essay writing focused on methodological issues, theory and concepts of environmental sustainability. Seminar work in the courses will require small group work to address specific topics in the area of environmental sustainability, critically evaluate methods and techniques and identify strengths and weaknesses in the application and use of knowledge by society. Project work will require larger team-based work to address real-world environmental issues through research design and preparation of a professional report and presentation to experts and the public. This component of assessment will address all of the identified Program Learning Outcomes (see Section 1.2) and the DLE (Table 3), however it will only apply to non-MES graduates (since MES graduates will have already taken these courses). See ENSC 897 below.
- 2. Quality of Research Proposal and Performance in Comprehensive Examination: This component of assessment will address all of the identified Program Learning Outcomes (see Section 1.2) and the DLE (Table 3). This aspect will apply to all PhD students in the program.
- 3. Progress Report (Advisory Committee Meetings): See Section 3.7. This component of assessment will address all of the identified Program learning outcomes (see Section 1.2) and the DLE (Table 3) and will apply to all PhD students.
- 4. Seminars (ENSC 897): Students will also be required to give one School of Environmental Studies seminar presentations over their four years (For ENSC 897) and to participate in the Graduate School of Environmental Studies Research Day each of their four years in the program. Each student will be required to present on the following in each year Year 1 proposal; Year 2 methods; Year 3-literature review; Year 4 results and implications. This component of the assessment process will address all learning outcomes and DLE.
- 5. Dissertation and oral defense: The dissertation and oral defense requires students to explore and defend their research approach, process, results and conclusions and recommendations. This component

of the assessment process will also address all learning outcomes and DLE.

- 4.3 Outline the plans for documenting and demonstrating the level of performance of students (must be consistent with the OCAV's Graduate Degree Level Expectations). [Refer to Graduate Degree Learning Outcomes GDLE, page 34 of QUQAPs]
 - 1. Course Evaluation: Performance in course work (ENSC 801 and ENSC 802) will be documented by graded essays, graded methods assignment, graded seminars, graded project report, and graded project presentation (please see attached course outlines).
 - 2. Quality of Research Proposal and Performance in comprehensive examination: The conceptual and theoretical understanding of sustainability and research proposal will be evaluated by the Comprehensive Examining Committee.
 - 3. Progress: Each student will be expected to participate in at least one Committee meeting each year. These committee meetings will be designed to track the student's progress on achieving degree level expectations and to provide the student an opportunity to have input into their own learning objectives. Please see Section 3.7 for more details on Progress.
 - 4. Seminars (ENSC 897 and Research Day): Feedback from all SES faculty will be received by the student following each seminar presentation with copies forwarded to the supervisor.
 - 5. Documentation and demonstration of the level of performance during the final oral defense will follow the guidelines outlined by SGS and will include written evaluations from an external to the University examiner, and internal to the University (external to SES) examiner, along with examiners from SES including a Head's delegate.

5. Program Content

5.1 Explain how the curriculum addresses the current state of the discipline and fields of study.

ENSC 801 addresses methodological issues and approaches in environmental studies. ENSC 802 specifically addresses the field of sustainability. Both courses are team taught, with a social scientist and natural scientist working together to ensure an interdisciplinary approach. This team teaching ensures that multiple perspectives are brought to all discussions and elements of the course. Interdisciplinarity is emphasized in both courses, with extensive use of guest lecturers, many from the Queen's community engaged in interdisciplinary research. Research techniques including qualitative and quantitative techniques are explored through critical discussions in the class and hands on experience outside the classroom through assignments and the project course components e.g. semi-structured interview, observational research, scientific techniques. ENSC 802 deals specifically with global issues in sustainability where students are expected to explore the history and evolution of the concept. The degree to which sustainability has become institutionalized is examined through processes including environmental assessment, land-use planning, natural resource management and environmental management.

Given that not all PhD students will take ENSC 801 and ENSC 802, the <u>comprehensive exam</u> will be instrumental in addressing the current state of knowledge in sustainability. The comprehensive exam requires students to explore the issue of sustainability in the context of both their specific research and sustainability in a broader context through a series of assigned readings on environmental sustainability. The questions asked during the comprehensive examination will address whether each student has a thorough understanding of the complex issues surrounding sustainability and whether each student can communicate and apply their knowledge towards a specific issue around sustainability.

The independent research that each students conducts will also make a substantial contribution to

sustainability, either through methodological, theoretical or practical applications. Furthermore, all students are required to express their scientific results in a way that is accessible to the community and decision makers.

The ENSC seminar series will involve interdisciplinary speakers covering a range of environmental issues related to sustainability. Students will hear from a wide range of experts and be exposed to excellent communicators. Through feedback on their own presentations, students will learn to communicate their findings to a wide audience.

5.2 *Identify any unique curriculum or program innovations or creative components.*

A unique component of our program is the emphasis on solution-based community focussed research to ensure research topics are relevant and grounded. This approach ensures that research is broadly vetted and more easily integrated into decision making and encourages community engagement.

Another feature that makes this program unique at Queen's is its focus on interdisciplinary research related to social-ecological and economic systems, including human health. The specific requirements for a thesis that encompass two or more disciplines, is unlike existing programs at Queen's University and constitutes a unique strength of the proposed program. Interdisciplinarity is already a strong component of graduate training conducted by School faculty members. See Section 3.8 for more details.

The requirement to participate in the School's Graduate Research Day each year is a unique component to the program. This allows all members of the School and broader community to learn about, provide input into and celebrate the research being carried out by graduate students in the school.

5.3 **Academic Integrity -** Explain how the Program educates students on the importance and role of academic integrity.

Academic Integrity will be covered during an orientation session at the beginning of each academic year. Additionally, each student will be required to take the Queen's Academic Integrity Tutorial.

Students will be exposed to research ethics through project course work in ENSC 801 and 802. General Research Ethics Board (GREB) approval is required for the semi-structured interviewing assignment in 801 and may be required for students carrying out project work in ENSC 801 and ENSC 802. This provides the opportunity for instructors to teach a block on ethics in general and research ethics in particular. Additional exposure to Research Ethics will be given each year during the first year student orientation session.

6. Mode of Delivery

6.1 Explain how the proposed mode(s) of delivery meets the Program learning outcomes and the degree level expectations. Comment on the relationship between mode of delivery and accessibility requirements.

The mode of delivery of ENSC 801 and ENSC 802 is small classroom sized classes (10-15), designed for team-based learning with students engaged in discussions and contributing to presentations. Lecture material, where appropriate, will augment and be integrated with active discussions.

Students will engage in research projects, some in traditional laboratory or field-work settings and others more library based and will be under the supervision of faculty members who are experts in their fields. Traditionally, individual research groups will hold weekly group meetings and journal club activities.

ENSC 897, which incorporates the bi-monthly ENSC seminar series, will be held in a traditional seminar environment.

Research Day presentations will occur in a room with the capacity to hold 50-100 people.

6.2 **Distance Delivery** - Where students may take the same Program or elements of it in two different modes of delivery, indicate how consistency in Program requirements and standards will be assured. Describe how a learning community will be fostered, how regular interactions with faculty, students, etc., will be assured, and comment on access to materials, resources, and technology.

N/A

7. Anticipated Enrolment

7.1 Describe the recruitment strategy for the Program. Indicate how many new students the Program will attract to Queen's, and how many students must be accommodated by other departments/units. Indicate which departments/units will be affected and how.

Recruitment of new students will be through our current MES program, our website, conferences and word of mouth. The new program will attract 1-2 new PhD students per year. Given that we are not anticipating an overall increase in the number of graduate students to the School (MES plus PhD), and historically our MES students have come from diverse backgrounds, we do not anticipate that other units will be significantly affected.

7.2 In Table 4 below, summarize the projected intake and enrolments by year (by degree level and field as appropriate) until steady-state is reached.

Table 4. Intake and enrolment in Master's and Doctoral Programs*

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Masters							
Intake	8	8	8	8	8	8	8
Enrolment	19	16	16	16	16	16	16
Doctoral							
Intake	2	2	1	1	1	1	1
Enrolment	2	4	5	6	5	5	5
Total Enrolment	21	20	21	22	21	21	21

8. Resources

Provide evidence that the academic unit(s) has the necessary resources to implement and deliver the proposed new Program under the following headings (where applicable). Complete Budget Module (see part C)

Faculty - Comment on the adequacy of the faculty complement to teach and/or supervise in the Program and by
8.1 field as appropriate AND complete Table 5 below. Attach completed CV modules for all faculty listed.

(See attached CV modules)

Table 5. Faculty associated with the proposed Program

Faculty Member	Rank/Status Tenured, tenure track, continuing adjunct, term adjunct, special	Field	Home Unit	Total Undergrad Teaching	Total Grad Teaching (incl new Program)	Supervisory Privileges in New Program	Total Theses Supervised (M/D)	Current Theses Supervised (M/D)
	appointment, emeritus, etc.							
S. Brown 50% SES	Associate Prof Tenured	Sustainability	Environmental Studies and Chemistry	2 term length courses	1 term length course	Sole supervision	2M 4D	1M
B. Cumming 50% SES	Professor and Head Tenured	Sustainability	Environmental Studies and Biology	2 term length courses	1 term length course	Sole supervision	16M 9D	5M 2D
R. Danby 50% SES	Assistant Professor Tenure-track	Sustainability	Environmental Studies and Geography	2 term length courses	1 term length course	Sole supervision	0	4M
A. Goebel 100% SES	Assoc Prof Tenured	Sustainability	Environmental Studies	2 term length courses	1 term length course	Sole supervision	9M 2D	3M 1D
M. Hird 100% SES	Professor Tenured	Sustainability	Environmental Studies	2 term length courses	1 term length course	Sole supervision	11M 12D	2M 1D
P. Hodson 50% SES	Professor Tenured	Sustainability	Environmental Studies and Biology	2 term length courses	1 term length course	Sole supervision	30M 9D	6M
H. Jamieson 50% SES	Professor Tenured	Sustainability	Environmental Studies and Geological Sciences and Geological Engineering	2 term length courses	1 term length course	Sole supervision	23M 4D	6M 3D
S. Liss 100% SES	Professor Tenured	Sustainability	Environmental Studies			Sole supervision		
M. Smith 50% SES	Professor Tenured	Sustainability	Environmental Studies and Philosophy	3 term length courses	1 term length course	Sole supervision	8M	3M
G. Whitelaw 66% SES	Assistant Professor Tenure-track	Sustainability	Environmental Studies and Urban and Regional Planning	2 term length courses	2 term length courses	Sole supervision	10M	7M
L. Winn 50% SES	Professor Tenured	Sustainability	Environmental Studies and DBMS	2 term length courses	0.5 term length course	Sole supervision	10M 3D	2M 1D
SES CROSS- APPONITED FACULTY								
K. Aronson	Professor Tenured	Sustainability	Epidemiology	1 term length course	1 term length course	Sole supervision (Full SES member must be on Advisory Committee)	22M	4M 3D
P. Collins	Assistant Professor Tenure-track	Sustainability	Urban and Regional Planning	New Faculty	New Faculty	Sole supervision (Full SES member must be on Advisory Committee)	0	3M

