THE UNIVERSITY OF BRITISH COLUMBIA

December 5, 2008

CURRICULUM & ADMISSIONS COMMITTEES
Vancouver Senate
2016 - 1874 East Mall
Vancouver, B.C. Canada V6T 1Z1

To: Senate

From: Senate Curriculum & Admission Committees

Re: New Program Proposals:
a) Bachelor of Science in Applied Biology
b) Master of Food and Resource Economics

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a) Bachelor of Science in Applied Biology (B.Sc. (Applied Biology))

The Senate Curriculum and Admissions Committees have reviewed the material forwarded to it by the Faculty of Land and Food Systems, and are pleased to recommend as follows:

> *That Senate approve the Bachelor of Science in Applied Biology (B.Sc. (Applied Biology)) program and its associated courses as set out in the attached report.*

b) Master of Food and Resource Economics (M.F.R.E.)

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

> *"That Senate approve the Master of Food and Resource Economics (M.F.R.E.) program and its associated courses as set out in the attached report."*

Note: As per the *University Act*, after academic approval has been granted by the Senate, the consent of the Board of Governors and the Minister of Advanced Education must be given before any new degree program may be offered by the University.

Respectfully Submitted,

Dr. David W. Fielding, Chair, Senate Admissions Committee
Dr. Peter Marshall, Chair, Senate Curriculum Committee

THE UNIVERSITY OF BRITISH COLUMBIA

Enrolment Services
Senate and Curriculum Services
2016 – 1874 East Mall
Vancouver, BC V6T 1Z1
ginette.vallee@ubc.ca
T: 604-822-0140; F: 604-822-5945

1 December 2008

To: Vancouver Senate

From: Senate Admissions and Curriculum Committees

Re: **NEW UNDERGRADUATE DEGREE PROGRAM**

Attached please find the Bachelor of Science in Applied Biology (B.Sc. (Applied Biology)) degree program proposal for your consideration.

LAND & FOOD SYSTEMS
The following **new program**:
B.Sc. in Applied Biology

The following **new courses**:

APBI 210 (4)	APBI 398 (3)
APBI 235 (3)	APBI 422 (3)
APBI 318 (4)	APBI 440 (3)
APBI 324 (3)	LFS 400 (3)
APBI 397 (3)	

The following **changed courses:**
Change course codes from AGSC to LFS for the following course numbers:

LFS 100 (1)	LFS 350 (3)
LFS 250 (6)	LFS 450 (3)
LFS 252 (3)	LFS 490 (3)
LFS 301 (3)	LFS 496 (3/6) d
LFS 302 (3/6) d	

Change course codes from AGRO to APBI for the following course numbers (those proposals marked with an asterisk also contain additional changes)

APBI 244 (4)	APBI 342 (3)	APBI 423 (3)
APBI 260 (6)*	APBI 360 (4)*	APBI 426 (3)
APBI 311 (3)	APBI 361 (3)*	APBI 427 (3)*
APBI 312 (3)*	APBI 401 (3)	APBI 428 (3)
APBI 314 (3)	APBI 402 (3)	APBI 444 (3)
APBI 315 (3)*	APBI 403 (3)	APBI 460 (3)*
APBI 316 (3)	APBI 411 (3)*	APBI 490 (3)*
APBI 322 (3)	APBI 414 (3)*	APBI 495 (3)*
APBI 351 (4)*	APBI 418 (3)*	APBI 497 (2-6) d
APBI 326 (4)	APBI 419 (3)*	APBI 498 (3)
APBI 327 (3)	APBI 420 (3)	APBI 499 (6)
APBI 328 (4)	APBI 421 (3)*	

Change course code from SOIL to LFS for the following course number:
APBI 200 (3)

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Executive Summary
Proposed B.Sc. in Applied Biology
Faculty of Land and Food System, UBC
November 25, 2008

Faculty History

The Faculty of Land and Food Systems (LFS) at the University of British Columbia (UBC) has evolved considerable over the past decade. In the early 1990s, the Faculty was named Agricultural Sciences and it had a traditional departmental configuration (e.g., animal science, plant science, soil science, food and nutritional sciences, and agricultural economics). The increasing pressure to significantly modify the curriculum due to the changing needs of students and the need for a more global perspective prompted a major Faculty restructuring, beginning in 1997. In particular, departments and specific degrees were eliminated and three new degree programs were created: B.Sc. in Agroecology (AGRO), B.Sc. in Food, Nutrition and Health (FNH) and B.Sc. in Global Resource Systems (GRS). As a result of this change, both student enrollment and student quality began to climb steadily, particularly in FNH and GRS. In 2005, the Faculty changed its name to the current Land and Food Systems to better reflect the diversity of its academic programs and research initiatives.

Faculty Mission and Academic Goals

The mission of the UBC Faculty of Land and Food Systems is to develop life-long learners and create knowledge to make our land, food and community healthy and sustainable.

The UBC Faculty of Land and Food Systems uses student-centered learning to educate new generations of scientists equipped to solve the most fundamental issues faced by society — those focused around human health, a sustainable food supply and the responsible use of finite land and water resources. Grounded in science, the Faculty is a leader in integrated research and education that addresses global issues surrounding health and sustainable land and food systems.

Rationale for B.Sc. in Applied Biology Degree

There are currently 1157 students registered in the Faculty of Land and Food Systems (LFS), which is up about 12 percent from five years ago. The B.Sc. in Food, Nutrition and Health (FNH) program has witnessed the largest growth: rising 42 percent from five years ago to the present enrollment of 916. The B.Sc. in Global Resource Systems (GRS) program has grown by 15 percent over the past five years (current enrolment is 100). However, enrollment in the B.Sc. in Agroecology (AGRO) program is down 44 percent from five years ago, currently standing at 141 students.

This trend in student interest toward the food and health side of the Faculty, and away from the production agriculture (agroecology) side of the Faculty, is primarily because a large majority of LFS students come from an urban background. They tend to have limited awareness and interest in primary agriculture, but have strong career interests in the health sector, including human nutrition and dietetics. At the present time, the undergraduate programs in the Faculty of Science at UBC are largely oversubscribed, with many Science students having few obvious career choices. LFS believes that a B.Sc. in Applied Biology Program will be attractive to both first year students and transfer students from

Science for reasons similar to those of students who are entering the FNH and GRS programs in growing numbers. After implementation of the proposed B.Sc. in Applied Biology degree, the existing B.Sc. in Agroecology degree will be phased out over the next three years.

Overview of Proposed B.Sc. in Applied Biology Degree

Before or after completing their first year in the Faculty, students who are interested in this Applied Biology degree will choose one of three majors: (i) Applied Animal Biology; (ii) Applied Plant and Soil Sciences; and (iii) Food and the Environment. The Applied Animal Biology Major is intended for students with a strong interest in animals, including companion, laboratory and farm animals, as well as wildlife affected by human activities. This program is ideally suited for "pre-vet" students. Students in the Applied Plant and Soil Sciences Major will utilize multi-disciplinary, transformational and integrative approaches to understanding plant-soil-atmosphere systems, with an emphasis on the science of managed ecosystem sustainability. The Food and Environment Major, which builds on the core features of the existing Agroecology program, is committed to provide an agricultural education that integrates disciplinary knowledge within a framework of ecological principles.

Students in each of the three majors will take Faculty core courses, program core courses, non-LFS required program courses and restricted and unrestricted electives. The core courses will ensure that students will learn general principles of land, food and environmental sustainability within an integrated systems framework, and will also ensure cross-program student interaction.

Details of Proposed Degree

The B.Sc. in Applied Biology will be offered at the UBC Vancouver Campus. The degree will be offered by the Faculty of LFS, which is located primarily in the MacMillan Building. Several of the classes which will be taken by students in this proposed new degree program are cross-listed with the Faculty of Science and with the Faculty of Forestry. The anticipated start date for the proposed degree is September, 2009 (i.e., the current first year group of students in LFS, as well as new and transfer students, will be able to choose the Applied Biology program for the 2009/2010 academic year by May, 2009). All three majors in the proposed Applied Biology degree consist of 120 credits over four years (eight semesters) of study.

Program Summary

The proposed B.Sc. in Applied Biology will be attractive to students because of its: (i) focus on problem solving and application of theory to issues relevant to today's society; (ii) emphasis on skill development in the areas of research methods, literacy and communication; and (iii) unique career opportunities arising from society's growing concern over various aspects of nutrition, and health, food safety and security, food production methods (e.g., animal welfare and plant biotechnology) and environmental impacts of food production. These attributes are highly consistent with UBC's Trek 2000 and 2010 goals and strategies (http://www.trek2000.ubc.ca/principles/learning.html), which include:

- … ensure that all students develop a greater awareness of their responsibilities as global citizens and of the issues surrounding social, environmental, and economic sustainability.

- Renew our commitment to help students in all disciplines develop good analytic and communication skills.
- Recognize interdisciplinarity as an important principle in academic planning for undergraduate and graduate programs.
- Encourage Faculties to continue developing innovative approaches that expose undergraduates to research-based and experiential learning, including co-operative education and problem-based learning.
- Make the big small wherever appropriate: provide individualized services and experiences to students within Faculty-based or program-based communities.

Each of the three majors will emphasize student involvement in research or industry work experience or both. Required courses include classes on quantitative methods, research methods, options to complete a 3-credit essay or 6-credit thesis, and a 6-credit fourth year experience (e.g., thesis, work placement, internship or study abroad). These courses will strengthen significantly the skill set of students when they seek post-graduation employment in areas such as animal health and welfare, wildlife management, aquaculture, conventional plant breeding, plant biotechnology, the greenhouse and nursery sector, urban agriculture, environmental protection, urban and regional planning, international development. All three programs will also prepare students for continuing their education in graduate programs.

