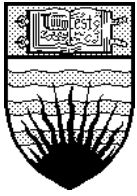


THE UNIVERSITY OF BRITISH COLUMBIA



3 February 2012

CURRICULUM & ADMISSIONS COMMITTEES

Vancouver Senate

2016 - 1874 East Mall

Vancouver, B.C. Canada V6T 1Z1

To: Vancouver Senate

From: Senate Curriculum & Admissions Committees

Re: **New Program Proposal for a Master of Land and Water Systems
(M.L.W.S)**

Master of Land and Water Systems (M.L.W.S.)

The Senate Curriculum and Admissions Committees have reviewed the material forwarded to them by the Faculty of Graduate Studies (Faculty of Land and Food Systems) and are pleased to recommend the following:

That Senate approve the new Master of Land and Water Systems and its associated course.

Respectfully Submitted,

Dr. Richard Anstee, Chair, Senate Admissions Committee

Dr. Peter Marshall, Chair, Senate Curriculum Committee

Proposal for a Master of Land and Water Systems (MLWS)

September 20, 2010

Revised - January 21, 2011

- February 7, 2011

- October 31, 2011

- November 22, 2011

Background:

The Faculty of Land and Food Systems proposes to launch a Master of Land and Water Systems (MLWS) professional degree in September 2012. The professional Masters program is modeled after two Professional Masters programs offered by the Faculty of Land and Food Systems in the areas of Food Science (MFS) and Food and Resource Economics (MFRE). With recent program changes, most universities, including UBC, no longer offer baccalaureate degrees in Soil Science (and water conservation) in the context of integrated systems management. This has been, in part, the recognition that the professional working level for land and water systems is better served by post-baccalaureate training and education. With the emergent recognition of global soil degradation, water scarcity, ecological restoration and concerns regarding food security, there has been a growing demand for post-baccalaureate training in land and water systems. Working professionals in both the private and public sectors are requesting information on mechanisms by which they could receive advanced and specialized programs in water systems and sustainable land management. We have, over the past decade, developed and offered most successful CD-ROM based /Web CT distance education courses in integrated watershed management. Over 900 students completed one or more of the CD based distant education courses. Students have enrolled from about 30 countries – USA, (EPA), Columbia, Brazil, Indonesia, Ecuador, Cambodia, Bhutan, Philippines, Panama, Costa Rica, Australia, New Zealand, Japan, The Netherlands, India, Pakistan, Italy, Ethiopia, Congo, South Africa, Kyrgyzstan, Vietnam, Jamaica, Norway, China, Norway and Sweden. In addition, we are in the process of adapting more of the graduate offerings in the Faculty of Land and Food Systems to distance education formats.

These alternative course delivery methods provide an opportunity for professional students to take courses for credit while gainfully employed, both locally and globally. What is lacking is

academic accreditation. The Master in Land and Water Systems will meet that need. The development of a professional Masters program will attract, in addition, the more mature student, as well as strengthen the existing Inter-Faculty Soil Science Graduate Program within the Faculty of Land and Food Systems and Faculty of Forestry and other academic units at UBC, notably the Department of Earth and Ocean Sciences.

Objectives

1. To provide an opportunity for students to obtain science based skills, training and knowledge in the area of Land and Water Systems to address the emerging environmental issues of food security, maintenance of ecological services, restoration of degraded lands, climate change, and resource conservation. Target students will be both recent graduates and practicing professionals who elect to gain additional academic qualification.
2. To strengthen the present Inter-Faculty Soil Science Graduate Program within the Faculty of Land and Food Systems and Faculty of Forestry; to expand the interdisciplinarity of graduate education in Land and Water Systems; to integrate with other academic units at UBC, notably Earth and Ocean Sciences; and, to attract highly qualified students to distance education initiatives and enrolment at UBC.

The MLWS will be a full cost recovery program and will provide discretionary revenue to support the teaching and research of the academic group in Soil Science and its associates. As a result of increased enrolment, students in the Inter-Faculty Soil Science Graduate Program will benefit from the certainty that a full complement of graduate courses will be offered each year.