V. Friesen	Professor	Sustainability	Biology	2 term length	2 term	Sole	8M	1M
	Tenured	Sustamaonity	Blology	courses	length courses	supervision (Full SES member must be on Advisory Committee)	5D	1D
K. Kyser	Professor Tenured	Sustainability	Geological Sciences and Geological Engineering	4 term length courses	3 term length courses	Sole supervision (Full SES member must be on Advisory Committee)	37M 39D	4M 8D
S. Lamoureux	Associate Professor Tenured	Sustainability	Geography	1 term length course	1 term length course	Sole supervision (Full SES member must be on Advisory Committee)	10M 5D	4M 4D
S. Lougheed	Associate Professor Tenured	Sustainability	Biology	2 term length courses	1 term length course	Sole supervision (Full SES member must be on Advisory Committee)	5M 6D	3M 3D
W. Mabee	Assistant Professor Tenure-track	Sustainability	Geography, Policy Studies	2 term length courses	2 term length courses	Sole supervision (Full SES member must be on Advisory Committee)	10M 1D	3M 4D
D. McDonald	Professor Tenured	Sustainability	Global Development Studies	1 term length course	1 term length course	Sole supervision (Full SES member must be on Advisory Committee)	8M 2D	2M 1D
K. Reimer	Professor Tenured	Sustainability	Chemical Engineering Royal Military College	1 term length course	1 term length course	Sole supervision (Full SES member must be on Advisory Committee)	33M 7D	5M 2D
A. Rutter		Sustainability	Environmental Studies				6M 3D	3M 1D
M. Taylor	Associate Professor Tenured	Sustainability	Global Development Studies	2 term length courses	2 term length courses	Sole supervision (Full SES member must be on Advisory Committee)	3M	3M 1D
G. vanLoon	Emeritus Professor	Sustainability	Chemistry	1 term length course	Guest Lectures	Joint- supervision (Full SES member must be on Advisory Committee)	35M 24D	2M 1D
L. Viswanathan	Assistant Professor Tenure-track	Sustainability	Urban and Regional Planning	N/A	5 term length courses	Sole supervision (Full SES member must be on Advisory Committee)	7M	2M
V. Walker	Professor Tenured	Sustainability	Biology	2 term length courses	1 term length course	Sole supervision (Full SES member must be on Advisory Committee)	9M 21D	2M 2.5D
J. Webster	Professor Tenured	Sustainability	School of Business	N/A	1 term length course	Sole supervision (Full SES member must be on Advisory Committee)	23M 4D	2D
P. Welbourn	Emeritus	Sustainability	Environment	Guest	Guest	Sole	25M	1M

Adjunct	Studies	Lectures	Lectures	supervision	7D	1D
Professor				(Full SES		
				member must		
				be on Advisory		
				Committee)		

8.2 **Staff -** Comment on the adequacy of the staff complement to support the Program (administrative, technical, IT, laboratory, etc.).

The School's Graduate/Financial Assistant, Karen Topping assists in all aspects of the School budget and accounts, and financial matters, and deals in all aspects involved in the coordination of our Graduate Program, amongst other activities. Since we are not anticipating an overall increase in our graduate student enrolment (combined MES and PhD students), we do not anticipate any significant increases to her workload.

8.3 **Space Requirements** - Describe the work space, laboratory space, office, classroom and equipment needed to support students' scholarship and research activities.

The School of Environmental Studies occupies a suite of offices and laboratory space in the Queen's Biosciences Complex. The laboratories are for research, which includes graduate training; students whose thesis requires hands-on research will be accommodated in research laboratories assigned to faculty members. Current facilities include:

- A chemistry lab (Brown; 20 m²) for analyses of solid and liquid samples as part of a program of research on hydrocarbons
- A biochemistry and histopathology lab (Hodson 60 m²) for biological and toxicological analyses as part of a program of research on hydrocarbons with Brown
- A geology lab (Jamieson, 40 m²) for analyses of rock, soil, and water samples as part of a research program on mine tailings
- An ecology lab (40 m²) for sample preparation and analyses of water, sediments and biota as part of a program of research on aquatic ecology and a clean lab (40 m²) for analysis of trace levels of contaminants
- An instrument lab (Brown, 6 m²) for highly sensitive instruments
- A 4°C cold room (6 m²) for sample storage and biochemical analyses requiring low temperatures
- Two equipment bays (total of 12 m²)
- Level-II lab for microbiological research (Liss Lab)
- A portable laboratory (8 m²)

Faculty members also have laboratories and offices in their other departments; laboratories and other facilities are also available through the cross-appointed members of the School.

Research in the School is also supported by access to the Queens University Biological Station, a research reserve of more than 5000 acres that includes mature and regenerating forests, aquatic ecosystems, and a complex of labs, seminar rooms, computer stations, boats, equipment, and residential services that support research and teaching. The School is also supported by the central facilities and services of the Department of Biology, such as liquid nitrogen, animal holding, large instruments (e.g. high speed centrifuges, molecular biology equipment), and a mechanical shop with a full-time technologist.

All full and joint faculty members have office space in the Biosciences Complex, which permits a high degree of interaction with graduate students. The space currently consists of 590 square meters in total (not including corridor space, etc). This includes two administrative offices, eight faculty offices, seven shared offices for graduate students and post-doctoral fellows, eight laboratories (described above) and a student/faculty lounge. Ancillary space (total of 124m²) includes a cold room, equipment bay, dedicated storage space in a new building at the Queen's University Biological Station, and access to space in the animal care facility.

The School has no specifically-assigned teaching space, but our needs for classes of 10-20 students will be met by Queen's system of central assignment of teaching space on a "per course, as needed" basis. Study space for students will be met within existing facilities through the assignment of 29-30 carrels.

8.4 **Information Technology -** Describe the information technology needed to support students' scholarship and research activities. Indicate the resource implications for hardware, software/internet, audio-visual, telecommunications, etc.

All faculty and graduate students are provided with a university computer account that gives them access to electronic mail, electronic library resources, internet, and a variety of free software packages. Other packages, including standard word processing, spreadsheets, graphics, and statistical packages, are available at discount through the university's computer store. All faculty members are expected to purchase their own computers from their research grants to support their research and research students. Students who wish to have portable or home computers must purchase their own. However, the School supplies five common user computers for those who do not have a personal computer and wish to have access to their e-mail accounts or to the web. These computers are installed in the student carrel rooms. The School also has a large format printer that enables students to prepare posters for assignments or conferences at a cost significantly below commercial rates.

8.5 **Library -** Provide information about library support holdings, availability of and access to library resources relevant to the proposed Program(s).

Please see attached Library appendix.

Indicate what **new** library resources will be needed(e.g. journals, print monographs, audio-visual material, historical documents, electronic databases, statistical/geospatial data)

We don't anticipate the need for any NEW library resources above and beyond the need in our current MES program.

Indicate the likelihood of the program having an impact on the Library staffing. <u>Provide date</u> that consultation with the Library staff took place.

In consultation with our library liaison (September, 2011), the main impact would be on the School's librarian in terms of new teaching and consultations for the new graduate students, which would be very similar to our current demand with our MES students.

8.6 **Research Funding -** Provide evidence of adequate research funding to sustain the research activities of faculty and graduate students AND complete Table 6 (below).

Details of research funding in the field of Sustainability from 2008-2011 (see below) demonstrate that Faculty are well funded, and receive funding from a diversity of sources including Granting Councils, Government and Industry. The total amount of funding that is held by faculty is in the range of 3 million/yr. Therefore, we do not believe that funding will be a limiting factor in our proposed PhD program.

Table 6. Research funding (operating) by source (do not include conference grants, SSHRC minor grants or equipment grants). <u>Include last 3 years only.</u> [add additional rows as needed]

Year	Field	Federal Granting Council	Other Peer Adjudicated	Contracts	Other
2010-11	Sustainability	Includes:	Includes:	Includes:	
		SSHRC	IDRC	Environment Canada	
		NSERC Strategic		PDS Inc	
		NSERC Discovery	Total:	OME	
		NSERC Frontiers	\$426,400	OMNR	
		CIHR		Great Lakes Fisheries	
				Indian and Northern	
		Total:		Affairs	
		\$2,140,425		Fisheries and Oceans	
				Canada	
				Health Canada	

Sustainability	Includes: SSHRC NSERC Strategic NSERC Discovery NSERC Frontiers CIHR Total: \$1,531,217	Includes: IDRC Total: \$351,400	International Energy Agency Total: \$617,538 Includes: Environment Canada PDS Inc OME OMNR Great Lakes Fisheries Indian and Northern Affairs Fisheries and Oceans Canada Health Canada
			International Energy Agency Total: \$1,056,495
Sustainability	Includes: SSHRC NSERC Strategic NSERC Discovery NSERC Frontiers CIHR Total: \$1,419108	Includes: IDRC Total: \$361,100	Includes: Environment Canada PDS Inc OME OMNR Great Lakes Fisheries Indian and Northern Affairs Fisheries and Oceans Canada Health Canada International Energy Agency Total:
		SSHRC NSERC Strategic NSERC Discovery NSERC Frontiers CIHR Total: \$1,531,217 Sustainability Includes: SSHRC NSERC Strategic NSERC Strategic NSERC Discovery NSERC Frontiers CIHR Total: Total:	SSHRC NSERC Strategic NSERC Frontiers CIHR Total: \$1,531,217 Sustainability Includes: SSHRC NSERC Strategic NSERC Strategic NSERC Strategic NSERC Discovery NSERC Frontiers CIHR Total: \$351,400 Includes: IDRC Includes: IDRC IDRC IDRC Total: \$351,400

8.7 **Student Funding -** Indicate if graduate students in the new Program will receive funding packages. If yes, state the minimum annual funding support (by degree level) and describe how the funding commitments will be met.

PhD Minimum Annual Funding - \$19,000 per year for 4 years

Queen's Graduate Award

Teaching Assistantship- 130 hours of teaching assistantship (TA) in undergraduate courses Supervisor support from research grants

In Table 7 below, summarize the approximate dollar amounts associated with each source of funding as well as Tricouncil scholarships for which students may apply.

PhD Minimum Annual Funding - \$19,000

Queen's Graduate Award - \$5000 per year

Teaching Assistantship - \$5096 = 130 hrs@ \$39.20 per hour (2012-13)= 2 TA in undergraduate courses Supervisor RA support - \$8904

PhD funding for students with Tri-Council – NSERC, SSHRC, CIHR depending on research topic \$27,000 Queen's Graduate Award - \$3452

Teaching Assistantship - \$2548 = 65 hrs@ \$39.20 per hour (2012-13)= 1 TA in undergraduate courses Supervisor RA support - \$0

Scholarship - \$21,000 per year Queen's Top Up in First Year - \$5000 bringing total to \$32,000

Table 7. Projected financial support for students at Program launch (according to 2012-13 Funding Policy)

Tri-	Other	Internal	TAs	RAs	Other	Total

	council	External Awards	Scholarships			(specify)	(Avg/student)
Master's	\$17,500 (NSERC, SSHRC)	\$15,000 (2 OGS)	\$10,000 (1 award)	\$5096 x16 + \$2458 x3	\$2000 x15 or \$0 x4	\$6258 (GETAx1)	\$338,488=[(24,998*1)+(21,998*2)+(19,546*1) +(22,504*1)+(14*16,246)] (Avg \$17,815/student
Doctoral	\$21,000 (NSERC, SSHRC) x (1 award)	\$15,000 (1 OGS)	\$10,000 (0 awards)	\$2458 x2	\$0	\$5,000 (ITA)	\$47,000 = [((25000*1)+(22000*1))/2] (Avg \$23,500/student)

8.8 Describe any additional resources required that are not currently available. Provide evidence of institutional commitment to supplement existing resources as needed (See Budget module).