The program will primarily be delivered with in-class lecture, lab and problem-based learning formats. Several of the courses will be offered with a distance learning option. Class sizes will generally be small enough to facilitate a variety of interactive learning techniques.

There are no other programs in Canada which offer a B.Sc. in Applied Biology. There are programs in Agricultural Biology at the University of Saskatchewan, and Environmental Biology at the University of Regina and University of Guelph, but none of these emphasize land, food and environmental sustainability as a framework for their learning outcomes and course delivery.

At the current point in time, LFS has not sought feedback from other post-secondary institutions and relevant regulatory and professional bodies. LFS has designed the curriculum to ensure that existing accreditation in professional bodies such as the British Columbia Institute of Agrologist will be maintained. LFS will soon contact the relevant professional bodies to inform them of the proposed new degree offering.

Contact Person

Dr. Jim Vercammen
Chair of LFS Curriculum Committee
Faculty of Land and Food Systems
2357 Main Mall
Vancouver, BC B6T 1Z2
james.vercammen@ubc.ca
Ph. (604) 822-5667 or (604) 822-8475
Fax: (604) 822-6394

Background

While overall undergraduate enrolment in the Faculty of Land and Food Systems has increased considerably in recent years (up close to 50% compared to 2000-01), there has been a significant shift in demographics within the Faculty. The B.Sc. program in Food, Nutrition and Health (FNH) has been responsible for the lion's share of this increase, and now constitutes almost 80% of our undergraduate body. Over the same period, enrolment in the BSc Agroecology has been in steady decline.

There are a number of reasons for these trends. The majority of our students come from an urban background, with limited or no awareness nor interest in primary agriculture *per se* (i.e., food production = farming). Primary agriculture employs less than 40,000 in British Columbia, < 2% of the provincial work force. On the other hand, students show strong career interest in the *health sector*, including human nutrition and dietetics. Our Dietetics Program receives three to four applications for every student accepted, and students who are not admitted continue in the nutrition or mixed majors of the FNH B.Sc. program. This situation is mirrored on a larger scale in the Faculty of Science where the majority of students at the outset are seeking admission into medical or dental schools; most of these students end up in biology or general science majors. Students seeking admission to veterinary schools used to make up a large number of students enrolling in the former BSc (Agriculture) program, majoring in Animal Science, but the evolution of that program into the current BSc Agroecology made it less attractive to many of those students.

Biology programs in Science appear to be over-subscribed while Land and Food Systems has some under-utilized capacity. When our faculty members give occasional lectures or provide other teaching in Science, they frequently note that students are captivated by subjects that place biology in a real-world context – precisely the areas of expertise in Land and Food Systems. However, we lack critical mass in certain aspects of animal, plant and soil sciences to deliver a full undergraduate curriculum independently. To provide the best possible programs for students with these interests, we need to partner with other academic units. The present proposal creates curricular paths that draw expertise not only from Land and Food Systems personnel, but also from the Departments of Botany, Zoology and Forest Sciences. Indeed, the proposed undergraduate program may provide a model for trans-faculty collaboration in delivering a package to undergraduate students that takes advantage of the best faculty experts in a given field irrespective of their home academic units. At the same time, the field of agroecology is preserved within the proposed BSc Applied Biology program, albeit with a name change to "Food and Environment" which will more closely align its learning objectives to the mission of the Centre for Sustainable Food Systems at UBC Farm.

Consultation Process

Between May and October, 2008 three working groups of LFS Faculty constructed three program areas for the proposed B.Sc. in Applied Biology degree together with the associated degree requirements, learning outcomes and new course proposals. LFS Faculty have had three face-to-face opportunities to openly discuss the new degree proposal. The first opportunity was at a LFS Faculty retreat in May 2008; the second and third opportunities were at LFS Faculty meetings on September 17, 2008 and October 23, 2008. The LFS Curriculum Committee also provided comments on the proposal during a September 16, 2008 meeting.

On October 28, 2008, after addressing the comments that arose during the October 23rd meeting, the proposal was sent out for external UBC academic consultation. The Library Consultation Form was sent to Rita Dahlie (Head, Woodward Biomedical Library). This current draft of the proposal was sent to all LFS Faculty members on November 17, 2008 for final comments and a vote. The e-mail votes tallied on November 19, 2008 revealed LFS approval of the proposed degree.

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UBC Curriculum Proposal Form
Change to Course or Program

Category: 1

Faculty: Land and Food Systems **Department:** **Faculty Approval Date:** November 19, 2008 **Effective Session __**W**__ Term _**1**__** **Year_**09/10**__ for Change**	**Date:** November 19, 2008 **Contact Person:** Jim Vercammen **Phone:** 822-5667, 822-8475 **Email:** james.vercammen@ubc.ca
Proposed Calendar Entry: **B.Sc. in Applied Biology (APBI)** **Introduction** Students pursuing a B.Sc. in Applied Biology will learn to apply the principles of biology in one of three program areas: (1) Applied Animal Biology (AABI); and (2) Applied Plant and Soil Sciences (APSS); and (3) Food and the Environment (FENV). AABI, which is intended for students interested in studying and/or working with animals (e.g., veterinary medicine), will provide students with sound up-to-date fundamentals in the field of animal science based on both theoretical and applied principles. APSS, which is intended to integrate diverse topics in plant-soil-atmosphere systems, emphasizes a systems-based approach, with an emphasis on the application of ecological theory to improving the sustainability of managed ecosystems. FENV brings together agricultural sciences, ecology and environmental thought, to provide the background to issues surrounding the management of land and water to produce food, other agricultural products and ecological services**.** Students in FENV will make extensive use of the Centre for Sustainable Food Systems at UBC Farm, as a living laboratory for experiential learning. **Advising Office** See the *Academic Advising Office*.	**URL:** n/a **Present Calendar Entry:** n/a. **Type of Action:** Add new degree program: B.Sc. in Applied Biology. **Rationale:** There are currently 1157 students registered in the Faculty of Land and Food Systems (LFS), which is up about 12 percent from five years ago. The B.Sc. in Food, Nutrition and Health (FNH) program has witnessed the largest growth: rising 42 percent from five years ago to the present enrollment of 916. The B.Sc. in Global Resource Systems (GRS) program has grown by 15 percent over the past five years (current enrolment is 100). Enrollment in the B.Sc. in Agroecology (AGRO) program is down 44 percent from five years ago, currently standing at 141 students. Within the AGRO program, the largest major is Animal Studies with about 50 students. Over this same time period, the General Biology and General Science programs in the Faculty of Science are oversubscribed, including many students for whom there are no obvious career opportunities. LFS believes that a B.Sc. in Applied Biology program will be attractive to both first year students and transfer students from Science for reasons similar to why students are entering the FNH and GRS programs in growing numbers. These reasons include: (i) a focus on problem solving and application of theory to issues pertinent to today's society; (ii) an emphasis on skill development in the areas of research methods, literacy and communication; and (iii)

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Admission

Students should refer to Calendar Chapter II, Admissions. Students may gain admission directly from secondary school or transfer from a recognized university or college with a minimum of 24 credits, or as mature students.

For admission to the Bachelor of Science in Applied Biology, students from Grade 12 British Columbia schools must meet the general University admission requirements and must have completed English 11 and 12; Social Studies 11; an approved language 11; Principles of Mathematics 11 and 12; at least two of Biology 11, Chemistry 11 and Physics 11; one of Chemistry 12, Physics 12, Biology 12 and Geology 12; and a course chosen from among the approved examinable Grade 12 courses.

Academic Regulations

See *Academic Regulations* as listed under Faculty of Land and Food Systems.

Degree Requirements and Minors

Candidates for the B.Sc. (APBI) degree must complete the requirements as required for each major.

unique career opportunities due to society's growing concern over various aspects of nutrition, and health, food safety and security, food production methods (e.g., animal welfare and plant biotechnology) and environmental impacts of food production.

LFS believes that enrollment in the Applied Biology program will increase significantly over the next five years. The B.Sc. in Agroecology program will gradually be phased out once the B.Sc. in Applied Biology program is in place.

LFS will structure its B.Sc. in Applied Biology around three majors: Applied Animal Biology (AABI); Applied Plant and Soil Sciences (APSS); and Food and Environment (FENV). The AABI Major is intended for students interested in various aspects of animal health and care. The APSS Major will allow students to tailor their interest to various aspects of plant and soil sciences, ranging from cellular and molecular topics to organismal and ecological topics. The FENV Major will enable students to apply ecological concepts and principles to the design and management of integrated food production systems.

Please see Appendix A for the list of new and existing LFS courses which will be offered as part of the Applied Biology program.

Proposed Calendar Entry:

Applied Animal Biology Major

The Faculty of Land and Food Systems> Bachelor of Science in Applied Biology> Applied Animal Biology

Applied Animal Biology is intended for students with a strong interest in animals and wanting to pursue careers working with animals (e.g., veterinary medicine). This major will provide students with fundamentals in the

URL:
n/a

Present Calendar Entry:
n/a

Type of Action: Add calendar description and degree requirements for the Applied Animal Biology Major in the proposed B.Sc. in Applied Biology.

Rationale:
This new program in Applied Animal Biology (AABI) is specifically designed for students

field of animal science and will provide considerable flexibility to students when selecting courses that meet their specific interests. Students are exposed to a challenging capstone research experience in the 3rd and 4th years of the program.