Learning Outcomes

Graduates will:

1. Have the necessary background and analytical skills to address the issues related to land and water systems based on an understanding of the integration of the ecological, carbon (energy), hydrological and pedagogical cycles and the impacts of human activity.
2. Obtain proficiency in developing analytical frameworks for the identification, articulation and analysis of land and water resource issues and concerns,

3. Develop skills to develop, apply, evaluate, adapt alternate practices through computer based information technology scenario frameworks, and
4. Develop communication skills for public communication and policy formulation.

Admission Requirements:

To be eligible for admission to the Master of Land and Water Systems (M.L.W.S.) degree program, applicants must (1) meet the admissions requirements of the Faculty of Graduate Studies and (2) have a science-based bachelor's degree preferably in one of the following disciplines: soil science, agricultural sciences, environmental science, geology, geography, ecology, forestry, or civil engineering. In addition, a background in introductory (first-year university equivalence) economics, geology, physical geography and soil science is beneficial but not required for admission into the program.

Application for admission must include a statement or letter outlining the applicant's career objectives and job experience. All applicants will be interviewed by an advisor from the M.L.W.S. degree program to determine their candidacy and suggest ways to address any subject matter deficiencies.

A total of 25 applicants will be admitted to the program yearly. Admission may be contingent on concurrent completion of first-year introductory courses in deficient area(s) at UBC or a recognized post-secondary institution to meet the graduating requirements of the program.

Program Requirements:

The MLWS degree requires 32 credits of coursework consisting of 23 credits of required courses plus 9 credits of restricted electives depending on which research stream the student has chosen. Of the 32 credits, 6 credits may be at the 300 - 400 level, and 26 credits must be at the 500 - level or higher.

The MLWS degree offers two fields of concentration:

- a) Land and Water Systems
- b) Sustainable Soil Systems

They are available on a full time or part time basis. Full time students will normally begin in September and complete their program at the end of August in the following year, thus completing the degree in 12 months of intensive study. Part time students can proceed at their own pace, except that they must complete, as a minimum, one academic term at UBC Vancouver campus. Each student will be required to complete a “major paper” registering into Soil 548 (6) This may be conducted off-campus and co-supervised by a recognized professional, (such as, Professional; Agriologist, Biologist, Forester, Geoscientist), and a member of the UBC Soil Science group.

The Masters program will allow students to gain credit towards accreditation in existing appropriate professional organizations and does not propose any new professional accreditation.

The MLWS degree is a 32 credit program:

1. Required courses (23 credits)

SOIL 500 (2) Seminar on Professional Activities
SOIL 501 (3) Advanced Soil Processes
SOIL 503 (3) Advanced Field and Laboratory Methods
SOIL 520 (3) Agricultural Watershed Management
FRE 302 (3) Small Business Management
FRST 544 (3) Technical Communication
SOIL 548 (6) Major Project

2. There are two options available in this program

- a) Land and Watershed Systems and
- b) Sustainable Soil Systems

Each of these options has a separate set of 9 credits of option electives.

Land and Water Systems

SOIL 515 (3) Integrated Watershed Management *
SOIL 516 (3) Urban Watershed Management *
SOIL 518 (3) Water in International Development
EOSC 329 (3) Groundwater Hydrology
EOSC 429 (3) Groundwater Contamination
EOSC 474 (3) Marine Pollution

EOSC 537 (3) Topics in Groundwater Hydrology

FRST 588 (3) Headwater Systems

RMES 542 (3) Integrated Assessment

* cross listed with IRES as RMES courses

Sustainable Soil Systems

SOIL 502 (3) Advanced Sustainable Soil Management

SOIL 514 (3) Biometeorology

FRST 495 (3) Biological Diversity and Forest Management

FRST 512 (3) Below Ground Forest Ecosystems

FRST 522 (3) Indigenous Peoples and Forest Land Management

PLNT 525 (3) Analysis of Plant performance

PLNT 531 (3) Biological Control

Other courses may be substituted with permission of Academic supervisor.