N/A

9. Other Matters

9.1 Provide evidence of student demand for the Program and describe how this information was obtained.

There has been a steady increase in the number of inquiries that the School receives regarding the opportunity for doctoral training in the Environmental Studies at Queen's over the last decade, and a much more significant number in the past few years. SES faculty report 26 inquiries from potential PhD candidates that they would consider seriously. Since the MES program graduated its first class in 2007, we frequently hear comments by the students that they wished we had a PhD program. We have recently conducted a survey of our past MES students (~65) and have received feedback from 10 students. 7 responded that they would apply to our proposed PhD program, 2 responded that while they are not interested in pursuing a PhD, they felt that our program would be highly valued, and one student responded that they would not apply to our program. We strongly believe that the program will meet a growing student demand for doctoral training relevant to environmental careers in industry, government, and non-governmental organizations, and it will respond to a very strong market in Canada for professionals with environmentally related skills. In consulting with our colleagues at other Universities in Canada, most PhD programs in Environmental Studies get over 30 applications for less than 10 positions. In particular, we are aware that York and Waterloo have a very high application rate for PhD programs. We are very confident that there is a clear demand for our program.

9.2 Explain how the Program will fulfill societal need. Comment on similar programs offered elsewhere and why the proposed program will be attractive to applicants (include any unique or innovative elements/features).

The goal of the proposed PhD program is to provide graduate-level training in environmental sustainability and its relationship to the sustainability of human health and social, ecological, and economic systems. The theme of sustainability emphasises the long-term nature and impacts of environmental change, the connections between today's decisions and tomorrow's welfare, and the strong dependency of human well-being on environmental quality. The interdisciplinary nature of the proposed program reflects this interdependency and provides the capacity to appreciate the breadth of environmental issues, develop concrete solutions to environmental problems, and the ability to interact with other professionals outside a single discipline. We believe that the PhD program will fulfill societal need by promoting a sense of community by engaging with the public, private sector, and civil society as well as with government at every level on issues of environmental sustainability.

Programs in Canada mainly focus on two broad areas – environmental and resource management, and sustainability. Our program would fall within the sustainability focus. It would be unique in offering opportunities in environmental management as well as environment and human health, and environmental toxicology. Other programs include:

Name of University	Program and focus
University of British Columbia	Institute for Resources, Environment and
	Sustainability, PhD Resource Management and
	Environmental Studies
University of Northern British Columbia	Natural Resources and Environmental Studies
	PhD Program
University of Saskatchewan	School of Environment and Sustainability,
	PhD Environment and Sustainability
University of Manitoba	Natural Resources Institute
	PhD Natural Resources and Environmental
	Management
University of Toronto	School of the Environment, Collaborative
	Programs in Environmental Studies (26
	Departments), Ph.D. Program
University of Waterloo	Environment and Resource Studies, PhD
	Program
Wilfrid Laurier University	Geography and Environmental Studies, PhD
	Program
York University	Faculty of Environmental Studies, PhD
	Program
University of Western Ontario	Centre of Environment and Sustainability,
	Collaborative research Program, Environment
	and Sustainability, PhD
McGill University	School of Environment, PhD (Collaborative
	with 16 Departments)

9.3 For new Professional Programs, provide evidence that the Program is congruent with the regulatory requirements of the profession.

N/A

9.4 For research-focused graduate programs, provide a clear indication of the nature and appropriateness of the major research requirements for program completion.

The proposed PhD program will include extensive <u>original</u> research. The research to be undertaken by students in the proposed PhD program will focus on questions related to environmental problems and sustainable solutions, and will therefore be highly interdisciplinary. The PhD program will require students to critically examine and potentially extend a variety of methods in their research. Students will need to demonstrate their ability to access and understand relevant literature, and to communicate their research findings. It is expected that through their research students will appreciate the complexity of environmental problems and decision-making. The expectation is that this research will results in the submission of a thesis that is subject to a formal defense.

10. Equity, Diversity and Accessibility

10.1 Describe how the proposed new Program will address equity considerations, including (but not limited to) issues of particular concern for the groups identified in the University's various Equity programs (http://www.queensu.ca/equity/).

The Strategic Plan for Queen's University names diversity and equity amongst key values and principles that define the Queen's community. Diversity includes, but is not limited to, "a diverse range of experience, nationalities and ethnicities, sexual orientation and gender identity, income levels, ages and cultures".

Our School strives to promote a positive climate that respects diversity and equity, and a welcoming climate for all students and we will ensure equitable admissions practices. All of our core faculty have taken the Appointments and Renewal, Tenure and Promotion Equity Training Workshop, and five have taken Employment Equity Representative Workshop.

Additionally, in compliance with the Accessibility for Ontarians with Disabilities Act (AODA), Queen's University requires all faculty, staff and students to complete the University's online training in Accessible Customer Service at Queen's.

10.2 Provide information about the representation rates of members of designated groups within the faculty and identify gaps in representation as compared to the appropriate Canadian workforce population.

To our knowledge, there has not been an equity audit of the School. The Office of the University Advisor on Equity was unable to provide us with appropriate census data for the School's academic and non-academic staff. Never-the-less, as a small academic unit, data based on self-designation by individuals would likely be confidential. Therefore, the only data on diversity in the School that can be analysed refers to gender.

Four of the ten core (seconded or joint) faculty members of the School are female, a proportion slightly less than the Canadian workforce as a whole (46%), but greater than the percentage of university teachers that are female (34%).

Our MES program reflects a higher percentage of females in our program. Historical Male/Female ratios for MES have been:

2005-07 2/6; 2006-08 4/5; 2007-09 1/6; 2008-10 2/9; 2009-11 5/7; 2010-12 4/4; 2011-13 1/10. We anticipate a similar pattern with the proposed PhD program.

11. Quality and Other Indicators

11.1 Define indicators that will provide evidence of the quality of the faculty and how they will be used (e.g. qualifications, teaching effectiveness, supervisory/mentorship ability, research impact, innovation and scholarly record; appropriateness of collective faculty expertise to contribute substantively to the proposed program).

The **Indicators** we will use to establish "excellence" include the annual merit process for faculty members, plus:

General Area Indicator(s)

Research Funding, growth in funding, numbers and sources of funds; publication rates, peer-reviewed publications; awards

National/International activities Number of collaborators and their nationalities; number of

international contracts and grants

PhD/MES exit polls Student satisfaction and ability to find employment in their

field

Professors Awards; international/national reputation (invitations to

speak or attend technical workshops, roles in learned societies, roles as external examiner outside department or

university)

Links with other unitsNumber of joint or cross-appointed faculty

External review assessment Feedback obtained from the QUQAPs review process

11.2 Comment on the Program structure and faculty attributes (including research activity) that will ensure the intellectual quality of the student experience.

The 2011 QS World University Ranking placed Queen's University in amongst the top 150 Universities in the world and the fourth ranked University in Canada.

We have developed expertise in three distinct, yet overlapping areas of sustainability: Environmental Chemistry and Toxicology; Ecosystem and Human Health; and Society and Culture. All faculty members are actively engaged in research, and all have been successful in obtaining extensive research funds. The capabilities and contributions of the faculty members are also recognized nationally and internationally as demonstrated by publications in international peer-reviewed journals and books, invited presentations and involvement in scientific societies and expert panels and workshops. Research activities involve numerous collaborations among disciplines, within the university, nationally and internationally.

Our faculty member's research programs have been recognized nationally and internationally through Canada Research Chairs (Campbell), Queen's National Scholars (Goebel, Smith, Whitelaw), Early Researcher and Chancellor's Research Awards (Jamieson, Winn, Campbell), plus a PREA (Cumming, Winn), Rx&D HRF Research Career Award, F. Clarke Fraser New Investigator Award of the Teratology Society, Velyien E. Henderson Award (Society of Toxicology of Canada), and Mihran and Mary Basmajian Award for Excellence in Health Research (Winn). Our experience has been that excellence in research by faculty members of the School has created more opportunities for research, particularly as outreach projects to northern Canadian communities and to communities in developing nations.

The excellence of our Faculty will benefit students through their expertise, mentorship in courses and research projects and initiatives for securing financial support.

Supporting documentation

Embed relevant documents supporting the proposal (e.g. letters of support from Deans, Department Heads, collaborators, external agencies, etc.) by inserting the letters as Word Documents. If the letters are .pdf documents, it is essential that they are first converted to Word documents using Adobe Acrobat Software to avoid loss of resolution and formatting. If you do not have Adobe Acrobat, please consult your faculty office.



DEPARTMENT OF COMMUNITY HEALTH AND EPIDEMIOLOGY Carruthers Hall Queen's University Kingston, Ontario Canada 78509 Fax 613 533-6686 William.mackillop@krcc.on.ca

January 16, 2012

Dr. Louise Winn School of Environmental Studies Department of Biomedical and Molecular Sciences Queen's University Kingston, Ontario, K7L 3N6

Dear Louise,

On behalf of the Department of Community Health and Epidemiology, I am pleased to express my support for the proposed PhD Program in Environmental Studies.

I believe that the School of Environmental Studies has developed a strong proposal focused on sustainability that will build on the existing strong MES graduate program, while adding a valuable new element with the ability for students to conduct in-depth interdisciplinary research. This program will provide an excellent mechanism for interdisciplinary communication and education. Indeed, the existing MES already has provided a very effective stimulus for interdisciplinary collaboration and graduate student supervision.

The establishment of a PhD Program is the next logical step, and is sure to further enhance these interactions. We wish the School of Environmental Studies continued success as the approval process moves forward.

sil Wacla

Yours sincerely,

W.J. Mackillop Department Head Department of Geological Sciences and Geological Engineering Queen's University Kingston, ON K7L 3N6

MEMORANDUM

TO: Dr. L. Winn, Professor, School of Environmental Studies

FROM: Dr. Vicki Remenda, P.Eng., Acting Head, Geological Sciences and Geological Engineering

DATE: January 19, 2012

SUBJECT: Support for the proposed Ph.D. program in Environmental Studies

On behalf of the Department of Geological Sciences and Geological Engineering, I am pleased to offer my support for the proposed PhD Program in Environmental Studies.

The School of Environmental Studies has developed a strong proposal that will build on the existing strength of the MES graduate program, while adding a valuable new element with the ability for students to conduct interdisciplinary research. The establishment of a PhD Program is the next logical step, and is sure to further enhance these interactions.

We wish the School of Environmental Studies continued success as the approval process moves forward.

Part C – Administration & Government Reporting Information

Part C is to be completed by the Department/Faculty in consultation with the Office of the University Registrar and the School of Graduate Studies.

12. Information for and/or from the Office of the University Registrar and/or the School of Graduate Studies Registrar						
12.1. Academic Administration						
Academic Career	GRAD					
Department(s)						
School of Environmental Studies						
Proposed Start Date 09/2013 mm/yyyy	Program duration	4 years	-			
Expected enrolment						
Initial Year1 Steady State5-6						
Program Name: Degree	Degree Code					
(max 50 characters) (e.g. Master of Applied Science)	(max 5 characters) (e.g., MASC)					
PhD in Environmental Studies	PHD					
Academic Plan	Academic Sub-Plan					
(e.g. Chemical Engineering)	(e.g. Specialization in Col	laborative Biome	edical Engineering)			
Environmental Studies	N/A					
Collaborative Program Sub-Plan List all departments/plans that may admit students in responsibility for Sub-Plan (underline) N/A	List all departments/plans that may admit students into the Collaborative Sub-Plan. Indicated department with <u>primary</u> responsibility for Sub-Plan (underline)					
Pattern of Study (Master's programs only; choices: Pattern I, II, III)	N/A					
<i>12.2. Complete the following:</i> Will students be admitted part-time?		Yes	⊠ No			
	DIGG					
Will all or part of the program be offered at the	BISC campus?	Yes	⊠ No			
Will all or part of this program be offered via distance learning (e.g. ☐ Yes ☐ No online or blended learning?)						
13. Course Information						
New Courses with new subject code required? ☐ Yes ☐ No						
If yes, suggested Subject Code						

14. Tuition and Student Activity Fees			
Tuition Fee	\$2,086/term = \$6,258/year (Domestic-based on 2011-2012)		
Fee Assessment Protocol (Annual? Per term Or per course?)	Per Term		
Student Activity Fees GRAD - SGPS	SAL + SGPS=\$99.99 + \$945.83 = \$1,045.82		

15. Government Reporting	
Proposed FORPOS	271
Program Weight (BIUs)	2.0
Proposed CIP Code	03.0103

Part D – Budget Details

This section is to be completed by the Department(s)/Faculty(ies) in consultation with the Faculty Office (s) and the School of Graduate Studies.