Degree Requirements

First Year

LFS 100	1
ENGL 112	3
BIOL 112/121	6
BIOL 140	2
CHEM 121/123 (111/113)[1]	8
MATH 102 or equivalent[2]	3
PHYS 101[3]	3
Restricted Elective[4]	3
Total Credits	29

Second Year

LFS 250	6
LFS 252 (or FRST 231 or BIOL 300)	3
BIOL 200/201	6
CHEM 233/235	4
MICB 201	3
Restricted Electives[4]	9
Total Credits	31

Third Year

APBI 398	3
Restricted Electives[4]	21
Unrestricted Electives	6
Total Credits	30

Fourth Year

APBI 498/499 (essay/thesis	3/6
Restricted Electives[4]	15/12
Unrestricted Electives	12
Total Credits	30

Overall four-year total	120

1. CHEM 111 is not for students with Chemistry 12

2. Students who have not completed Calculus 12 must take MATH 180 or 184 to fulfill their first year Math requirement. Students planning with a strong interest in animals, including companion, laboratory and farm animals, as well as wildlife affected by human activities. Students intending to apply for advanced study in veterinary medicine or research are good examples. The learning outcomes of this proposed major will be achieved through two required faculty courses (LFS 100 and LFS 250), a required course in statistics (e.g., LFS 252), a 3 credit research methods course, a 3 credit essay or 6 credit thesis, and a set of restricted and unrestricted electives, all of which currently exist at UBC.

Learning Outcomes:
In addition to fulfilling the learning objectives for the Faculty of Land and Food Systems, the following are specific to students who wish to pursue the Applied Animal Biology major:

1. Define, discuss and critically evaluate the basic biological (developmental, ecological, evolutionary, genetic, nutritional, physiological) and sociological principles relevant to animal systems;
2. Apply the basic biological and sociological principles to animal systems;
3. Recognize the diverse role played by animals in different human cultures and societies, including their role in food, agriculture, and the environment;
4. Critically read (question perceived knowledge), evaluate and report on scientific research in a relevant field;
5. Identify important basic concepts from the primary literature and be able to generalize these concepts and apply these to practical problems in animal agriculture and other areas;
6. Have hands-on research experience; and
7. Recognize the limits of their knowledge and developed a defined information-seeking strategy

Restricted Electives:

See Appendix C

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to study Veterinary Medicine must take Math 103 or Math 105 as a restricted elective. 3. Students planning to study Veterinary Medicine must take PHYS 102 as a restricted elective. 4. To be selected in consultation with a program advisor. Typically includes courses in APBI, BIOL and FNH. For suggested courses see the Faculty website.	

Proposed Calendar Entry:

Applied Plant and Soil Sciences Major

The Faculty of Land and Food Systems> Bachelor of Science in Applied Biology> Applied Plant and Soil Sciences Major

Applied Plant Biology and Soil Sciences uses a systems-based approach to assess, design, and manage human-made ecosystems by applying best practices derived from agriculture, ecology, soil science, biotechnology, and other disciplines. Crop and non-crop plants will be studied in terms of interactions between natural and human-influenced factors, addressing the vulnerability of these systems to external and internal factors (e.g., climate change), and at a range of scales (from modified genomes to ecosystems).

Degree Requirements

First Year

LFS 100	1
ENGL 112	3
BIOL 112/121	6
BIOL 140	2
CHEM 121/123 (111/113)[1]	8
MATH 102 or equivalent[2]	3
Restrictive Electives[3]	3
Unrestricted Elective	3
Total Credits	29

Second Year

Econ 101 or 102	3
LFS 250	6
LFS 252	

URL:
n/a

Present Calendar Entry:
n/a.

Type of Action: Add a calendar description and degree requirements for the Applied Plant and Soil Sciences Major in the proposed B.Sc in Applied Biology.

Rationale:
First year students and transfer students from Science are likely to be interested in multi-disciplinary, transformational and integrative approaches to understanding plant-soil-atmosphere systems, with an emphasis on the science of managed ecosystem sustainability. To maximize program appeal, the Applied Plant and Soil Sciences (APSS) Major will: (i) offer a set of new courses which emphasize applied plant and soil science in an integrated framework; (ii) provide students with the flexibility to tailor their degree towards a major area of interest; and (iii) provide students with the opportunity to develop an independent research project. APSS students will be required to take a course in statistics (e.g., LFS 252) and four courses which feature general principles of land and food systems: LFS100/250 (required courses for all students in the Faculty) and LFS 350/450 (required courses for most students in the Faculty). Students in the APSS major will further integrate knowledge of the principles of applied plant and soil sciences by taking a course on scientific inquiry (APBI 397) and a three credit essay or six credit thesis (APBI 498/499).

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(or FRST 231 or BIOL 300)	3
APBI 200	3
APBI 235	3
BIOL/APBI 210	4
Restricted Electives[3]	6
Unrestricted Electives	3
Total Credits	31
Third Year	
LFS 350	3
APBI 397	3
Restricted Electives[3]	18
Unrestricted Electives	6
Total Credits	30
Fourth Year	
LFS 450	3
APBI 498/499 (essay/thesis)	3/6
Restricted Electives[3]	18/15
Unrestricted Electives	6
Total Credits	30
Overall four-year total	**120**

1. CHEM 111 is not for students with Chemistry 12

2. Students who have not completed Calculus 12 must take MATH 180 or 184 to fulfill their first year Math requirement.

3. To be selected in consultation with a program advisor. Typically includes courses in APBI, BIOL and FNH. For suggested courses see the Faculty website. Students interested in studying soils should take PHYS 101.

Learning Outcomes:
In addition to achieving the Faculty's learning outcomes, upon completing the course requirements in this major, students will have:

1. Gained a greater awareness of issues surrounding social, environmental, and economic impacts on environmental sustainability and the responsibilities associated with being stewards of managed ecosystems;
2. Identified and characterized components of the soil-plant-atmosphere continuum and their interactions using an interdisciplinary perspective;
3. Assessed the impacts of crop domestication, genetics, and biotechnology on the sustainability of managed ecosystems;
4. Applied information of fundamental ecological processes and functions to sustainable managed ecosystems;
5. Described in detail important physical, chemical and biological processes and cycles that occur in managed ecosystems, such as water and energy flows, the roles of secondary metabolites and phytochemicals, and decomposition and succession;
6. Developed expertise and skills in solving problems associated with the sustainability of managed ecosystems; and
7. Developed the required analytical and communication skills to propose, conduct, analyze, and present an independent research project.

Restricted Electives:

See Appendix C

Proposed Calendar Entry:

Food and Environment Major

The Faculty of Land and Food Systems> Bachelor of Science in Applied Biology> Food and Environment Major

The Food and Environment (FENV) Major is

URL:
n/a

Present Calendar Entry:
n/a.

Type of Action: Add a calendar description and degree requirements for the Food and Environment Major in the proposed B.Sc. in

intended for students interested in the application of agroecological concepts and principles to the design and management of integrated food production systems. It brings together agricultural sciences, ecology and environmental thought, to provide the background to issues surrounding the management of land and water to produce food, other agricultural products, and ecological services**.** This major provides students with the flexibility to tailor their learning experiences to a diversity of emphases including resource economics, conservation of wildlife habitat and biodiversity as related to agriculture, integrated agro-ecosystem management, or self-directed areas of study. FENV also provides students the option to gain hands-on experience through an intensive practicum. The FENV major will be strongly focused on the Centre for Sustainable Food Systems at UBC Farm - an on-campus living laboratory for experiential learning.

Degree Requirements

First Year

LFS 100	1
ENGL 112	3
BIOL 112/121	6
BIOL 140	2
MATH 102 or equivalent[1]	3
Restricted elective[2,3]	11
Unrestricted Elective	3
Total Credits	29

Second Year

ECON 101 or 102	3
LFS 250	6
LFS 252 (or FRST 231 or BIOL 300)	3
APBI 200	3
APBI 260	6
Restricted Electives[3]	6
Unrestricted Elective	3
Total Credits	30

Third Year

LFS 350	3
APBI 360/361	7

Applied Biology.

Rationale:
Sustainable food systems are founded on the science of agroecology - the application of ecological concepts and principles to the design and management of integrated food production systems. The Food and Environment (FENV) Major, which builds on the core features of the existing Agroecology program, is designed to provide an agricultural education that integrates disciplinary knowledge within a framework of ecological principles. It provides students with the flexibility to tailor their learning experiences to a diversity of emphases including resource economics, and conservation of wildlife habitat and biodiversity as related to agriculture. Its curriculum will be fully integrated with the learning opportunities available at the Centre for Sustainable Food Systems at UBC Farm. FENV students will take four Faculty courses (LFS 100/250/350/450) and will gain specific knowledge of agroecology principles from four additional required courses APBI 260/360/361/460 plus a 6-12 credit internship/practicum and/or a study abroad semester. FENV students will also be required to take a course in statistics (e.g., LFS 252) and a course in communications (LFS 400), with their remaining program made up with courses from a set of selected restricted and unrestricted electives.

Learning Outcomes:
In addition to achieving the Faculty's learning outcomes, upon completing the course requirements in this major, students will have:

1. Become qualified to pursue a professional career related to sustainable agriculture;
2. Acquired the academic foundation required for postgraduate studies in agroecology and in its underlying disciplines;
3. Defined, discussed, applied and evaluated the ecological principles and approaches needed to critique, design and/or manage sustainable food production systems;
4. Formulated strategies to promote

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Restricted Electives[3]	18
Unrestricted Elective	3
Total Credits	31
Fourth Year	
LFS 400	3
LFS 450	3
APBI 460	3
Fourth Year Experience[4]	6
Restricted Electives[3]	12
Unrestricted Elective	3
Total Credits	30
Overall four-year total	**120**

1. Students who have not completed Calculus 12 must take MATH 180 or 184 to fulfill their first year Math requirement.

2. Some students may be advised to take first year Chemistry and/or Physics courses depending on their academic plans and interests. They should consult with an FENV advisor.

3. To be selected in consultation with a program advisor. Typically includes courses in APBI, BIOL and FNH. For suggested courses see the Faculty website.