Program Instructors:

The professorial staff include:

Dr, T.A. Balck, Professor, Biometeorology

Dr. A.A. Bomke, Associate Professor, Sustainable Soil Management (P. Agrologist)

Dr Sie Tan Chieng, Professor Irrigation/drainage/hydrology, (Land and Food Systems and Civil Engineering) (Professional Engineer)

Dr, Chris Chanway, Professor (Land & Food Systems and Forestry)

Dr. S. Graystone, Professor, Chair, Forest Sciences, Below Ground Ecology (negotiating for joint appointment with Land and Food Systems)

Dr. Maja Krzic, Associate Professor, Land quality and Rangelands

Dr. M.D. Novak, Associate Professor, Soil Physics and Water Relations

Sessional

Dr. S. J. Brown, Land water and Communities

Dr. H.E. Schreier. Land-water integration, Integrated Watershed Management

Adjuncts (Professionals, approached to supervise Professional Project/Paper)

Dr. Shannon Berch, B.C. Ministry Forests, Victoria

Dr. Klaas Broesma, Agriculture and Agri Food Canada, Kamloops, B.C.

Mr. Brian Carson (P. Ag, P.Geo/P.Biol.) Consultant Gibsons, BC.

Dr. M.C. Curran, B.C. Forest Service, Nelson, B.C.

Dr. T.Forge, Agriculture and Agri-Food Canada Agassiz, B.C.

Several others contacted but no negotiations until program in place, including Professorial staff at UNBC, Thomson Rivers, SFU and U. Victoria

Employment for graduates and future opportunities

There is demand in Canada and around the world for professionals who can understand and analyze the relationships between the resource sectors and the realities of human population growth, increased demand for land and water systems and the added uncertainty brought by climate change. This demand has been increasing due to the prevalence and complexity of issues related to land degradation, food and water security, and the global concern of sustaining ecological biodiversity and services. There is a frustration expressed by narrowly trained professionals in their abilities to address the dynamics of systems management issues resulting from scarcity, uncertainty and impacts of globalization and how to acquire and apply the necessary scientific skills in a more integrated and holistic manner. Governments and private industry, both in developed and developing countries, need professionals with resource management skills and knowledge of institutions, policies and ecological constraints of the resource sectors. The degree is designed to meet the needs of resource practitioners in these sectors.

Delivery methods

Initially, the program will be delivered using standard scheduling and classroom delivery, including a part-time option, with more flexible scheduling and delivery methods.

It is anticipated that elements of distance education and distributed learning will be incorporated as appropriate. In addition equivalent courses at other institutions may be substituted for UBC

courses and students may elect to conduct their Major Project (SOIL 548) under the co-supervision of an approved faculty member at another institution, especially at universities within British Columbia.

Program strengths

Students will learn land and water theory relevant to applications in the resource sectors through their SOIL graduate courses. These graduate courses will be taught by regular Soil Science faculty, who will bring their areas of research expertise to the classroom. Three graduate courses will be taught by sessional lecturers drawn from professional organizations from the private and public sectors. This will complement the student experience by association with practicing professionals who deal with real challenges. The program therefore provides the framework for the integration of a sound and rigorous theoretical and academic base, with practice. The major project will contribute to the communication skills necessary for professional practice. Twenty academic credits will provide the academic scientific base, and SOIL 500, 501, FRE 302, FRST 544 or RMES 542 will provide the academic foundation for practice.

Relation to other established programs

A search of the INTERNET and consultation with colleagues in North America resulted in identifying one professional Soil and Water program at the University of Florida, USA, one Soil and Water Management program at Uppsala, Sweden and one at Lleida in Spain. There are two comprehensive Soil Science programs in Canada - the University of Saskatchewan and the University of Manitoba, both along with other Universities examined offer the M.Sc. with thesis with the primary goal of training research based graduates. The Universities of Alberta and Saskatchewan offer Professional Masters degrees in Agriculture but not in land and water management. At UBC the only complementary programs are the M.Sc. in Soil Science and the M.F. in Forestry. From this careful analysis, it appears there is only one somewhat comparable program in North America– the University of Florida, USA, and two in Europe.