16. S	16. Summarize the additional resources needed to implement the Program under the following headings				
(when	(where applicable)				
16.1	Faculty (e.g. number of 0.5-credit courses)	0			
16.2	Staff (include number or fraction of FTEs)	0			
16.3	Teaching Assistants (include number of TA hours)	0			

17. Other Non-Academ	Other Non-Academic University Services					
Indicate if any unique	Indicate if any unique or customized services will be required from the following Units. Provide details as needed.					
Financial Services	Financial Services No					
Human Resources	No					
Advancement	No					
Student Services	No					
Residences	No					
Administrative service	s No					
Other	N/A					

18.1 Complete the budget template (attached) in consultation with the School of Graduate Studies detailing one-time expenses (monies that will only be required once for start-up), base funds (year after year expenses), all other expenses and revenues from all sources for each year until steady state is reached. Include a brief narrative to accompany the budget template. See attached 18.2 If other sources are needed, list the sources and indicate if the funds have been applied for and if they have been secured. N/A

19. Net Impact of the Proposed Program Summarize any other resource or funding implications of the proposed Program. New resource needs are anticipated to be minimal, as we do not anticipate a significant increase in total graduate student enrolment over what our current MES numbers are.

Supporting documentation

Embed relevant documents supporting the proposal (e.g. letters of support from Deans, Department Heads, collaborators, external agencies, etc.) by inserting the letters as Word Documents. If the letters are .pdf documents, it is essential that they are first converted to Word documents using Adobe Acrobat Software to avoid loss of resolution and formatting. If you do not have Adobe Acrobat, please consult your faculty office.

Part E - Authorizations

Part E	is to be completed by the SGS following	ig GSEC approval.
Date Approved by GSEC	May 15, 2012	
Department Head(s)	Signature	29 June 2012 Date
	Signature	
Faculty Dean(s) or delegate(s)	Signature	July 11/12
University Librarian	Signature	10 July 2012
University Registrar	Signature	O9 July 2012
Chief Information Officer and Associate VP (Information Technology Services)	Signature	July 16 2012
Vice-Provost and Dean, School of Graduate Studies	Signature	July 13 2012 Date
Vice-Provost (Planning and Budgeting)	Signature	uly 13 2012 Date
Provost and Vice-Principal (Academic)	Juan Po Cole Signature	17 Dec 2012

ATTACHMENTS

- 1. Course Outlines
- Library Report
 Budget Template

1. Course Outlines

Methodological and Conceptual Basis for Environmental Studies

Friday 10:30-1:30 KINES104

Peter Hodson: Biosciences 3122 email peter.hodson@queensu.ca **Mick Smith:** Biosciences 3123 email michael.smith@queensu.ca

Introduction

The course will examine methodological and conceptual issues arising from Environmental Studies' position as an inter-, multi- and/or trans-disciplinary practice. It will focus on the inherent difficulties in overcoming disciplinary fragmentation in approaches to studying complex issues in environmental sustainability which require integrated understandings of the inter-relations between social and natural systems. The course will promote methodological literacy beyond students' own area of expertise, develop critical and reflexive thinking about how environmental studies might approach issues of sustainability, and encourage and facilitate communication across disciplinary paradigms. The course precedes and complements ENSC 802, familiarizing students with the historical origins, philosophical underpinnings and practical deployment of key approaches within the social and natural sciences and humanities.

Approach

This is primarily a seminar and project-based course using a variety of formats to raise key questions concerning the role and status of Environmental Studies. This year the course will investigate current debates about the production of so-called 'ethical oil' (Levant, 2011) from Canada's oil sands. Ethical oil is a term that has gained some currency amongst proponents of the oil sands looking to counter the arguments of those who object to, or want to limit, such extraction for a variety of environmental and social reasons, including habitat destruction, water pollution, and global climate change. Indeed, environmentalists and critics have tended to refer to oil produced from the tar sands as 'dirty oil' (Nikiforuk, 2008). Key questions thus arise as to what might make oil 'dirty' and/or 'ethical' and how to understand and investigate such claims about the ethical, social and natural ramifications of oil sand operations.

This topic will provide a unifying theme for the course and an investigative and discursive focus to begin to unravel the different dimensions and complexities of environmental issues. In addition to individual work students will work together as an inter-disciplinary team using first their own expertise from undergraduate work and then diversifying through engagement with different methodologies (scientific, social scientific, philosophical etc) as needs and interests dictate. The inter-disciplinary team will explore various research approaches that might be used to understand both the intricacies of this particular case and their wider resonances in terms of environmental sustainability, social and political repercussions, and energy policy. This work will culminate in a group report and presentation.

More specifically, the class will be playing the role of an expert panel convened to provide a briefing document to advise a select committee of Parliament convened to assess a government decision to officially promote the oil sands as an ethical alternative to other world oil supplies. The expert's role will be to recognize, evaluate, and prioritize the key areas of controversy and to critically summarise (and evaluate) the academic evidence available that speaks to these issues. (The panel has not been asked to make explicit comparisons to other forms of energy production except insofar as this might impact directly on the question of the ethics of the particular situation of the oil sands.) Each student will take responsibility for collating one or more aspects of the advice given and the class/panel as a whole will produce both a written briefing document summarizing their findings (see assessment below) and make individual and joint class presentations on this.

Students will be expected to broaden their understanding of the difficulties and advantages of employing and integrating different environmental perspectives. This understanding will be assisted by hands-on experience developed through practical elements built into the course design. For example, all students will be required to conduct a qualitative interview with an 'expert' (on Queen's faculty) in a disciplinary field quite different from their own. They will then transcribe, analyse and report on this to the group, relating from their perspective how that expert works within their discipline to address one or mare facets of the relevance to the practice of

environmental studies. They will also participate in and observe the everyday workings of a class or laboratory that is not related to their own disciplinary background.

N.B. This is a methodology course, not a course that will train students in specific methods or investigative techniques. Such a course is impractical partly because environmental studies students on this course come from a very wide variety of backgrounds and are involved in disciplinarily diverse projects each of which requires a very different set of skills. Where specific methods (like interviews and ethnography) are employed as part of this course, they are introduced only in a very rudimentary way and in the sense that they are illustrative of, and give insight into, certain broader methodological approaches.

To this end, seminars drawing on papers relating to 'ethical oil' from a wide variety of disciplinary perspectives are also key part of the course. They are not only intended to provide information about the social and environmental impacts of oil extraction and use but to illustrate different disciplinary expectations and approaches to the question of what counts as reliable knowledge. The key aim of the course is to promote methodological literacy, that is, an understanding of the ways in which different kinds of knowledge are produced, used and valued in environmental debates. Students will be encouraged to critically appraise different paradigms of knowledge production and evaluate their relative merits/demerits through class discussion and their class assignments.

Some of the issues that may arise during the course of the semester might include:

- The question of disciplinary fragmentation in studying the environment;
- Historical origins of the social and natural sciences and key methodological debates
- The epistemological status of the knowledge produced by the social and natural sciences especially debates around positivism and the question of *the* 'scientific method'
- Contributions and limitations of quantitative and qualitative methodologies
- The methodological status of the environment in the natural and social sciences and humanities [what is it that different disciplines try to study and why?]
- Operationalizing methodologies [how differing understandings seek information and ideas]
 - o measuring physical environmental parameters
 - o surveys biological and social
 - o qualitative approaches ethnomethodology, interviews
 - o textual analysis interpretative and quantitative (content analysis) approaches
 - o economic approaches such as cost benefit analysis
- Strategies in Environmental Studies and Sustainability
- Multi/Inter and Trans-disciplinary approaches and their outcomes
 - o Environmental Impact Assessments
 - o environmental assessments

Texts

Specific reading will be allocated for classes and for the 4 seminars. All participants will also be expected to read, over the course of the term

Levant, Ezra (2011) Ethical Oil: The Case for Canada's Oil Sands, McClelland and Stewart

Nikiforuk, Andrew (2008) Tar Sands: Dirty Oil and the Future of a Continent Vancouver: Greystone Press.

These texts are available online.

All readings for seminars (except those marked*) are available electronically through the University library and Web of Science. Those not available electronically will be provided.

You will also want to look at this Ethical Oil website

httkip://www.ethicaloil.org/

Schedule – all classes will be held from 10:30-1:30 on Friday mornings in KINES 104.

Week 1 - (Sept.16th) Introduction to the course

- Introductions
- Course outline and structure.
- Seminar allocation and format.
- Methods and Methodologies: What is the difference?
- Ethical Oil? What might this mean?

Week 2 (Sept. 23rd) The case for ethical oil

Week 3 (30th Sept) A Science of Extraction: Oil, Geology and Technology

Seminar 1 Understanding pollution

What do we mean by pollution? Is the notion of pollution scientific? If so how is pollution defined, measured, assessed? Is pollution a loaded term, i.e. to what extent is it regarded as bad (dirty) in an ethical/moral sense and why? What other definitions of pollution might there be?

Readings

Kelly, Erin N. Short, Jeffrey W., Schindler, David W., Hodson, Peter V., Ma, Mingsheng, Kwan, Alvin K and Fortin, Barbara L. (2009) Oil sands development contributes polycyclic aromatic compounds to the Athabasca River and its tributaries PNAS 106(52) pp.22346-22351 and see also supporting information at www.pnas.org/cg/content/full/0912050106/DCSupplemental.

Bickerstaff Karen and Walker Gordon (2003) The place(s) matter: matter out of place – public understandings of air pollution. *Progress in Human Geography* 27(1) pp. 45-67.

Serres, Michel (2011) 'Urine, Manure, Blood, Sperm: The Lived Foundations of Property Right' Chapter 1 of *Malfeasance: Appropriation Through Pollution?* Stanford: California: Stanford University Press. pp.1-35.

Week 4 (Oct. 7th) Philosophy and Sociology of Scientific Knowledge (SSK)

Background Reading

Implications of science wars for sociology and interdisciplinarity

Cooper, Geoff (1999) 'The Fear of Unreason: Science Wars and Sociology'

Sociological Research Online, vol. 4, no. 3,

http://www.socresonline.org.uk.proxy.queensu.ca/4/3/cooper.html

Seminar 2 Values in Research and Policy

Readings

Jasanoff, Shiela (2010) A New Climate for Society' Theory, Culture and Society 27(2-3) pp.233-253.

Latour, Bruno (1999) 'Circulating Reference: Sampling the Soil in the Amazon Forest' from Pandora's Hope: Essays on the Reality of Science Studies Cambridge MA: Harvard University Press.