4. To be selected in consultation with a program advisor. Credits can include APBI 496 (3-6) and/or a semester studying at another approved institution including those outside Canada. Students can also combine the Fourth Year Experience with restricted credits to complete a season-long practicum at the Centre for Sustainable Food Systems at UBC Farm, at other approved farms, or at an approved educational or research institution.

sustainability and innovation in food production systems, based on appropriate ecological concepts;

5. Described, discussed and analysed the interrelationships among food production systems, other components of the food system, and other ecosystems and land uses;
6. Critically evaluated the ecological, economic and social impacts of different food production systems; and
7. Developed analytical and communication skills to function effectively as global citizens knowledgeable in food security and related issues.

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New Course Proposals

Category: 1

Proposed Calendar Entry: **APBI 210 (4) Vascular Plants** A comparative study of pteridophytes, gymnosperms and angiosperms, integrating form, function and ecology. [3-3] Prerequisite: Either (a) all of BIOL 121, BIOL 140 or (b) all of SCIE 001, BIOL 140. Or (c) 7 credits of first-year biology. Equivalency: BIOL 210	**URL:** n/a **Present Calendar Entry:** n/a. **Type of Action:** Create a new course through use of a cross listing with an existing course, BIOL 210 **Rationale:** This course is designed to introduce students to the basic elements of plant structure, biodiversity, and evolution. A major emphasis is placed on the flowering plants, which form the basis of nearly all agricultural systems. APBI 210 is one of the core courses in the second-year of the proposed Applied Plant and Soil Sciences major. Sean Graham from LFS is currently co-teaching BIOL 210.
Proposed Calendar Entry: **APBI 235 (3) Biotechnology in Agricultural Food Production** Genetics, genomics, and biotechnology concepts with applications to agricultural food production and food safety. *Prerequisites:* BIOL 112, BIOL 121, BIOL 140	**URL:** n/a **Present Calendar Entry:** n/a. **Type of Action:** Add new 3-credit course: APBI 235 Biotechnology in Agricultural Food Production **Rationale:** The Faculty of LFS does not offer any introductory courses in genetics and molecular biology. This currently restricts the eligibility of LFS students to enroll in any advanced genomics courses offered by LFS faculty members (e.g. BIOL 430, BIOL/FNH 436, BIOL 440) and limits learning opportunities in biotechnology for LFS undergraduates. The 200-level course proposed here will cover introductory genetics, molecular biology, genomics, and biotechnology subject matter. By offering this 200-level course to LFS undergraduate students early in their degree programs, those students inspired to pursue a career in biotechnology in animal, plant, or food sciences can then track through relevant advanced courses taught by LFS faculty and/or faculty in Science. Those students who do not opt to specialize in a

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	biotechnology field in their 3rd and 4th years will be better equipped to make informed decisions about their choices of foods and medicines developed using genomics technologies, as well as the ideological stances they form towards genomics, in a future likely impacted more and more by biotechnology. **Learning Outcomes** Students who enroll in this course will learn: 1. Fundamental concepts in molecular biology (nucleic acid (DNA) and protein biochemistry, gene regulation); 2. Fundamental concepts in Mendelian genetics and gene mapping; 3. Genomics and approaches to genomic studies (basic concepts in gene sequencing, sequence bioinformatics, and gene expression analyses); 4. Biotechnology concepts including genetic modification (GM) and non-GM applications to agricultural food production; and 5. Regulatory and ethical issues in biotechnology with a focus on Canadian policies.
Proposed Calendar Entry: **APBI 318 (4) Applied Plant Breeding** Small-scale classical (i.e., non-biotechnological) plant breeding. Hands-on, application-oriented approach to techniques and procedures for managing seed inventories, designing and implementing a simple plant breeding program, and evaluating the impact of selection on breeding populations and desired outcomes. [3-1-0]	**URL:** n/a **Present Calendar Entry:** **Type of Action:** Add new 4-credit course: APBI 318 Applied Plant Breeding **Rationale:** Andrew Riseman from LFS currently teaches AGRO 424/BIOL 443- Plant Breeding and Biotechnology. This current pair of cross-listed courses will not be taught by Andrew after APBI 318 has been approved. In the near future, LFS will ask Science to delete BIOL 443 and to create a cross-listing of APBI 318 under the name BIOL 318. This action is in response to several issues. These include the development of APBI 235, which is specifically designed to address

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	agricultural biotechnology theory and applications. In addition, there are no courses currently offered at UBC that address the practical aspects of plant breeding and represents a significant deficiency for those students interested in learning the specifics of how to manage on-farm genetic resources. Finally, there are comparatively few 300 level courses available as restricted electives for APSS students, and the course will be targeted toward both third and fourth year students. This is why the course will be offered at the 300 level rather than at the 400 level. This course will use problem-based learning as the primary pedagogy. Therefore, the primary learning experience will occur in the tutorials. **Learning Outcomes:** Upon successful completion of this course, the students should be able: 1. To design and implement a simple plant breeding program; 2. To predict the potential for successful plant improvement for a particular breeding objective, given the nature of the plant species and the genetic inheritance of the trait; 3. To create and manage plant populations in terms of specific genetic composition; and 4. To develop genetic hypotheses and apply the appropriate statistical methods for their evaluation.
Proposed Calendar Entry: **APBI 324 (3) Introduction to Seed Plant Taxonomy** Introduction to seed plant taxonomy emphasizing descriptive morphology and identification. Each student will be required to submit a plant collection. [2-3-0] Prerequisite: BIOL 121 Equivalency: BIOL 324	**URL:** n/a **Present Calendar Entry:** n/a. **Type of Action:** Create a new course through use of a cross listing of an existing course, BIOL 324 **Rationale:** This course provides skills in plant identification suitable for ecologists, weed scientists, conservation biologists and environmental consultants. It is thus an important component of the overall APSS program. Furthermore, the treatment of the

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	biological basis of plant variation will be useful background for other APSS courses such as the proposed course in Applied Plant Breeding (APBI 318) and Plant Domestication (APBI 422). Quentin Cronk from LFS is currently co-teaching BIOL 324.
Proposed Calendar Entry: **APBI 397 (3) Scientific Inquiry in Plant and Soil Sciences** Information literacy, the scientific method, framing scientific questions, critical analysis of primary literature, evaluating scientific research outcomes, designing experiments, data analysis, writing research proposals and reports, and presenting seminars. [2-0-1]	**URL:** n/a **Present Calendar Entry:** n/a. **Type of Action:** Add new 3-credit course: APBI 397 Scientific Inquiry in Plant and Soil Sciences **Rationale:** This course is designed to prepare students for the completion of an individual research project or major essay in their forth year [APBI 498/499]. Topics to be addressed include information literacy, the scientific method, framing scientific questions, hypothesis development, experimental design, data collection and analysis, and information dissemination/manuscript development. This course will provide the required framework for students to propose, design, conduct, and share an individual, multi-year research project. **Learning Outcomes:** At the completion of this course students will: 1. Understand the historical origins of scientific thought in western philosophy; 2. Understand the concept of null hypothesis and the designed experiment; 3. Be aware of ethical issues in science including scientific integrity; 4. Analyse data statistically and graphically; 5. Be aware of the issues involved in writing a technical report or paper. 6. Know how to develop grant and research proposals; 7. Develop hypotheses and design experiments; 8. Be able to use a range of analytical procedures; 9. Distinguish type I and type II error; 10. Distinguish types of replication and pseudoreplication; and 11. Write a research proposal.

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Proposed Calendar Entry: **APBI 398 (3) Research Methods in Applied Animal Biology** Research methods including research design, scientific critique, writing proposals and reports, and oral presentation. *Prerequisite:* Third year standing in the Applied Animal Biology program.	**URL:** n/a **Present Calendar Entry:** n/a **Type of Action:** Add new 3-credit course: APBI 398 Research Methods in Applied Animal Biology **Rationale:** This course is required for students in Applied Animal Biology – 3rd year standing in this program is a prerequisite. The course introduces students to research methods in this field and helps students develop the research and critical thinking skills essential for the success in the essay / thesis (APBI 498/499) required in 4th year. This course responds to the TREK 2010 aim of better integrating undergraduates in research, and provides a foundation for linking undergraduates with graduate students and other researchers in applied animal biology. The course relies upon the active participation of the other researchers, and builds a team environment for students and faculty within the Applied Animal Biology program. **Learning Outcomes:** 1. Students will become familiar with research approaches in applied animal biology. 2. Students will learn how to present to a general audience. 3. Students will learn how to present to a research audience. 4. Students will gain experience in summarizing and critiquing published research articles and reviewing an area of research. 5. Students will generate their own ideas for new research, and gain experience in the development of research proposals.
Proposed Calendar Entry: **APBI 422 (3) Plant Domestication** Outstanding scientific questions raised by the major groups of domesticated plants in tropical and temperate regions; emphasis on soja, brassicas, cassava, cacao and sunflower and	**Present Calendar Entry:** n/a **Action:** Add new 3-credit course: APBI 422 Plant Domestication **Rationale:** An advanced course in domesticated plants and the process of domestication is central to APBI. The course