Implementation

It is prudent to implement the MLWS professional degree program as soon as feasible as there is a real need and an opportunity to offer this program in this important area of concentration as

societal concerns grow with respect to the uncertainties of food and water security, and loss of ecological diversity and services.

It is therefore recommended that the program be implemented September 2012.

Resources

The new degree will be full cost recovery with all additional resources required for the program to be paid from program tuition. These include program administrators, sessional instructors, professional project supervisors, summer project coordinators, teaching assistants, and any space or library requirements.

Faculty

Additional responsibilities imposed on Soil Science and Faculty of Forestry faculty as a result of this new degree will be compensated by “fee for service”. This may be achieved through hiring additional human resources. The program Director will be appointed initially for a three year term with the major responsibility of ensuring the development of a viable program and implementing policy regarding non-UBC involvement in the program. A major responsibility of the program Director will be to maintain close communication with the students enrolled. Sessional instructors will be employed to teach three graduate courses and to assist with the supervision of summer research projects. The Soil Science group already has a small pool of qualified sessionals who have teaching, research, and industry experience.

Space requirements

As the program is primarily course-based, the space requirements will be classrooms, temporary office space for sessional appointees, and some flex space for MLWS students to study. The Faculty has a computer lab which the MLWS students may use. It is anticipated that with the recent innovative renovations by the Faculty of Land and Food Systems, space is not an issue.

Library resources

The current undergraduate and graduate courses offered by the SOIL's group are well served by the excellent library resources at the University. No additional resources are deemed to be required.

Administrative and support staff

The MLWS program will hire an Academic Advisor/ Director to oversee all operations of the new degree, to liaise with potential supervisors and implement the professional project program requirement (SOIL 548), to coordinate the summer orientation program for international students and to arrange for placements for the research projects.

Proposed fee structure:

1. Tuition

Based on the costs to deliver this new program and the projected demand for it, the proposed tuition levels for the degree program are \$17,877 for domestic students and \$28,952 for international students.

The tuition level for domestic students is lower than for international students in recognition of Canadian taxpayers' contribution to this program. The tuition level for international students is identical to the Master of Food Science and the Master of Food and Resource Economics programs within the Faculty of Land and Food Systems. The proposed tuition levels for degree are consistent with what UBC and other universities are charging for professional master's degree programs in related areas.

The above tuition levels for the MLWS degree apply to the 12-month period (from the beginning of September to the end of August) required to complete the degree. During this period, it is expected that the students complete the 32 credits of required course work.

Tuition levels do not vary with the number of credits taken. Tuition fees and student fees are divided into three installments, due in September, January and May. For each installment, domestic students will be assessed \$5,959.00 plus student fees, and international students will be

assessed \$9,650.66 plus student fees. For students who become ill and are required to leave for a term or two, the regular domestic and international graduate student On-Leave fee will apply.

1. Continuing Tuition (after the first 12-months)

Although the MLWS program has been designed to be completed in one 12-month period, there may be cases where students need to take courses in the subsequent Academic Year in order to complete the requirements for the degree. Continuing students will continue to pay their regular installments: \$5,959.00 plus student fees for domestic students and \$9,650.66, plus student fees for international students, due in September, January and May.

2. Revenue Sharing

The revenue received from MLWS student tuition will be split 72% to the Faculty of Land and Food Systems and 28% to UBC central. For the 28% going to central, 20% (of total tuition) will be earmarked for financial aid, and the other 8% to central. The financial aid funds will be transferred to the Faculty of Land and Food Systems with the restriction that they be used only for financial aid for MFWR students. *These proportions are subject to adjustments after review by University Treasury.*

Financial aid:

The MLWS program will use scholarships and other forms of financial aid for both domestic and international students to increase the affordability for this professional master's degree. As mentioned above, funding for the financial aid program will come from the portion of gross tuition revenue that UBC central holds back for this purpose.