Week 5 (Oct. 14th) – Social Scientific Approaches

Background reading: Moustakas, Clark (1994) *Phenomenological Research Methods* 'Methods and Procedures for Conducting Human Science Research' London: SAGE.

- Discussion Differences between quantitative and qualitative approaches and variations in approaches within social sciences. Can/should researchers be neutral or objective? Research practices and ethics.
- Assignment and planning for Laboratory study (participant observation) and semi-structured interview with an expert *not* from your field.
- Practice interviews

Week 6 (Oct. 21st) An Ethics of Oil: Human Rights versus Ecological Ethics?

Seminar 3 Ethics and Oil

Readings

van den Hove, Sybille, Menestral, Marc Le and de Bettignies, Henri-Claude (2002) 'The Oil Industry and Climate Change: Strategies and Ethical Dilemmas' *Climate Policy* 2 pp3-18.

Eweje, Gabriel (2006) 'Environmental Costs and Responsibilities Resulting From Oil Exploration in Developing Countries: The Case of the Niger Delta of Nigeria' Journal of Business Ethics 69 pp.27-56.

Urquhart, Ian (2010) 'Between the Sands and a Hard Place? Aboriginal Peoples and the Oil Sands' Working Paper No.10-005 Buffett Centre for International and Comparative Studies. (Available online via the center)

Week 7 (Oct. 28th) Ecosystem Approaches

- Group consultation in order to assign and begin to prepare an individual study plan for a particular issue related to the interdisciplinary proposal that can be integrated into a group report.
- Are there vital areas of research needed that are not covered by the speakers/seminars?

Week 8 (Nov. 4th) Economics, pollution and climate change

- Using cost-benefit analysis to identify solutions –
- Discussion Can Economics be used to identify the best solution? What are its advantages/limitations?

Seminar 4 Evaluating harm

Readings

Remillard, Chasetern (2011) Picturing environmental risk: The Canadian oil sands and the *National Geographic*. International Communication Gazete 73(1-2) pp127-43.

Sagoff, Mark (1981) 'At the Shrine of Our Lady of Fàtima or Why political Questions are not all Economic' *Arizona Law Review* Vol.23 pp.1283-1298. Reprinted in VanDerVeer, Donald & Pierce, Christine eds. (2005) *The Environmental Ethics and Policy Book* 3rd. ed. Wadsworth.*

Week 9 (Nov. 11th) Human Health Approaches

- Epidemiology and human health –
- Discussion What values are used here? Compare and contrast with natural sciences and Social Sciences and Humanities
- Reports back from interviews and participant observation. Class discussion.

Week 10 (Nov. 18th) Oil and Development: Ethics and Politics between North and South.

• Planning time for group report

Week 11 – (Nov. 25th) Individual Study Plans

- Presentation of individual study Plans all students
- Discussion fitting it all together
- Planning time for group report

Week 12 – (Dec. 2nd) Group Report Presentation

- Group report and presentation.
- Wrap up

ASSESSMENT

	Assignment	Mark	Date Due
1	Book Review Article	10%	7 th Oct.
	An 1000 word critical book review of:		
	Levant, Ezra (2011) <i>Ethical Oil: The Case for Canada's Oil Sands</i> . McClelland and Stewart and		
	Nikiforuk, Andrew (2008) <i>Tar Sands: Dirty Oil and the Future of a Continent</i> Vancouver: Greystone Press.		
	The review should be suitable for an environmental studies journal such as <i>Environments</i> .		
2	Seminar paper presentation, contribution, and notes. We are looking for a critical engagement with the article not just a description of its contents. At the end of your seminar, you should hand in your notes on the paper allocated to you to introduce. These notes do not have to be extensive but should cover your interpretation of the paper and the main issues that you intended to raise for discussion from the reading. There is no prescribed format providing that they are legible and well organized.	15%	Various
3	Interpretation of individual interview and participant observation laboratory study (The full transcription of the interview should also be appended.) Interpretation: 1500-2000 words; Participant Observation – journal – circa 1000 words (see detailed instructions below)	40%	Nov 11 th .
4	Class presentation of individual study plans for their aspect of risk evaluation – 5 minutes each.	10%	Nov 25 th .
5	Group report of 'panel of experts' delineating the scope and contents of the briefing and explaining the methodological presuppositions made by the panel. Class presentation of written group report and submission with individual reports included as chapters.	25%	Dec. 2 nd

Academic Integrity

Academic integrity is constituted by the five core fundamental values of honesty, trust, fairness, respect and responsibility (see www.academicintegrity.org). These values are central to the building, nurturing and sustaining of an academic community in which all members of the community will thrive. Adherence to the values expressed through academic integrity forms a foundation for the "freedom of inquiry and exchange of ideas" essential to the intellectual life of the University (see the Senate Report on Principles and Priorities http://www.queensu.ca/secretariat/senate/policies/princpri/).

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments conform to the principles of academic integrity. Information on academic integrity is available in the Arts and Science Calendar on the Arts and Science website (see http://www.queensu.ca/calendars/artsci/Regulation_1____Academic_Integrity.html), and from the instructor of this course.

Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulation on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

ENSC801 Guidance for Interview and Participant Observation

Interview:

The interview is intended to give you experience of a common qualitative social science technique (focused interview) and a greater understanding of its methodological assumptions, aims, advantages, and limits. In this way you should be better able to understand both the necessity of using qualitative methods in certain circumstances with human subjects and some of the difficulties in comparing the results and interpretations gained from their employment with more quantitative and/or structured approaches. It also raises important ethical considerations many of which we discussed in class. It will also give you insights into the methodological assumptions underlying a discipline unfamiliar to you and provoke thought about the possibilities and difficulties of inter-disciplinary environmental work.

There are 4 parts to the interview

1) Ethical approval: We will submit a covering letter/information sheet and a research ethics application form on your behalf to the General Research Ethics Board (GREB). This should give you all ethical approval to carry out a single interview within the limits set out in the letter (attached). You need to get your interviewee to read and sign the letter **BEFORE** interviewing them. We will let you all know by email as soon as permission is granted.

This does not cover any subsequent interviews or other methods you may need to do as part of your research project outside of 801 and you will need to apply separately for permission if you intend to carry these out. This process is intended to protect you, the subject and Queen's. You need to abide by the conditions spelt out in the letter e.g. concerning requests for anonymity, security of data etc.

- 2) Locating a suitable subject/topic: The subject of your interview is not restricted to this particular issue but clearly if you can find someone with expertise in an associated area, e.g. environmental politics, government policy, economics, energy production and planning, analysing water pollution, climate change, etc. and so on who is also from a rather different academic discipline to yourself this would help link directly to the course. We don't however want everyone hounding the same people so it's perfectly acceptable to interview anyone with a research interest in environmental issues broadly construed. In both cases we want you to try to uncover the person's understanding of how their own work and their discipline contributes to understandings of environmental concerns, the problems they face in conducting interdisciplinary work if they engage in it, (if not why not?) and so on. In other words, we want a personal and disciplinary take on environmental interdisciplinarity and its problems e.g. in communicating ideas that might help us understand some of its advantages/difficulties. A slightly different, but also acceptable take might be to investigate issues of relations between particular academic disciplines and the wider public e.g. what role do they, as researchers see themselves and their discipline having in terms of public debates, education, involvement in environmental issues etc.
- 3) Conducting the interview, taking into account all the issues we discussed in class about not directing questions too narrowly or putting words into people's mouths yet keeping them on topic etc. You must record the interview. Try to aim at 30 minutes max remember everyone is really busy.

4) Transcribing and interpreting the interview. Presuming that you end up with 30 minutes of recorded material we want you to transcribe it i.e. turn it into text. You might want to hire a transcription machine or find a computer program that provides a suitable alternative. Get the material down as accurately as possible and if you recall excited hand-waving or other emphases think how you might put that into the text. Not all of the material may be worth transcribing and 30 minutes may take a considerable time – so in order to make it a little easier for you we've decided that you should focus in on transcribing what you think were the most important 20 minutes. (This is not standard procedure as sometimes people say the most interesting things when you least expect it). You should end up with a text that you can code for themes – i.e. use a font colour or even a crayon to highlight areas that return to the same issues. There are computer programs that will do this for you to some extent but they still depend upon you and they have the additional disadvantage of tending to re-impose a particular form on the text that can miss possible interpretations.

Think about the words used and assumptions made by the interviewee – how might you begin to relate them to your own understanding of the issues discussed? The point here is to use skills we all have in reading both on and between the lines of what is said, looking for theoretical, conceptual, political and even subliminal expressions of particular understandings and so on. If you are interested there are lots of books on this issue of interpretation, some offering more rigid forms of interpretative methods, other advocating almost free association. You don't need to refer to these books. What we want to see is how you employ your imagination, background and critical abilities to think through what has been said to you. This is why we've asked you to put *your* interpretation and what conclusions *you* draw from it down on paper too (in no more than 1500-2000 words.). Hand this, plus the full transcript to us.

Participant/Observation

Again this exercise is intended to give you a taste of a very different qualitative (ethnographic) research method and its advantages/disadvantages. It also, however, has a more important aspect, that of getting you to recognize some of the tacit assumptions employed in the day to day activities of different disciplines. In this sense it has close links with the work of those in Science and Technology Studies like Bruno Latour and Sergio Sismondo who are interested in the 'culture' of the sciences, their epistemological assumptions (what kinds of knowledge they think they are producing and how) and so on. Every discipline has its own culture though the practices and presuppositions associate with these may be more or less explicit. We want you, via your experiences participating in and observing the everyday practices of a different discipline to think about just what those cultural presuppositions might entail.

You need to find some way of getting to participate/observe these practices without being intrusive or troublesome. We suggested that, for example, you might arrange with a professor to spend 2 hours in their laboratory. (We ask that you make sure with that professor that all safety protocols are followed and we have already raised this issue with professors associated with Environmental Studies and let them know that you may be contacting them). Listen to what is said, what is not said, how time is spent (wasted?), how much is taken for granted, how materials and people are arranged and so on. Basically you are doing a kind of cultural anthropology of the everyday for that particular discipline. Where you want to study humanities this is more difficult but attending open seminars, auditing lecture (with permission) etc may be one way of doing this.

We'd suggest you write it up a form of concise journal after the event – as no more than 1000 words.

ENSC 802

Global Environmental Problems: Issues in Sustainability Winter 2011 Thursdays 9:30 am to 12:30 pm, Kingston Hall Rm. 209 Instructors:

Stephen Brown browns@chem.queensu.ca Graham Whitelaw graham.whitelaw@queensu.ca

This course focuses on real-world environmental problems analyzing their social, ethical, and biogeochemical origins, economic ramifications, and institutional frameworks for their mitigation and resolution in the context of environmental sustainability. ENSC 802 will deepen and continue the theoretical work introduced in ENSC 801 through consideration of the intellectual history of theories and concepts relevant to environmental studies, with a focus on the concept of "sustainability".

Water issues and problems will be examined from the global to local scales, and will expose students to a variety of theories (e.g. adaptive environmental management, collaborative planning, sustainability), assessment processes (e.g. environmental assessment, land use planning), governance frameworks (e.g International Joint Commission, Ontario water governance) and research methods, both qualitative and quantitative. A number of lectures will be delivered by guests who have carried out research on these topics and who have real world experience.