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cereals. Prerequisites: APBI 235 and either BIOL 324 or APBI 325	builds on BIOL 343 (Plants and People) and BIOL 324 (Seed Plant Taxonomy). It is intended to be complementary to BIOL 440 and APBI 325. The course will develop the ideas on the biosystematics of crop plant complexes introduced in BIOL 324 and the general interest in crop plants encouraged by BIOL 343. Students inspired by these two courses have not hitherto had the means of developing this material to a high level. The course is intended to be a useful introduction for a career working with crop plants. In the near future, LFS will ask Science to create a cross-listing of APBI 422 under the name BIOL 422. **Learning outcomes**: Upon successful completion of this course students should be able to (1) demonstrate familiarity with the major crop plant systems (2) conduct a test for selection on crop plant genes relative to those of wild species (3) set up a designed experiment to screen for traits relevant to crop plants, such as salinity and drought tolerance (4) use genomic resources to determine the origin of domesticates
Proposed Calendar Entry: **APBI 440 (3) Plant Genomics** Concepts, principles, and recent discoveries in genome structure and comparative genomics in plants with a focus on economically important plants; applications of genomics approaches to questions in plant genetics, evolution, and ecology. Prerequisites: BIOL 334, and BIOL 335 (or taken concurrently). Equivalency: BIOL 440	**URL:** n/a **Present Calendar Entry:** n/a **Type of Action:** Add new 3-credit course APBI 440 Plant Genomics **Rationale:** The proposed new 3 credit course is intended as a fourth year course to be cross-listed between Biology and the undergraduate curriculum in the Faculty of Land and Food Systems. A formal request for the Science cross-listing is currently being processed by Science's Curriculum Committee. History: A course substantially like that proposed will be taught under the listing of

	Topics in Agricultural Sciences, AGSC 490B, during the spring semester 2009. AGSC 490B has been approved as an elective for the Cell Biology and Genetics, Plant Biology, and Evolutionary Biology options within the Biology major. <u>Background:</u> Plant genomics currently is a very dynamic and exciting field with discoveries being rapidly made from genome sequencing projects and analyses of the genomes of several agricultural and model system plants that have been published recently and that are ongoing. Genomics is at the cutting-edge of plant biology and its importance will increase in the future especially as new sequencing technologies allow more rapid and cost-effective sequencing that can be applied to a range of biological questions. Genomics approaches are being used in genetics, evolution, and ecology to gain new insights into important problems in each field. The proposed course will help prepare students for research jobs in government, universities, and the biotechnology industry, as well as for graduate studies in genomics, genetics, evolution, and other aspects of plant biology. <u>Precedent:</u> Many universities across North America have a Plant Genomics course for fourth year undergraduates. At UBC Vancouver the only current courses that include plant genomics are BIOL/FNH 436 Integrated Functional Genomics, and BIOL 430 Genome Evolution. BIOL/FNH 436 has a focus on functional genomics and the use of genomics technologies to answer questions in plant molecular biology. The proposal Plant Genomics course will focus on structural and comparative genomics, and the use of genomics approaches to answer questions in genetics, evolution, and ecology. The proposed course is being coordinated with the instructors of BIOL 436, Sunita Chowrira and Steve Lund, to be complementary and avoid overlap. Both instructors are supportive of this proposal and indicated that there will be minimal overlap with BIOL/FNH 436. Structural and comparative genomics in plants is only a small

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	part of BIOL 430 (instructor: Keith Adams) and that aspect will be minimized to avoid overlap once the proposed course is in place. There is considerable student demand for both BIOL 436 and BIOL 430 each year; indeed the registration and wait lists for both courses fill up during the first week of registration in the summer and remain full through the first week of classes. Some students who want to take the courses are unable to do so because of the limited number of seats. The proposed course will help accommodate the high demand and allow more students to learn about genomics in small fourth year courses. **Learning Outcomes:** 1. Students will achieve a good working knowledge of concepts, principles, and recent discoveries in structural and comparative genomics of plants. 2. They will be able to apply genomics approaches to answer questions in genetics, evolution, and ecology, as well as to crop plant improvement. 3. Students will be able to discuss and critically evaluate recent research papers in plant genomics. 4. They will be able to use web resources in plant genomics for research and general knowledge.
Proposed Calendar Entry: **LFS 400 (3) Digital Communication and Topics in Agriculture** Summarize, evaluate, and synthesize information pertaining to agricultural topics; distinguish between unbiased and biased reports; effectively communicate using digital media. [1-2-0]	**URL:** n/a **Present Calendar Entry:** n/a **Type of Action:** Add new 3-credit course: LFS 400 Digital Communication and Topics in Agriculture **Rationale:** No course currently available at UBC addresses modern communication skills and their use to inform the public on agricultural topics. This course will integrate discipline-based knowledge with ways of contextualizing and disseminating it to the public. Students will understand, design and produce both unbiased and promotional digital content.

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	Learning Outcomes: Upon successful completion of this course, the students will have: 1. Discussed the ways information is contextualized and manipulated for a predetermined outcome; 2. Understood how to best position information for a desired outcome; 3. Designed, produced, and released communication products that present information in an unbiased context and in a biased or promotional context through digital media; 4. Developed the required technological skills to produce high quality digital content (e.g., podcast); 5. Integrated discipline knowledge into effective communication vehicles designed for a predetermined outcome; 6. Characterized the advantages and disadvantages of releasing information using traditional media outlets and social networks; and 7. Engaged with rudimentary data visualisation tools and determined how they can be used effectively to enhance communication.

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Relabeling of Existing Courses

Proposed Calendar Entry: *Except where otherwise noted, please use the calendar description of the corresponding AGSC course.*	**URL:** n/a **Present Calendar Entry:**
LFS 100 (1) Introduction to Land, Food and Community	**~~AGSC~~ 100 (1) Introduction to Land, Food and Community** Orientation to the programs, learning environment and core values of the Faculty of Land and Food Systems; career programs; survey of professional opportunities and requirements. [1-0-0]
LFS 250 (6) Land, Food and Community I	**~~AGSC~~ 250 (6) Land, Food and Community I** Introduction to managed systems and concepts of sustainability; economic, ecological and social components; managed landscapes, agri-food systems, and communities; urban and rural systems; the land, food, nutrition and human health continuum. [4-0-4]
LFS 252 (3) Land, Food, and Community: Quantitative Data Analysis	**~~AGSC~~ 252 (3) Land, Food, and Community: Quantitative Data Analysis** Introduction to tools needed for data analysis of the economic, ecological, health, and scientific components of land and food systems. *Prerequisite:* AGSC 250 and one of MATH 100, MATH 102, MATH 104, MATH 180, MATH 184.
LFS 301 (3) Aquaculture Field Studies	**~~AGSC~~ 301 (3) Aquaculture Field Studies** An orientation to the aquaculture system in BC. Given jointly with Malaspina University-College. Participating students are assessed a fee.
LFS 302 (3/6) d International Field Studies	**~~AGSC~~ 302 (3/6) d International Field Studies** Field studies carried out abroad under staff direction. Participating students are assessed a fee.
LFS 350 (3) Land, Food, and Community II	**~~AGSC~~ 350 (3) Land, Food, and Community II** Introduction to tools and skills required to assess the economic, ecological, social, and technological components of managed landscapes, agrifood systems and communities comprising

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	the land, food, nutrition and health continuum. [3-0-0] *Prerequisite:* AGSC 250.
LFS 450 (3) Land, Food, and Community III	**~~AGSC~~ 450 (3) Land, Food, and Community III** Capstone course. Problem-based analysis of complex case studies selected from the land, food and community continuum. Cases are specifically designed to require development of integrated disciplinary and inter-disciplinary analysis. [1-0-3] *Prerequisite:* AGSC 350 and fourth year standing
LFS 490 (3) Topics in Agricultural Sciences	**~~AGSC~~ 490 (3) Topics in Agricultural Sciences** Analysis and interpretation of current issues in agricultural sciences.
LFS 496 (3/6) d Career Development Internship	**~~AGSC~~ 496 (3/6) d Career Development Internship** Technical work experience appropriate to students' career goals. Enrolment subject to competition and availability of work placements. **Type of Action:** (1) Change course codes from AGSC to LFS **Rationale:** (1) These courses should reflect the name of the current faculty (Land and Food Systems) rather than the name of the old Faculty (Agricultural Sciences)

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Proposed Calendar Entry: *Except where otherwise noted, please use the calendar description of the corresponding AGRO course.*	**URL:**n/a **Present Calendar Entry:**
APBI 244 (4) Forest and Agricultural Climatology	~~**AGRO**~~ **244 (4) Forest and Agricultural Climatology** An introduction to the basic principles and processes of climatology. Energy and water balance concepts. Atmospheric motion. Microclimate modification and air pollution. Climate classification and land capability. [3-2-0] *Equivalency:* GEOG 204.
APBI 260 (6) ***Food and Environment I*** ***Prerequisite:* LFS 250.**	~~**AGRO**~~ **260 (6)** ~~**Agroecology I**~~ Introduction to the biophysical and socioeconomic factors affecting systems management and production in selected agroecosystems. A fee will be assessed each student to cover field trip costs. [1-3-6] ~~*Prerequisite: AGSC 250.*~~
APBI 311 (3) Animal Physiology I	~~**AGRO**~~ **311 (3) Animal Physiology I** Physiological principles in animals, including vital life support systems, cellular communication, growth and development. [1-0-3] *Prerequisite:* BIOL 201.
APBI 312 (3) Animal Physiology II ***Prerequisite:* APBI 311.**	~~**AGRO**~~ **312 (3) Animal Physiology II** Physiological systems of importance to animal production and wildlife management. digestion, reproduction, lactation and environmental adaptation. [1-0-3] ~~*Prerequisite: AGRO 311.*~~
APBI 314 (3) Animals and Society	~~**AGRO**~~ **314 (3) Animals and Society** Contemporary use of animals for food production, companionship, recreation and science; social and ethical issues concerning human impacts on animals; animals in human culture; protection of animals by society and the law. *Prerequisite:* At least third-year standing in any faculty.
APBI 315 (3) Animal Welfare and the Ethics of Animal Use ***Prerequisite:* At least third-year standing in any faculty.**	~~**AGRO**~~ **315 (3) Animal Welfare and the Ethics of Animal Use** Scientific assessment of animal well-being, ethical concepts applied to animal use, and animal welfare issues