Budgetary impact of the proposal:

The new degree program is expected to be full cost recovery or show a slight positive balance and for each year will be a net contributor of revenue to the Faculty. This new source of revenue will be used to support the academic mission of the Soils Group and the Faculty. The budgetary impact statement plus an annual budget of the program are given in Appendix

Consultations:

Curriculum consultation included the following UBC units:

Geography

Faculty of Forestry

College for Interdisciplinary Studies (IRES, Liu Centre, Community and Regional Planning,
Fisheries)

School of Population and Public Health

Faculty of Applied Science

Library

Curriculum consultations with the following units were sought with no response:

Faculty of Commerce & Business Administration

Faculty of Science, Department Earth & Ocean Sciences

Name, title, phone number and e-mail address of contact persons:

L. M. Lavkulich, Interim Director

Land and Food Systems, Room 127

lml@interchange.ubc.ca ; 604-822-3477

UBC Curriculum Proposal Form Change to Course or Program

Category: (1)

<p>Faculty: Land & Food Systems Department: Faculty Approval Date: April 08, 2011 Effective Session Winter 2012</p>	<p>Date: September 15, 2010 Contact Person: L.M. Lavkulich Phone: 2-3477 Email: lml@interchange.ubc.ca</p>
<p>Proposed Calendar Entry: <i>Soil Science</i> Degrees Offered: Ph.D., M.Sc., M.L.W.S. Program Overview Soil Science offers opportunities for advanced study and research leading to Ph.D. and M.Sc. degrees in the areas of soil microbial ecology, organic matter, soil physics, irrigation and drainage, biometeorology, soil pollution, soil and water conservation, soil management, and land use, with application to forest, agricultural, urban, and range soils, as well as a professional Master of Land and Water Systems (M.L.W.S.) degree. The Ph.D. and M.Sc. degrees include a combination of courses in both basic and applied sciences, with research leading to the completion of a thesis/dissertation. The M.L.W.S. degree is intended for students seeking a post-baccalaureate degree for professional practice in the land and water resources management realm. The program is designed to be completed in one calendar year. Master of Land and Water Systems Admission Requirements: To be eligible for admission to the Master of Land and Water Systems (M.L.W.S.) degree program, applicants</p>	<p>URL: (http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,204,828,1234)</p> <p>Present Calendar Entry: <i>Soil Science</i> Degrees Offered: Ph.D., M.Sc. Program Overview Soil Science offers opportunities for advanced study and research leading to M.Sc. and Ph.D. degrees in the areas of soil microbial ecology, organic matter, soil physics, irrigation and drainage, biometeorology, soil pollution, soil and water conservation, soil management, and land use, with application to forest, agricultural, urban, and range soils. Graduate training in Soil Science normally involves a combination of courses in both basic and applied sciences, with research leading to the completion of a thesis/dissertation. Type of Action: Create New Program Rationale: Most universities, including UBC, no longer offer baccalaureate degrees in Soil Science (and water conservation) in the context of integrated systems management. This has been, in part, the recognition that the professional working level for land and water systems is better served by post-baccalaureate training and education. With the emergent recognition</p>