Evaluation

- 1. **Student led seminars**: Students will work in small teams to prepare and lead one in-class seminar on an assigned seminar topic. You will have the opportunity to rank a number of seminar topics (see tentative schedule below for topics) and we will do our best to give you one of your top three choices. You are to explore the assigned topic from the basis of the theoretical and conceptual underpinnings of research in the area along with one or more of the methodological approaches applied by researchers working in the particular area of study. Among the issues you may consider in your seminar are: definition of environment, interdisciplinarity, social/environmental justice issues, links to decision-making. (20%)
- 2. **Individual essay**: (3500 words) Students will describe and explore the main theoretical/conceptual underpinnings of the area of their research. The essay should be based on at least fifteen scholarly works. Due date: March 17, 2011 (40%)
- 3. **Sustainability assessment of water governance in Ontario**: Working as one class team, you are to carry out a sustainability assessment of three components of the Ontario water governance regime. Each component should be at a different scale international, provincial and local. The project has three main tasks. 1. Describe the main components of the Ontario water governance system and select three components for review. 2. Select one or adapt a number of existing sustainability frameworks to guide your sustainability assessment of each of the three components. Provide justification for your selection/adaptation of the sustainability framework(s). 3. Carry out the sustainability assessment and discuss strengths and weaknesses. The class will present the results of the assessment on April 7, 2011. The presentation portion is worth 20%. The written portion of the assignment will be due April 14 2011 and is worth 20%.

We will provide further details on each assignment during class time.

Academic Integrity

Students are responsible for familiarizing themselves with, and adhering to, Queen's University's regulations concerning academic integrity, and for ensuring that their assignments conform to the principles of academic integrity. Information on academic integrity is available on the Faculty of Arts and Science website (http://www.queensu.ca/artsci/integrity/index.html), in the Arts and Science Calendar (see http://www.queensu.ca/calendars/artsci/pg4.html), and from the instructor of this course.

Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulation on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

Tentative Schedule

January 13 Introduction to course, review of course outline and assignments (G. Whitelaw and S. Brown)

Lecture Topic: Global Water Issues and Sustainability (S. Brown)

Reading: Alexander J. B. Zehnder, Hong Yang and Roland Schertenleib, 2003. Water issues: the need for action at different levels, Aquatic Science, 65: 1-20.

January 20 Lecture Topic: Sustainability frameworks, indicators and assessment (G. Whitelaw)

Readings: Gibson, R.B. 2006. Sustainability assessment: Basic components of a approach, Impact Assessment and Project Appraisal, Vol. 24, No. 3, 170-182.

Rydin, Y., N. Holman and E. Wolff, 2003. Local Sustainability Indicators, Local Environment Vol. 8(6): 581-589

Gahin R., V. Veleva, M. Hart, 2003. Do Indicators Help Create Sustainable Communities?, Local Environment Vol. 8(6): 661-666

January 27 Lecture Topic: Conceptual and practical aspects of watershed and municipal water planning and management in southern Ontario (G. Whitelaw)

Reading: Ferreyra, C. and P. Beard, 2007. Participatory evaluation of collaborative and integrated water management: Insights from the field, *Journal of Environmental Planning and Management*, Vol. 50, No. 2, 271-296.

Prudham, S. 2004. Poisoning the well: Neoliberalism and the contamination of municipal water in Walkerton, Ontario, *Geoforum* (Journal), Vol. 35, 343-359

Student led seminar: Watershed research, planning and management

February 3 Lecture Topic: Technical aspects of drinking water (S. Brown)

Readings: Readings will be posted on Moodle

Student led seminar: Water and technology

- **February 10** Group work on water governance assignment and discussion with instructors
- **February 17 Lecture Topic**: Water infrastructure planning and environmental assessment: case study of York Region (G. Whitelaw)

Readings: Kirchhoff, D., D. McCarthy, D. Crandall, L. McDowell, G. Whitelaw, (In press), Strategic Environmental Assessment and Regional Infrastructure Planning: the case of York Region, Ontario, Impact Assessment and Project Appraisal, 29(1)

Kirchhoff, D., D. McCarthy, D. Crandall, L. McDdowell, G. Whitelaw, 2010. A policy window opens: strategic environmental assessment in York Region, Ontario, Canada, Journal of Environmental Assessment Policy and Management, 12(3), 333–354.

Student led seminar: Strategic environmental assessment

March 3 Lecture Topic: Sustainable water at Queen's University

Student led seminar: Greening the campus movement

March 10 Lecture Topic: International environmental governance: the role of the International Joint

Commission in Great lakes planning and management (Chris McLaughlin)

Reading: Chris McLaughlin and Gail Krantzberg, 2010. An appraisal of the policy implementation deficit and management pathologies in the Laurentian Great Lakes, ArcelorMittal Dofasco Centre for Engineering and Public Policy, McMaster University

Student led seminar: Great Lakes research, planning and management

March 17 Lecture Topic: "Paleolimnology and climate change: Understanding past and potential future

changes to climate with a focus on water" (Dr. Brian Cumming)

Readings: Readings will be posted on Moodle.

Student led seminar: Climate change research, issues and implications

March 24 Lecture Topic: Watershed assessment and monitoring: Case study of the impact of the Tar

Sands on the Athabaska River (Dr. Peter Hodson)

Readings: Readings will be posted on Moodle

Student led seminar: Environmental monitoring

March 31 Seminar preparation

April 7 Student Seminar Day

- Alexander, E.R. (1992). Approaches to Planning: Introducing Current Planning Theories, Concepts, and Issues, Second Edition, Longhorne: Gordon and Breach Science Publishers,
- Booher, D., and Innes, J.E. (2002). Network Power in Collaborative Planning, *Planning Education and Research* 21, 221-236.
- Connich, S. and Innes, J. (2003). Outcomes of Collaborative Water Policy Making: Applying Complexity Thinking to Evaluation, *Environmental Planning and Management*, 46(2): 177-197.
- Frame, T.M., Gunton, T and Day, J.C. (2004). The Role of Collaboration in Environmental Management: An Evaluation of Land and Resource Planning in BC, *Environmental Planning and Management*, 47(1), 59-82.
- Giddens, A. (1984). The Constitution of Society, Berkeley, CA: University of California Press.
- Habermas J. (1981). The Theory of Communicative Action, Boston, 1984, 1987
- Healey, P. (2003). Collaborative Planning in Perspective, *Planning Theory*, 2(2), 101-123.
- Healey, P. (1998). Building Institutional Capacity Through Collaborative Approaches to Urban Planning, *Environment and Planning A*, 30, 1531-1546.
- Healey, P. (1997). Collaborative Planning: Shaping Places in Fragmented Societies, Vancouver: UBC Press.
- Hudson, B.M. (1979). Comparison of Current Planning Theories: Counterparts and Contradictions, *American Planning Association*, 25(4), 387-397.
- Innes J. E. and Booher, D.E. (1999). Consensus Building and Complex Adaptive Systems: A Framework for Evaluating Collaborative Planning, *American Planning Association*, 65(4), 412-424.
- Margerum, R. D. (2002). Collaborative Planning: Building Consensus and Building a Distinct Model for Practice, *Planning Education and Research*, 21, 237-253.
- McGuirk, P.M. (2001). Situating Communicative Planning Theory: Context, Power and Knowledge, *Environment and Planning A*, 33, 195-217.
- Peterman, W. (2004). Advocacy vs. Collaboration: Comparing Inclusionary Community Planning models, *Community Development Journal*, 39, 266-276.
- Tewdwr-Jones, M and Allmendinger, P., (1998). Deconstructing Communicative Rationality: A Critique of Habermasian Collaborative Planning, *Environment and Planning A*, 30(30), 1975-1989.
- Throgmorton J.A. (1999). Learning Through Conflict at Oxford, *Planning Education and Research*, 18, 269-270.
- Yiftachel, O., (1999). Planning at a Crossroads: the Third Oxford Conference, *Planning Education and Research*, 18, 267-269.
- Yiftachel, O., (1998). Planning and Social Control: Exploring the Dark Side, *Planning Literature*, 12(4), 395-406.

2. Library Report

LIBRARY RESOURCES TO SUPPORT THE

SCHOOL OF ENVIRONMENTAL STUDIES

September 2011

The Queen's University Library (QUL) consists of five main facilities. The Engineering and Science Library, located in the Douglas Library, provides resources and services for all engineering and science disciplines. The Douglas Library also houses the W.D. Jordan Special Collections and Music Library. The Stauffer Library primarily supports the needs of students in the humanities, business, and social sciences. It also contains the Maps, Data and Government Information Centre (MADGIC). There are three faculty libraries – the Education Library, the Bracken Health Sciences Library, and the Lederman Law Library.

COLLECTION SUPPORT

The Library collects a variety of types of materials including journals, books, conference proceedings, technical reports, government documents, preprints, indexes/abstracts, standards, and multimedia, to support study and research across the range of the School's teaching and research areas. The undergraduate environmental studies program is multidisciplinary in its scope; the graduate program focuses on "environmental sustainability and its relation to human health and social, ecological, and economic systems." The proposed PhD will cover the following fields: ecosystem and human health; society, culture, environmental planning and management, and economic sustainability; and environmental chemistry and toxicology. Faculty members teaching and researching in the program are drawn from diverse departments including Biology, Chemistry, Economics, Environmental Studies, Geography, Geological Sciences, Microbiology and Immunology, Pharmacology and Toxicology, Philosophy, Urban and Regional Planning, and Women's Studies.

The materials are available online, in print and some limited resources are available in microform (with the ability to convert microfilm to PDF). In response to student and faculty preference we are selecting electronic format for all materials (notably journals, books and standards) whenever possible. There is a growing demand for multimedia resources and the Library is turning its attention to building this collection.

In collection practice there is a growing emphasis on electronic resources, including books, journals, databases, and reference sources that provide currency of content, and point-of need 24/7 access from any computer with internet access. Remote access to most electronic resources is available through the Queen's Proxy, allowing students and faculty members to access a rich array of resources from anywhere on or off campus.

Monographs - Queen's University Library has extensive holdings of print monographs in the disciplines of interest to the School of Environmental Studies. The print monograph collection comprises reference materials as well as books, conference proceedings and technical reports (see the table below). We also purchase books in electronic format from a variety of publishers. Two major e-book sets, *ENVIRONetBASE*: *Environmental Resources Online* and *KNOVEL*, are of particular value for environmental studies. *ENVIROnetBASE* is a collection of online professional and technical books published by CRC Press on all aspects of environmental resources. Book subjects include Environmental Chemistry (84 titles), Environmental Toxicology (107 titles), Environmental Law, Management, and Compliance (64 titles), and Resource Management and Sustainability (68 titles). *KNOVEL* is a collection of hundreds of interactive books and databases in the fields of engineering, biology, chemistry, food sciences, safety and health, and related disciplines. There are 174 titles in the Environment and Environmental Engineering section.

LC class	Description	Print Titles bought 2009/10	Print Titles bought 2010/11
GB	Physical geography	23	11

GC	Oceanography	2	3
GE	Environmental sciences	60	27
GF	Human ecology, anthropogeography	34	21
HC79	Economic history - special topics (including conservation of natural resources, environmental policy and economic development, pollution, sustainable development)	53	11
HC94-1085	Economic history by region or country	159	48
HD87-88	Economic development – public policy	5	0
HD101-1395	Land use	32	8
HD1401-2210	Agricultural economics	10	12
HD9000-9495	Agricultural industries	14	0
HD9502- HD9502.5	Energy industries. Energy Policy. Fuel trade	7	0
HV6401-6405	Crimes against the environment	1	1
QA276-280	Mathematical statistics	15	30
QC851-999	Meteorology, climatology	48	32
QD	Chemistry	78	46
QE	Geology	45	36
QH	Natural History - Biology	108	102
QK	Botany	24	15
QL	Zoology	66	91
QP1-345	General physiology, including influence of the environment	0	1
QR	Microbiology	11	7
RA565-600	Environmental Health	0	2
RA1190-1270	Toxicology, poisons	0	1
S	Agriculture (General)	17	17
TD	Environmental technology - sanitary engineering	19	12

Reference Materials – Most, if not all, major bibliographic tools have been converted from print to electronic format, greatly enhancing access to their content. Key online indexes to the literature of environmental studies include *BIOSIS Previews* (from 1926-), *ECONLit* (1969+), *Geobase* (1980+), *PAIS International* (1915-),

SciFinder Scholar (1907+), Sociological Abstracts (1952+), and Science Citation Index (Web of Science; 1900+).