	arising in agriculture, biomedical research and other areas. [1-0-3] *Prerequisite:* ~~A minimum of t~~hird-year standing in any faculty.
APBI 316 (3) Equine Biology, Health and Nutrition	~~AGRO~~ **316 (3) Equine Biology, Health and Nutrition** Physiology, growth and reproduction of the horse; nutrition, diet formulation and feeding practices; common diseases, their prevention and treatment. [3-0] *Prerequisite:* Permission of instructor
APBI 322 (3) Horticultural Techniques	~~AGRO~~ **322 (3) Horticultural Techniques** An introduction to horticultural practice in an experiential learning format. Plant identification, seeding, propagation, pruning, cultivation media, pesticide application and safety are examined in the context of integrated crop management. An additional fee may be required for the pesticide certification examination. [0-3-3]
APBI 351 (4) Plant Physiology	~~AGRO~~ **324 (4) Plant Physiology** Mechanisms and regulation of functional processes contributing to the assimilation, transport and utilization of water, mineral nutrients and carbon by plants. [3-3-0] *Prerequisite:* BIOL 121 and either (a) CHEM 123 or (b) all of CHEM 111, CHEM 113. CHEM 233 is recommended. *Equivalency:* BIOL 351, FRST 311.
APBI 326 (4) Introductory Plant Pathology	~~AGRO~~ **326 (4) Introductory Plant Pathology** Study of the ecology of plant pathogenic organisms; principles of disease development and control. [3-2-0] *Equivalency:* BIOL 316.
APBI 327 (3) Introduction to Entomology	~~AGRO~~ **327 (3) Introduction to Entomology** A survey of the structure, classification and biology of insects; ecology and life-histories of insects; insect-plant relations. [2-3-0] *Prerequisite:* BIOL 121. *Equivalency:* BIOL 327.
APBI 328 (4) Weed Science	~~AGRO~~ **328 (4) Weed Science** Importance, identification, dissemination and biology of weeds; preventive, cultural, biological and

	chemical methods of control. [3-2-0] *Equivalency:* BIOL 317.
APBI 342 (3) Soil Biology	~~AGRO~~ **342 (3) Soil Biology** The diversity of soil organisms (bacteria, protozoa, fungi, animals, plants) in natural and managed ecosystems; roles in primary production, nutrient cycling, decomposition and reclamation; interactions between soil organisms; responses to environmental change. [2-3-0] *Prerequisite:* BIOL 121. *Equivalency:* FRST 310.
APBI 360 **(4) *Food and Environment II*** Animals and Plants as Components of Agricultural Ecosystems. The functions and interactions of plants and animals in agricultural systems using a systems approach. A fee will be assessed each student to cover field trip costs. **[1.5-0-3]** ***Prerequisite:* APBI 260.**	~~AGRO~~ **360 ~~(3) Agroecology II~~** Animals and Plants as Components of Agricultural Ecosystems. ~~This second course in the agroecology core uses a systems approach to investigate~~ the functions and interactions of plants and animals in agricultural systems. A fee will be assessed each student to cover field trip costs. ~~[1-0-3]~~ ~~*Prerequisite:* AGRO 260.~~
APBI 361 (3) Key Indicators of Agroecosystem Sustainability A detailed exploration of biophysical, economic and social ecosystem sustainability indicators for primary production subsystems. [1-0-3]	~~AGRO~~ **361 (3) Key Indicators of Agroecosystem Sustainability** ~~This course builds on the foundation of agroecosystems in AGRO 260 and AGRO 360, and the key indicators of sustainability in the faculty core (AGSC 350) with a~~ detailed exploration of biophysical, economic and social ecosystem sustainability indicators for primary production subsystems. [1-0-3]
APBI 401 (3) Soil Processes	~~AGRO~~ **401 (3) Soil Processes** Integration of soil physics, chemistry and biology in understanding essential soil processes. [3-0-0]
APBI 402 (3) Sustainable Soil Management	~~AGRO~~ **402 (3) Sustainable Soil Management** Application of fundamental, unifying, soil science principles in sustainable ecosystem management. [1-0-3]
APBI 403 (3) Field and laboratory methods in soil science	~~AGRO~~ **403 (3) Field and laboratory methods in soil science** [1-3-0]
APBI 411 (3) Reproductive Physiology and Technology ***Prerequisite:* APBI 312.**	~~AGRO~~ **411 (3) Reproductive Physiology and Technology** A comparative overview of reproductive physiology and

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	reproductive technologies in domesticated and laboratory animals. [1-0-3] ~~*Prerequisite:* AGRO 312.~~
APBI 414 (3) Principles of Animal Breeding ***Prerequisite:* LFS 350.** BIOL 334 or FRST 302 are recommended.	~~**AGRO**~~ **414 (3) Principles of Animal Breeding** The basic principles and tools used in animal breeding and genetics in birds, fish, and mammals. [1-0-3] ~~*Prerequisite:* AGSC 350.~~ BIOL 334 or FRST 302 are recommended.
APBI 418 (3) Intensive Fish Production ***Prerequisite:* APBI 312.**	~~**AGRO**~~ **418 (3) Intensive Fish Production** Management of fin fish throughout the life cycle; broodstock, egg, larvae and juvenile. Control of environmental factors, including pathogens, for maximum productivity at all life stages. [3-2] ~~*Prerequisite:* AGRO 312.~~
APBI 419 (3) Fish Diseases ***Prerequisite:* Either (a) all of APBI 311, APBI 312 or (b) BIOL 353. APBI 418 is strongly recommended.**	~~**AGRO**~~ **419 (3) Fish Diseases** Common diseases of fish. Epidemiology, zoonotic potential, prevention and treatment of diseases. ~~*Prerequisite:* Either (a) all of AGRO 311, AGRO 312 or (b) BIOL 353. AGRO 418 is strongly recommended.~~
APBI 420 (3) Greenhouse Horticulture Systems	~~**AGRO**~~ **420 (3) Greenhouse Horticulture Systems** Integrated crop management in controlled environment systems. The primary focus of the course will be on greenhouse vegetable and floriculture production systems. [0-3-3]
APBI 421 (3) Integrated Crop Management ***Prerequisite:* All of APBI 260, APBI 360.**	~~**AGRO**~~ **421 (3) Integrated Crop Management** Development and implementation of an integrated crop management program in horticulture. The course focuses on the linkages between crop production and protection in the management of a horticultural ecosystem. [0-3-3] ~~*Prerequisite:* All of AGRO 260, AGRO 360.~~
APBI 423 (3) Ecophysiology and Horticulture	~~**AGRO**~~ **423 (3) Ecophysiology and Horticulture** Ecophysiological processes in horticultural production systems. Transformations of energy and matter by horticultural crops. Regulation of crop development and performance by

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	biotic and abiotic environmental factors. [1-0-3]
APBI 426 (3) Plant-Microbe Interactions	~~AGRO~~ **426 (3) Plant-Microbe Interactions** Biology and physiology of selected plant-microbe relationships. Impacts of plant-microbe relationships on society. [3-2-0] *Prerequisite:* BIOL 201. *Equivalency:* BIOL 421.
APBI 427 (3) Insect Ecology ***Prerequisite:*** Either (a) BIOL 205 or (b) all of BIOL 327, **APBI 327.** *Equivalency:* BIOL 411.	~~AGRO~~ **427 (3) Insect Ecology** Behavioural, population and community ecology of insects. Interaction between insects and plants and the application of the principals of insect ecology to biological control of insects and weeds. [3-0] *Prerequisite:* Either (a) BIOL 205 or (b) all of BIOL 327, ~~AGRO 327.~~ *Equivalency:* BIOL 411.
APBI 428 (3) Integrated Pest Management	~~AGRO~~ **428 (3) Integrated Pest Management** Development and implementation of multi-disciplinary pest management programs in agricultural crops. [3-2] *Prerequisite:* BIOL 121.
APBI 444 (3) Agroforestry	~~AGRO~~ **444 (3) Agroforestry** An introduction to the application of knowledge and principles of agroecology and forest ecology to global agroforestry systems. The course includes a one-weekend field trip that requires a supplemental fee. [1-0-3] *Prerequisite:* An undergraduate course in ecology or equivalent. *Equivalency:* FRST 444.
APBI 460 (3) Advanced Agroecology The relationship between biological diversity and sustainability for the management of agroecosystemes; emphasis **on** ecological interactions between natural ecosystems and agroecosystems, including connections between agroecology and conservation biology. A fee will be assessed each student to cover field trip costs. [1-0-3] ***Prerequisite:* APBI 360 or equivalent.**	~~AGRO~~ **460 (3) Advanced Agroecology** ~~Focuses on~~ the relationship between biological diversity and sustainability for the management of agroecosystemes. ~~It builds on the core agroecology courses and~~ emphasis~~es~~ ecological interactions between natural ecosystems and agroecosystems, including connections between agroecology and conservation biology. A fee will be assessed each student to cover field trip costs. [1-0-3] ~~*Prerequisite:* AGRO 360 or equivalent.~~
APBI 490 (3) Topics in Applied Biology	~~AGRO~~ **490 (3)** ~~**Topics in Agroecology**~~ Analysis and interpretation of current issues in agroecology. Prior to