<p>must (1) meet the admissions requirements of the Faculty of Graduate Studies and (2) have a science-based bachelor's degree preferably in one of the following disciplines: soil science, agricultural sciences, environmental science, geology, geography, ecology, forestry, or civil engineering. In addition, a background in introductory (first-year university equivalence) economics, geology, physical geography and soil science is beneficial but not required for admission into the program.</p> <p>Application for admission must include a statement or letter outlining the applicant's career objectives and job experience. All applicants will be interviewed by an advisor from the M.L.W.S. degree program to determine their candidacy and suggest ways to address any subject matter deficiencies.</p> <p>A total of 25 applicants will be admitted to the program yearly. Admission may be contingent on concurrent completion of first-year introductory courses in deficient area(s) at UBC or a recognized post-secondary institution to meet the graduating requirements of the program.</p> <p>Program Requirements:</p> <p>The M.L.W.S. degree requires 32 credits of coursework consisting of 23 credits of required courses (SOIL 500, SOIL 501, SOIL 503, SOIL 520, FRE 302, FRST 544 and SOIL 548) plus 9 credits of restricted electives depending on which research stream the student has chosen. Of the 32 credits, a maximum of 6 credits may be at the 300 - 400 level, and 26 credits must be at the 500 - level or higher.</p>	<p>of global soil degradation, water scarcity, ecological restoration and concerns regarding food security, there has been a growing demand for post-baccalaureate training in land and water systems. Working professionals in both the private and public sectors are requesting information on mechanisms by which they could receive advanced and specialized programs in water systems and sustainable land management.</p> <p>The distant course delivery methods provide an opportunity for professional students to take courses for credit while gainfully employed, both locally and globally. What is lacking is academic accreditation. The Master in Land and Water Systems will meet that need. The development of a professional Master's program will attract, in addition, the more mature student, as well as strengthen the existing Inter-Faculty Soil Science Graduate Program within the Faculty of Land and Food Systems and Faculty of Forestry and other academic units at UBC, notably the Department of Earth and Ocean Sciences.</p>
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The M.L.W.S. degree offers two fields of concentration:

- a) Land and Water Systems**
- b) Sustainable Soil Systems**

Each of these options has a separate set of 9 credits of option electives. Please check with the Program's website for details.

The M.L.W.S. degree is available on a full time or part time basis. Full time students will normally begin in September and complete their program at the end of August in the following year, thus completing the degree in 12 months of intensive study. Part time students can proceed at their own pace, except that they must complete, as a minimum, one academic term at UBC Vancouver campus.

Each student will be required to complete a "professional paper" by registering into SOIL 548 (6). This may be conducted off-campus and co-supervised by a recognized professional, (such as, Professional; Agrologist, Biologist, Forester, Geoscientist), and a member of the UBC Soil Science group.

The M.L.W.S. program will allow students to gain credit towards accreditation in existing appropriate professional organizations and does not propose any new professional accreditation.



THE UNIVERSITY OF BRITISH COLUMBIA.

**UBC Curriculum Proposal Form
Change to Course or Program**

Category: (1)

Faculty: Land and Food Systems Department: SOIL Faculty Approval Date: July 13, 2009 Effective Session: Winter 2012	Date: November 4, 2011 Contact Person: L.M. (Les) Lavkulich Phone: 2-3477 Email: lml@interchange.ubc.ca
Proposed Calendar Entry: SOIL 548 (6) Major Project Professional paper on topics focusing on emerging issues in water and land resources.	URL: SOIL Present Calendar Entry: N/A Type of Action: create new course Rationale: This is a required course that addresses current and emerging issues that integrates water and land resource management. The course will be the supervised by the Coordinator of the program. Each student will prepare a report on issues incorporating challenges of land degradation, salinization, water dynamics in watersheds, loss of wetlands and biodiversity, urbanization and food security under conditions of uncertainty (including climate change). The subject matter will be tailored to each student and the instructor. The focus on “issues” allows the opportunity to have adjuncts, who are practicing professionals, play a significant role in the program. Soil 548 is the capstone course for the professional Masters in Land and Water Systems. The academic expectation of SOIL 548 is a demonstration by the candidates that they can formulate and articulate a water or land resource concern or issue and develop a framework that analyzes the issue, provides a synthesis of how the issue may be addressed and provides recommendations for the resolve of the concern or issue. The analysis will consist largely but not exclusively of existing (published) information and integration with reasonable field experience. SOIL 548 will be supervised by either a UBC faculty member, or an approved “adjunct” faculty member (an approved professional). In the latter case a UBC faculty member will be the second reviewer. In all cases there will be a minimum of two supervisors/reviewers. The final mark will be set by the two reviewers and final mark will be approval by the Director of MLWS.