A complete list of databases, many more of which are relevant to this program, is available at http://library.queensu.ca/research/guide/environmental-studies/article-indexes-databases. To expedite access to the electronic content, the ability to link from database citations to the remote full-text to which QUL subscribes or to the Queen's Library Catalogue (QCAT) has been enabled.

Freely accessible academic search tools such as *Google Scholar* and *Scirus* are also featured on our web page as are freely available databases such as *Agricola*.

Online encyclopedias include the *International Encyclopedia of the Social and Behavioral Sciences, Oxford Reference Online – Earth and Environmental Sciences*, and the *Encyclopedia of Water Science*.

Online reference tools are complemented by a host of specialized print encyclopedias, dictionaries, and handbooks. Our print collections relative to environmental studies are particularly strong with such titles as Encyclopedia of Global Change: Environmental Change and Human Society, International Encyclopedia of Environmental Politics, Encyclopedia of World Environmental History, and Seas at the Millennium: An Environmental Evaluation.

Items not available

Compared to other Canadian university libraries, QUL lacks some indexing databases relevant to environmental sciences, notably GREENR, CAB Abstract, and Aquatic Sciences & Fisheries Abstracts.

Multimedia - The Library is building a multimedia collection and a separate budget allocation has been established for multimedia acquisitions.

Journals/Electronic Journals - QUL currently provides access to over 50,000 serial titles, including subscribed and open access titles, and is actively selecting full-text e-books and e-journals where they are available and appropriate. The entire suite of electronic journals from publishers such as the American Chemical Society, Institute of Physics, IEE, IEEE, Elsevier, Emerald, Wiley, Springer, Blackwell, Oxford, Cambridge University Press, Oxford University Press, Sage, and Taylor and Francis are available to researchers.

The Library subscribes to at least 88% of titles included in the *ISI Journal Citation Reports* in the categories Environmental Sciences, Environmental Studies, Biodiversity Conservation, Ecology, Geography, Public, Environmental, and Occupational Health, and Women's Studies. On average, at least 93% are available online and QUL subscribes to 95% of the titles with an Impact Factor greater than 1.00.

Maps, Data, and Government Information - The government documents collection located in the Stauffer Library's Maps, Data, and Government Information Centre (MADGIC) contains a substantial number of resources of relevance to the research and teaching of the School. Government technical reports, maps and GIS software are available in this Centre. There are over 1,000,000 print items in the government and international documents collection, in addition to the large sections of the collection available only in microform and electronic format. The Library is an official depository for publications of the Government of Canada, the Province of Ontario, the European Union, and the United Nations. Through a subscription to Microlog, we provide access on microfiche to a broad range of documents produced by Canadian Federal and Provincial governments and independent policy-analysis organizations.

Our map collection offers world-wide coverage with an emphasis on the local area and Canada. It includes over 100,000 maps, 1,900 books and atlases, 45,000 air photos, and 1,000s of GIS data files acquired from governmental and commercial sources such as Natural Resources Canada, Ontario Geospatial Data Exchange, ESRI and DMTI. Other important collections of spatial data on campus include the historical map collection in the W.D. Jordan Library, with over 2,000 pre-19th century maps of Canada and the local area, and a large collection of geological maps in the Douglas Library.

Primary responsibility for the selection of new resources rests in the collaboration of the subject liaison librarian, the departmental library representative, and the members of the Collection Development Unit who consult broadly with graduate students and faculty members and maintain awareness of departmental research and teaching priorities. The collection policy (appended) is reviewed on a regular basis to ensure that it reflects changes in areas of interest and emphasis. Approval plans which bring in shelf ready monographs according to subject and publisher defined profiles are in place with English and French language vendors. Interlibrary borrowing requests are monitored to identify material of interest that should be added to the collection. Subject liaison librarians maintain awareness of new electronic resources. Students and faculty members may make recommendations for purchase online, through their liaison librarian, library representative, or the Collection Development Unit.

Because of consortium purchasing of databases and large interdisciplinary electronic journal packages, the cost of serial subscriptions and database subscriptions has been moved from departmental allocations to general funds. Interdisciplinary databases are funded centrally.

Engineering and Science Library Acquisitions Budget, 2011/2012

	2011/2012 Budget
Books	\$98,000
Serials	\$125,000
Multimedia	\$2,500
Electronic	\$2,495,000
Total	\$2,730,000

The Library also reviews free web accessible materials as part of our collections activities. Government documents, technical reports, and open access journals are added to our library catalogue and web guides as appropriate. Research agencies and government departments are linked to pertinent course guides.

Queen's University has always had a strong commitment to the excellence of library collections. The acquisitions budget represents over half of the total library budget. QUL's participation in various consortia has leveraged its purchasing power and dramatically increased the number of electronic books and journals available. Consortia include the Canadian Research Knowledge Network (CRKN), the Ontario Consortium of University Libraries (OCUL), and the Consortium of Ontario Academic Health Libraries (COAHL). It remains crucial that the acquisitions budget continue to expand to meet the ever-growing cost of providing the information resources demanded by students and faculty.

LIBRARY FACILITIES AND SERVICES

All campus libraries have been renovated to accommodate the new electronic environment, providing wireless access throughout, laptops for loan, and a large number of hard-wired personal computers, loaded with productivity and other software (e.g. ArcGIS Desktop). All locations provide a mix of table, carrel, and soft seating. Classrooms in all locations are equipped with an instructor's workstation linked to an overhead projector for classes that include demonstrations and laptops that can be used for hands-on instruction. Students may reserve group study rooms using a self-serve online booking system. Other amenities include printers, copiers, and scanners.

The Library has responded to tight staffing budgets during a time of increased demand by identifying areas where we can provide efficient self-service. Our electronic library-management system allows borrowers to view their own records, renew books, place holds on or recall items currently signed out to another borrower, ask for a book to be rush catalogued, recommend acquisition of specific titles, offer suggestions regarding library services, ask a research question and initiate an interlibrary-loan request and track its progress. Graduate students and faculty have term loans for circulating library materials.

The Engineering and Science Library, staffed by 5 librarians and 4.92 FTE library technicians, is open 95 hours per week for the majority of the year. Opening hours are extended during the fall and winter examination periods and are slightly reduced in the spring and summer.

The library provides 823 study spaces in a combination of tables, carrels and leisure seating. All except leisure spaces are wired to provide access to the Queen's network. Wireless access is also available throughout the building.

The ground floor entry level houses the Circulation Desk and the engineering/science reserve collection, four public workstations, two DVD viewing stations, photocopying facilities, colour and black & white laser printers and a reserve reading area. An electronic classroom, equipped with 26 networked workstations, provides a facility for instruction in the use of electronic information resources. A large electronic bulletin board recently installed near the entrance is used to display announcements concerning new materials, library workshops, departmental seminars and campus events, as well as items from the Queen's news feed.

The first floor accommodates an information/reference/document delivery service point. Twenty public workstations and three SunRay workstations provide access to bibliographic, full-text and multimedia information sources in all disciplines. A public scanner and black & white laser printer are also available.

In 2005-2006 the Library expanded its services by offering librarian office hours in Chernoff Hall (Chemistry), and in 2006-2007, the Biosciences Complex (Biology/Environmental Studies). Librarians equipped with laptops provide assistance, instruction and research services at these locations for several hours each week during the school year.

One seminar/meeting room and four group study rooms are provided on the first floor together with a spacious current periodicals reading room with ample table and lounge seating and associated scanning facilities. Tables and group studies are wired for power and data.

Third floor reading rooms have been refurbished to provide additional study space for engineering and science students. Six public workstations in the north reading room and three SunRay workstations in the south reading room provide access to e-mail and online resources.

Bound journals and monographs are housed on the three below-grade stack levels. There are three workstations on each of the three stack levels in addition to table, carrel and leisure seating.

Students and faculty have 24x7 access to the library's home page, which provides a gateway to information and services including our on-line catalogue; circulation services; electronic journals, databases and reference tools; electronic reserves; general campus information; and the Internet. Subject liaison librarians have prepared subject research guides, which direct users to key reference resources, electronic journal databases and Internet sites related to their field. A general "How To" section provides information on basic issues. A "Library News" section provides information on latest developments. Students and faculty subscribing to RSS readers can add a Library news feed to keep up with our newest resources, workshops and services.

INSTRUCTION AND ASSISTANCE

Professional librarians are available in all campus libraries to help students on weekdays. Students may also book individual consultations with a librarian. Reference services and research assistance are available via email, instant messaging, telephone, voicemail, and 1-800 numbers allowing students to consult with a librarian whether they are on campus or at a remote location. Subject liaison librarians throughout the library system create and update user guides which identify major discipline-specific resources.

The liaison librarian for Environmental Studies is available for consultation by phone, email or in-person (either by appointment or drop-in) at her office in the Engineering and Science Library. The librarian provides in-depth research assistance, and teaches students how to use specific resources (e.g. RefWorks), as well as answering more basic questions. Students may also consult other liaison librarians.

The liaison librarian for Environmental Studies has worked with undergraduate courses, such as ENSC 201 and BIOL 111, to provide instruction about information resources particular to those courses. This librarian also works with MES students, providing an introductory presentation during the fall orientation for new graduate students, and meeting with individual students for research consultations

Students, staff and faculty can also obtain reference assistance from the librarians and reference assistants who staff the Engineering and Science Library's reference and information desk. The desk is open weekdays in the Fall/Winter terms. During the summer months reference is available by appointment (as of 2011). Since March 2006, the Engineering and Science Library has also provided an instant messaging reference service. Patrons also have the option of emailing the reference desk or a specific subject librarian. All contact information is posted on the Engineering and Science Library's website http://library.queensu.ca/webeng/.

In the Stauffer Library, there is a GIS Librarian and a Data/Government Information specialist. Both of these individuals are available for consultation with graduate students.

RESOURCE SHARING

While the Library provides a substantial collection it is inevitable that researchers and students will need books, journal articles, and other material not available locally. Canadian academic libraries work together to make the sharing of resources as efficient as possible. Through DocLine and RACER, automatic routing systems, the libraries have access to other collections throughout Canada and the United States. Ontario libraries have jointly implemented RACER, an interlibrary-loan system which gives users more independence and produces faster results. Queen's has added to this an extra tool for library staff that allows us to determine more efficiently sources for material that must be obtained from other provinces or countries. QUL also has an agreement with the Canada Institute for Scientific and Technical Information (CISTI), which also provides an extremely fast turnaround time for journal article requests. Journal articles are sent from one Canadian institution to another through an electronic imaging system. Though the Library subsidizes the cost of interlibrary loan, we charge a flat fee of \$3.00 for copies of journal articles. We do not normally pass on fees related to borrowing books from other institutions.

Graduate students can use their Queen's student card, or in some cases a special identification card obtained from our Circulation Department, to borrow books directly from other Canadian academic libraries. We are fortunate to be located within easy commuting distance of the very large collections at the University of Toronto, McGill University, and the University of Ottawa.