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	registration, students should consult with Student Services in the Faculty of Land and Food Systems. [0-0-3]
APBI 495 (3) Principles of Wildlife Management in Forests and Agricultural Environments	**~~AGRO~~ 495 (3) ~~Principles of Managing Problem Wildlife in Forests and Agricultural Environments~~** Impacts of wildlife on crop productivity in temperate and tropical environments, the resiliency of wildlife populations to conventional control methodology, adoption of innovative methods to reduce crop damage, and the impact of introduced species on native fauna. [2-0-1] *Equivalency:* CONS 495.
APBI 497 (2-6) d Directed Studies	**~~AGRO~~ 497 (2-6) d Directed Studies**
APBI 498 (3) Undergraduate Essay	**~~AGRO~~ 498 (3) Undergraduate Essay** Preparation of a comprehensive and analytical review of an approved topic under the supervision of a faculty member. Consultation with a program adviser is required.
APBI 499 (6) Undergraduate Thesis	**~~AGRO~~ 499 (6) Undergraduate Thesis** Design and execution of an experimental/analytical research project leading to the preparation of a thesis. *Prerequisite:* Approval of a program adviser; consult before the end of classes in third year. **Type of Action:** (1) Change course code from AGRO to APBI (2) Update calendar descriptions and course prerequisites to reflect new LFS and APBI labels. (3) Increase credits for APBI (~~AGRO~~) 360 from 3 credits to 4 credits. **Rationale:** (1) These courses should reflect the name of the proposed new degree (Applied Biology) rather than the name of the existing degree to be phased out (Agroecology) (2) Update calendar descriptions and prerequisites as appropriate. (3) APBI 360 will continue to be taught with 1.5 hours of lectures and 3 hours of "learning experience" tutorials. This

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	number of contact hours justifies the 4 credits.
Proposed Calendar Entry:	**URL:**n/a **Present Calendar Entry:** ~~AGRO 424 (4) Plant Breeding and Biotechnology~~ ~~Genetic Basis and methodology of breeding for improved crop and ornamental plants.~~ ~~Application of tissue culture and molecular biology to plan improvement. [3-0-2]~~ ~~Prerequisite: BIOL 201 and one of BIOL 334, FRST 302.~~ ~~Equivalency: BIOL 443.~~ **Type of Action:** Delete course. **Rationale:** This course will not be used in the B.Sc. in Applied Biology degree program, and will not be offered to students who are finishing the B.Sc. in Agroecology program.

Proposed Calendar Entry: APBI 200 (3) Introduction to Soil Science	**URL:**n/a **Present Calendar Entry:** ~~SOIL~~ **200 (3) Introduction to Soil Science** Physical, chemical and biological properties of soils; soil formation, classification, use and conservation. There are no prerequisites for this course, but background in Biology 12, Chemistry 12, and Physics 12 (or first-year university-level) is strongly advised. **Type of Action:** Change course code from SOIL to APBI. Course description remains the same. **Rationale:** SOIL 200 is an LFS course, and so it should have the APBI label (it previously should have been relabeled as AGRO, but this did not happen). SOIL 200 is currently a program requirement within other faculties (e.g., Forestry), so these faculties will be notified of this switch.

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Enrolment Services
Senate and Curriculum Services
2016–1874 East Mall
Vancouver, BC V6T 1Z1
ginette.vallee@ubc.ca
T: 604-822-0140; F: 604-822-5945

2 December 2008

To: Vancouver Senate

From: Senate Curriculum Committee

Re: **NEW GRADUATE DEGREE PROGRAM**

Attached please find the Master of Food and Resource Economics (MFRE) degree program proposal for your consideration.

LAND AND FOOD SYSTEMS
New Program:
Master of Food and Resource Economics (MFRE)
Program Entry:
New program entry for MFRE degree
New Courses:
AGEC 515 (3) Agribusiness Management
AGEC 547 (6) Graduating Project

Proposal for a Master of Food and Resource Economics (MFRE) degree program

November 3, 2008

Background:

The Faculty of Land and Food Systems launched its new Master of Food Science professional degree in September, 2008. Following its success, the Faculty wants to offer a similar professional degree in the area of food and resource economics. The Faculty's Food and Resource Economics (FRE) group believes that by developing a professional master's degree it will be able to attract a new type of graduate student as well as strengthen its existing M.Sc. degree in Agricultural Economics.

Need for program:

For three decades, FRE faculty members have seen many graduates from agricultural economics and related bachelor's degrees struggle to find a master's degree that suits their interests and background. Many find the M.Sc. in Agricultural Economics to be too research focused. Some consider degrees in public policy, while others consider an MBA, but in both cases they want a degree that is more economics based. They want a degree in applied economics that builds on their undergraduate degrees by extending their economic theory and applying it to the food and resource sectors. The proposed degree combines applied economics with policy analysis and agribusiness management. It is the type of professional degree that many graduates have said they wanted.

Credential:

Master of Food and Resource Economics (MFRE)

Location:

The University of British Columbia, Vancouver campus

Faculty offering the program:

Faculty of Land and Food Systems

Anticipated program start date:

September, 2009

Anticipated completion time in years or semesters:

1 year (Sept. to Aug.)

A summary of the proposed program

Objectives:

1. To provide a new opportunity for students from B.C., Canada, and the world to obtain the necessary skills and knowledge for careers as professional economists in the food and resource sectors, locally and globally. Target enrollment is 15-20 students each year, with a balance of recent graduates and working professionals, and international and domestic students.

Expected enrollment for the first year is three students from China, seven students from other countries, and five domestic students. For recruiting students from China, the MFRE program is expecting to partner with the same recruiting agency as the Master of Food Science does, namely Can-Zhong International Educational Consulting Service. A contract with Can-Zhong similar to Food Science's will be set up following the Senate approved guidelines.

2. To strengthen the overall graduate program of the FRE group in the Faculty of Land and Food Systems. As well as attracting more highly qualified students, the MFRE will be a full cost recovery program and will provide discretionary revenue to support the teaching and research of FRE. Students in the M.Sc. in Agricultural Economics will benefit from the certainty that a full complement of graduate courses will be offered each year.

It is anticipated that a small number of students will enter the MFRE program who would otherwise have enrolled in the M.Sc. program. This is not seen as a problem as it is consistent with the direction the FRE group wants to take the M.Sc. degree: towards a smaller number of students who are highly committed to research.

Contribution of the proposed program to UBC's mandate and strategic plan

1. Contributes to UBC's goal that all academic programs meet the highest standards of excellence by strengthening the overall graduate program of FRE.

2. Provides a new learning opportunity for students to become more aware of issues concerning economic, social and environmental sustainability.

3. Contributes to internationalization as each of the six required graduate courses presents students with global issues, concerns, and solutions.

4. Provides a new professional opportunity for UBC alumni and other life-long learners throughout B.C. and Canada to gain access to UBC.

Learning outcomes for the MFRE degree

<u>Upon completing the MFRE degree, students will be able to:</u>

1. Analyze the key economic and policy issues associated with the production, distribution, processing, and marketing of food in a global context.
2. Analyze how markets function with respect to time, space and form in the local and global food sectors.

3. Identify positive and negative natural resource and environmental externalities associated with food production and distribution.
4. Identify the role of the agri-food sector in emerging markets for greenhouse gas emissions and carbon offsets.
5. Apply analytical techniques to evaluate policies for food markets and the associated natural resource and environmental sectors.
6. Critically evaluate and interpret research results from economic studies relating to food markets and related natural resource and environmental sectors.
7. Analyze food and resource-based problems using quantitative techniques such as econometrics and math programming combined with data collection and handling.
8. Apply tools of institutional analyses to prices, markets, development (e.g. project evaluation) and the environment.
9. Present economic arguments in a professional manner, both in spoken and written form.

Program requirements

The MFRE requires students to complete 30 credits as follows: 18 credits of required graduate courses, 6 credits of restricted electives, and a 6 credit graduating project. The AGEC graduate courses are offered by the Food and Resource Economics group; "AGEC" reflecting the group's previous name (Agricultural Economics). Restricted electives must be chosen from the list below. Note that a maximum of 6 credits of upper-level undergraduate courses can be used towards the degree.

1. Required graduate courses (18 credits)

AGEC 501(3): Applied Demand Analysis
AGEC 502(3): Topics in Food Market Analysis
AGEC 503(3): Policy Analysis for Food, Environment and Resources
AGEC 515(3): Agribusiness Management (new course)
AGEC 520(3): Topics in Land and Forest Resource Economics
FRST 530 (3): Multiple Regression Methods
or FRST 533 (3): Problems in Statistical Methods

2. Restricted Electives (6 credits)

Students choose two courses from the following list of Restricted Electives:

- AGEC 521 (3): Topics in Agricultural Economics – "Trade and the Environment"
- AGEC 540(3): International Agricultural Development
- ECON 370 (3): Benefit Cost Analysis and the Economics of Project Evaluation
- ECON 472 (3): Economics of Renewable Resources
- FOOD 510 (3): Introduction to Food Science
- FOOD 528 (3): International Food Laws and Regulations
- FRE 302 (3): Small Business Management in Agri-food Industries
- FRE 385 (3): Quantitative Methods for Business and Resource Management
- FRST 531 (3): Multivariate Statistical Methods

NB: Students who choose to take both FRST 530 and 533 can use one of these courses for 3 credits of Restricted Electives.

3. Required Graduating Project (6 credits)

AGEC 547 (6): Graduating Project (new course)

Because this is a professional degree, a master's thesis is not required. Instead, students carry out a summer research project under the supervision of FRE faculty and professional economists in industry and government.

The proposed calendar entry for the MFRE degree and the two new courses (AGEC 515 and AGEC 547) is in Appendix A.

Potential sectors of employment for graduates and opportunities for further study

There is unmet demand in Canada and around the world for professionals who can understand and analyze the economic relationships underlying the food and resource sectors. This demand has been increasing due to the prevalence and complexity of economic issues dealing with food security, safety, trade, and the effects of the food sector on the environment, combined with the inability of unspecialized managers to apply the necessary applied economics skills and industry know-how to deal with these issues. Governments and private industry, both in developed and developing countries, want professionals with applied economic skills and knowledge of the institutions, policies and other key features of the food and resource sectors. The MFRE is designed to meet the needs of economic practitioners in these sectors.