Queen's is a member of the Center for Research Libraries (http://www.crl.org) which provides access to important research collections in area studies, international dissertations, and government documents. CRL is particularly committed to making available newspapers and journals that are rarely held in North American libraries and that are published in Asia, Africa and the Middle East. CRL provides long term interlibrary loans which makes it possible for graduate students to work with the materials over a long period.

The Library will continue its efforts to provide timely access to information and library resources outside its own collections. There will be a continued monitoring of the balance between on-site and external resources.

FUTURE COMMITMENT

In order to understand the needs and expectations of the new generation of scholars we are participating in a *LIBQual* survey in 2010. This tool was designed by the Association of Research Libraries (ARL) to measure library performance against the expectations of library users as well as against the results of the same survey conducted in other ARL libraries. The responses from Applied Science are currently being analyzed and steps will be taken to address the service and collection issues that arise from the results.

The Library is also participating in the effort to build a local repository (Qspace) through which Queen's scholars can voluntarily archive and share the results of their research while reducing dependence on high-priced commercial publishing. This repository also facilitates the electronic submission of graduate theses and dissertations that began in 2007.

The library will monitor closely Queen's participation in the Ontario government's plan to increase the number of graduate students in Ontario universities in the coming years. It is anticipated that the effect on graduate programs at Queen's will vary by department and it will be essential for library liaisons and departmental representatives to communicate on this issue. This trend, combined with the increasingly interdisciplinary nature of research will require a new approach to building collections and assessing the adequacy of library support for programs. In the past, we have consulted on a department-by-department and title-by-title basis when deciding what should be in our collections. The pressure of externally imposed deadlines combined with the interdisciplinary nature of collections on offer makes this increasingly difficult. We intend to consult with and inform departmental library representatives and graduate students as much as possible, and have established Library Advisory Committees for the general areas of humanities, social science, and engineering/science with the intent of involving interdisciplinary groups in the discussion of library services and collections.

We believe that Queen's University Libraries provide substantial support to students and faculty working in the School of Environmental Studies. We are confident, based on long experience, of strong support from the University for the provision of library collections and services. Within this framework, we are committed to providing the best possible service, in consultation with faculty and students, to support the continuing programs in Environmental Studies.

Prepared by Morag Coyne, Environmental Studies Liaison Librarian, and E. Jane Philipps, Coordinator of Collection Development

Library Collection Policy for Environmental Studies

General Purpose: To serve undergraduate and graduate teaching and research programs in the School of Environmental Studies to the doctoral level.

Languages: English is preferred but important materials in other languages are collected.

Geographical Areas: No restriction. Material is selected for its importance. Special areas of interest include Africa (particularly eastern and southern Africa), China, India, and South America.

Type of Material Collected:

- Books: monographs; bibliographies; conference proceedings; etc.
- Serial Publications: series; periodicals
- Technical reports
- Government documents
- Indexing and abstracting services
- Multimedia: DVD's, videos

Note: any of the above may be in print, microform, or electronic format.

Fields of research:

- Sustainability
- Environmental Planning, Policy and Management
- Environmental Thought and Philosophy
- Systems Human, Ecological and Economic

Subjects and Collecting Levels:

Areas to be collected at level B:

Sustainability:

- Energy resources
- Sustainability indicators

Environmental Planning, Policy and Management::

- Environmental history
- Environmental policy
- Resource and land management (agriculture, energy, mining, forests, water, parks, waste, wildlife)

Environmental Thought and Philosophy

- Environmental ethics
- Environmental philosophy
- Environmentalism
- Gender and environment

<u>Systems – Human, Ecological and Economic:</u>

- Human and ecosystem health
- Environmental contaminants
- Environmental toxicology
- Ecological economics
- Pollution
- Climate change
- Global warming
- Restoration ecology

Areas to be collected at level C:

Sustainability:

- Environmental sociology
- Sustainable industry
- Sustainable agriculture

Environmental Planning, Policy and Management:

- International development
- Biodiversity conservation
- Environmental impact assessment
- Environmental design and planning
- Environmental analysis methods

Environmental Thought and Philosophy

- Environmental politics
- Environmental psychology

<u>Systems – Human, Ecological and Economic:</u>

- Water
- Environmental systems monitoring (energy, pollution, waste, water)
- Urban ecology
- Energy

Areas to be collected at level D:

Sustainability:

• Environmental education

Environmental Studies is a highly interdisciplinary field. Materials collected by the Departments of Biology, Chemistry, Economics, Geography, Geological Sciences, Microbiology and Immunology, Pharmacology and Toxicology, Philosophy, and Women's Studies; the School of Urban and Regional Planning; and the School of Law are also of interest.

Levels of Collecting

The level of collecting represents the areas of concentration in which programmes are offered, related directly to the level of teaching and research -- through some courses only, undergraduate degree, master's programme, to doctoral programme and post-doctoral research. Individual faculty members may be involved in research in areas not specified in any programme, and/or at a level beyond that necessary for the programme given. Where they require library materials in areas not reflected in the collection policy statements of the department, or to a depth different from that stated in the policy, these special needs may have to be met through a combination of limited acquisitions, interlibrary loan, document delivery, and visits to other institutions.

Level A:

Exhaustive assembling of unique collections, including all printed editions plus archival and MS materials. Normally such collections would cover a very small subject area, e.g. political parties in Kingston in the 1840's.

OR

Intensive collecting in specialized scholarly fields in order to support post-doctoral research with a high degree of adequacy. This would not normally include all printed editions, manuscript materials, or fields in which serial publications form the primary interest. It would include reprints and microform reproductions. It would normally be focussed on historical material within carefully defined time periods and geographical areas e.g.: significant publications of political dissent produced in Great Britain between 1688 and 1832. We would avoid collecting at this level where strong collections already exist at other institutions.

Level B:

Support for doctoral programmes and most post-doctoral research. Includes important primary and secondary sources in relevant subject areas, definitive editions, significant first editions, scholarly monographs, conference proceedings, and major publications of research societies. All key reference sources should be provided as well as a core selection of the most relevant and most frequently cited serial titles. Emphasis is on materials in English or other western languages especially relevant to the subject being taught (e.g.: French history, Spanish and Latin American literature, Italian art history). Most common formats are print, microform and electronic. Manuscript material is included only in narrowly defined fields (usually in Canadian Studies) or for special needs. Manuscripts are normally collected by and held in Queen's Archives. The library occasionally purchases microfilmed manuscript collections, which are sent to Archives. It is assumed that interlibrary loan and document delivery services or visits to other institutions will be required to supplement material held locally.

Level C:

Collecting material at a level advanced enough to cover basic requirements for graduate teaching and research for master's programmes. Includes some of the most important serials (though fewer than we would provide for a doctoral programme), a wide range of subject indexes and bibliographies, major reference tools, and important primary and secondary sources as well as scholarly monographs. Emphasis is on materials in English or other western languages especially relevant to the subject being taught (e.g.: French history, Spanish and Latin American literature, Italian art history). Most common formats are print, microform and electronic. Manuscript materials are normally not collected. It is assumed that interlibrary loan and document delivery services or visits to other institutions will be required to supplement material held locally.

Level D:

Maintains a collection to support undergraduate instruction, including honours programmes (courses numbered 300 to 500). Includes a few basic journals, key reference tools, significant primary and secondary sources, and works of criticism and analysis. Limited to collecting in English except in the case of classical studies or modern language and literature programmes. Formats may be print, microform or electronic. Assumes that faculty in most disciplines provide considerable guidance to students regarding key works of scholarship in their field. At this level, it is advisable for faculty to consult with the Libraries' public service staff regarding our ability to support self-directed learning before assignments

are handed out. Since interlibrary loan and document delivery may not be fast enough for students in first and second year, course packs or electronic reserve readings may be required to supplement stack collections. The Libraries do not normally acquire textbooks or classroom-teaching materials.

Level E:

This level provides general background information or supports one or two undergraduate courses. Includes a few general reference titles, and some basic monograph publications. Serials are not normally acquired at this level, though titles acquired to support other programmes would probably provide some coverage.

For further information, please contact Jane Philipps, Coordinator of Collection Development (533-3040 ext. 33040) email: jane.philipps@queensu.ca

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Ph.D. in Environmental Studies	Year 1 B&S Budget 2013-14	Year 2 Forecast 2014-15	Year 3 Forecast 2015-16	Year 4 Forecast 2016-17	Year 5 Forecast 2017-18	Notes:
Program Intake	2.00	2.00	1.00	1.00	1.00	
Enrolment		2.00	2.00	1.00	1.00	
Returning Students Year 2 Returning Students Year 3	-	2.00	2.00 2.00	1.00 2.00	1.00 1.00	
Returning Students Year 4	-	-	-	2.00	2.00	
Total Enrolment	2.00	4.00	5.00	6.00	5.00	
Enrolment Domestic vs International						
Domestic International	2.00	4.00	5.00 -	6.00	5.00 -	
	2.00	4.00	5.00	6.00	5.00	
Enrolment Reductions Required to Accordance of Master's Domestic	(1.00)	(4.00)	im (4.00)	(4.00)	(4.00)	
Master' International Total Reduction	(1.00)	(4.00)	(4.00)	(4.00)	(4.00)	
Program fees Domestic						
Tuition	\$ 6,258				. ,	
Non-tuition Total Fees	N/A \$ 6,258	N/A \$ 6,258	N/A \$ 6,258 \$	N/A \$ 6,258	N/A \$ 6,258	
Total rees	Φ 0,238	Φ 0,236 .	φ 0,236 t	ў 0,236 ,	φ 0,236	
International Tuition	\$ 12,366	\$ 12,366	\$ 12,366	\$ 12,366	\$ 12,366	
Non-tuition	N/A	N/A	N/A	N/A	N/A	
Program fee	\$ 12,366	\$ 12,366	\$ 12,366	\$ 12,366	\$ 12,366	
Assumptions:						
Grant Revenue Assumption		er Master's FTE er Ph.D FTE				
Recovery to the University Fund	2.75%					
Shared Services Attribution Cost per FTE New Faculty Positions Required	\$ 8,716 T	wo year slip on e	nrolment			Note 1
•	L		ı			
Revenue Tuition revenue	6,258	-	6,258	12,516	6,258	
Non-tuition revenue	-	-	-	-	-	
Government grant revenue	39,942	43,536	72,594	101,652	72,594	Note 2
	46,200	43,536	78,852	114,168	78,852	
Gifts and grant University Fund Recovery on Revenues	-1,271	-1,197	-2,168	-3,140	-2,168	
Total revenue from Ph.D.	44,930	42,339	76,684	111,028	76,684	
Expenditures						
-						
Direct program costs Academic salaries and professional fees	-	-	-	_	_	Note 1
Adjunct Salaries	-	-	-	-	-	
TA - Salaries Program delivery	5,096	-	5,354	10,976	5,625	Net increase with reduction in Master's students
Books and materials	-	-	-	-	-	
Scholarships and bursaries	-	-	-	-	-	
Other salaries and benefits Other	-	-	-	-	-	
Ottlei	5,096	<u>-</u>	5,354	10,976	5,625	
Attribution of Central Shared Services	-	-	8,716	-	8,716	
Total expenses	5,096	-	14,070	10,976	14,341	
Net Revenue to Faculty	39,834	42,339	62,614	100,052	62,343	

Note 1: No New Faculty Positions are required due to the reduction in Master's during the growth of the Ph.D. Note 2: Assumes full grant funding for Ph.D. offset by the reduction in grant for the Master's program.