Graduates from the MFRE degree will have a solid foundation for entering a PhD program in Agricultural Economics and other areas that have an applied economics focus.

Delivery methods

Initially, the program will be delivered using standard scheduling and classroom delivery. But once the program has been operating for a few years, the FRE group will consider adding a part-time option, with more flexible scheduling and delivery methods. It is anticipated that some elements of distributed learning would be incorporated at this time.

Program strengths

Students will learn economic theory relevant to applications in the food and resource sectors through their FRE graduate courses. Four graduate courses will be taught by regular FRE faculty, who will bring their areas of research expertise to the classroom. The FRE faculty members have particular strengths in food economics, environmental economics, and policy analysis. Each faculty member brings direct experience working in the food and resource sectors, both domestically and internationally in Europe and Asia, particularly with developing countries.

Three graduate courses will be taught by sessionals drawn from professional economists who have work experience in industry or government. For example, for 2009/10, a Senior Policy Economist from Agriculture and Agri-Food Canada has expressed interest in teaching policy analysis (FRE 503), and a World Bank consultant who has spent his career working with economic incentives for small farmers and community forests in Indonesia is interested in teaching international development (FRE 540).

Relation to other established programs

In the Faculty of Land and Food Systems

M.Sc. in Agricultural Economics

The M.Sc. emphasizes skills required for quality economics research focused on the food and resource sectors. The MFRE emphasizes skills required by practitioners in the food and resource sectors who contribute to public policy issues and business decisions, where questions tend to be more applied than theoretical. Because the MFRE can be completed in one year, it will be more attractive for those students with a tighter time constraint, such as working professionals, and those for whom research is a lower priority.

Master of Food Science (MFS)

The MFS and MFRE are based in two very different disciplines, food science and economics. But they are structured in the same way, requiring six graduate courses, two restricted electives, and a summer project. Synergies will exist between the two programs in promotion and recruiting, the summer orientation program, and summer project placements.

In other Faculties at UBC

Master of Arts in Economics (MA)

Although course based, the MA in Economics is still considered a research degree, not a professional degree like the MFRE. Another major distinction between them is the subject matter. The MA focuses on broad questions of social importance, whereas the MFRE focuses on real world applications and issues related to food, agriculture, and environment.

Master of Business Administration (MBA) and Master of Management (MM)

These are professional degrees focusing on business management. While the MFRE will incorporate some aspects of agribusiness management, compared to the MBA and MM the MFRE is much less focused on management and more focused on applied economics. The MBA targets working professionals, while the MM targets new graduates from arts, engineering and science. The MFRE will target a balance of working professionals and new graduates.

Other B.C. Institutions

No other B.C. institution offers degrees in agricultural economics or in food and resource economics.

Other Canadian Institutions

M.Sc. in Agricultural Economics

This is the standard degree in the areas of agriculture, food and resource economics offered at major Canadian universities (typically with an updated title). The only professional degrees related to these areas in Canada are the joint MBA/Master of Agriculture degree at University

of Alberta, the MBA with a specialization in agribusiness management at University of Guelph, and the Master of Development Economics at Dalhousie University.

The MFRE is unique in Canada in combining applied economics with policy analysis and agribusiness management.

Admission procedures

The admission process will be the same as for other masters programs in the Faculty. Students must meet the general admission requirements for master's degree programs set by the Faculty of Graduate Studies. The FRE group will recommend to FOGS which applicants to admit. The MFRE admission process will be administered by the Faculty's Graduate Programs Office in conjunction with FOGS.

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, summer project supervisors, summer project coordinators, teaching assistants, and any space or library requirements.

a. Faculty

Additional responsibilities imposed on FRE faculty as a result of this new degree will be compensated for by an equivalent reduction in their other responsibilities. This will typically be achieved through hiring additional human resources. The program Director will be a regular FRE faculty member, on a rotating basis. A major responsibility of the program Director will be to recommend which students to accept to the MFRE program. Sessional instructors will be employed to teach three graduate courses and to assist with the supervision of summer research projects. The FRE group already has a small pool of qualified sessionals who have teaching, research, and industry experience.

b. Space requirements

As the program is primarily course-based, the space requirements will be classrooms, temporary office space for sessionals, and some flex space for MFRE students to study. The Faculty has a computer lab which the MFRE students may use.

c. Library resources

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

d. Administrative and support staff

The MFRE program will hire a Program Manager to oversee all operations of the new degree, except admission. The Program Manager will have a graduate degree in an area closely related to food and resource economics. He/she will hire support staff to coordinate the summer orientation program for international students and summer placements for the research projects.

e. Summer orientation program

The MFRE program will include a summer orientation similar to the Master of Food Science for students who have graduated from a university where courses are not taught in English. The orientation program will be 4-6 weeks in length, in the mid-July to late August period. It will include written and spoken English, disciplinary English, technical writing, adjustments to Canadian culture and academic environment, and an introduction to the local food and natural resource sectors. The purpose of the orientation is to ensure that students from different academic and cultural backgrounds will succeed in the MFRE program. The orientation will be highly recommended for international students, but not mandatory. Participants will be assessed a fee to cover the costs. All students in the MFRE program will begin Term 1 of the Winter Session in early September. Arrangements will be made with International Student Services to initiate medical insurance in early July for the students participating in the summer orientation program.

f. Tuition levels for the MFRE degree

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 taxpayer contribution to this program. The tuition level for international students is identical to the Master of Food Science program. The proposed tuition levels for the MFRE are consistent with what UBC and other universities are charging for professional master's degree programs in related areas. For a comparison of relevant tuition levels, please see Appendix C.

g. Financial aid

The MFRE 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. Funding for the financial aid program will come from the portion of gross tuition revenue that UBC central holds back for this purpose.

h. Budgetary impact of the proposal

The new degree program is expected to nearly break even in the first year (2009/2010), and for each year after that will be a net contributor of revenue to the Faculty. This new source of revenue will be used to support the academic mission of FRE and the Faculty. The budgetary impact statement plus an annual budget for the first five years of the program are given in Appendix D.

Consultations

Curriculum consultation request forms have been received back from the following UBC units. They all support the proposal.

Economics Department, Faculty of Arts
Faculty of Forestry
Fisheries Centre
Library
Sauder School of Business

Consultation forms have been sent (on October 22, 2008) but have not been received back from the following UBC units:

Institute of Asian Research (MAAPS program)
Institute for Resources, Environment, and Sustainability (IRES)

Consultation forms were sent to the above two units to alert them to the new program on anticipation that a few of their students might want to take a course from the MFRE program.

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

Mahesh Upadhyaya
Associate Dean, Graduate Programs
Faculty of Land and Food Systems
Tel: 604-822-6139
Email: mahesh.upadhyaya@ubc.ca

Appendix A: Proposed Curriculum Changes/Additions for Calendar

UBC Curriculum Proposal Form
Change to Course or Program

Category: (1)

Faculty: Land and Food Systems **Department: Food and Resource Economics** **Faculty Approval Date:** **pre-approved Sept. 18, 2008** **Effective Session Winter Term 1 Year 2009 for Change**	**Date: October 6, 2008** **Contact Person: Mahesh Upadhyaya** **Phone: 604-822-6139** **Email:mahesh.upadhyaya@ubc.ca**
Proposed Calendar Entry: CALENDAR 2008/09 IX. Faculties, Colleges, and The Faculty of Graduate Studies > Degree Programs > **Agricultural Economics** *Degrees Offered: M.Sc., M.F.R.E* **Members** ***Professor*** J. A. Vercammen. ***Associate Professors*** R. Barichello. ***Assistant Professor*** S. Gulati. **Program Overview** **The Food and Resource Economics (FRE) Group offers both a research master's degree, the Master of Science (M.Sc.) in**	**URL:** **http://www.students.ubc.ca/calendar/index.cfm?tree=12,204,828,1110** **Present Calendar Entry:** CALENDAR 2008/09 IX. Faculties, Colleges, and The Faculty of Graduate Studies > Degree Programs > **Agricultural Economics** *Degree Offered: M.Sc.* **Members** ***Professor*** J. A. Vercammen. ***Associate Professor*** R. Barichello. ***Assistant Professors*** ~~K. Baylis,~~ S. Gulati. **Program Overview** ~~The Food and Resource Economics (FRE) Group offers the Master of Science (M.Sc.) degree in Agricultural Economics through the Faculty of Graduate Studies.~~

Agricultural Economics, and a professional master's degree, the Master of Food and Resource Economics (M.F.R.E.). The M.Sc. is designed for careers where research is a main component, while the M.F.R.E. is designed for careers in industry or government. **In both degrees, coursework provides students with rigorous training in applied economics and quantitative methods. In the M.Sc., students develop specialized research skills by working with faculty throughout UBC on important real-world issues. In the M.F.R.E., students combine applied economics with policy analysis and agribusiness management, enabling them to analyze issues in the food and resource sectors.** **FRE faculty members have direct experience working in the food and resource sectors, both domestically and internationally in Europe and Asia, particularly with developing countries.** **Master of Science** ***Admission Requirements*** Students admitted to the M.Sc. degree program will normally possess a bachelor's degree in agricultural economics or a related area, and are expected to meet the admission requirements of the *Faculty of Graduate Studies*. ***Program Requirements*** The M.Sc. program can normally be completed in 18 to 20 months. After completing at least 18 credits of coursework, a thesis is written under the guidance of a UBC-wide committee that is chaired by a FRE faculty member. On occasion a course-based option is pursued. With the thesis option, students with an adequate undergraduate background in economic theory, mathematical economics, and quantitative methods must complete AGEC 501, **ECON** 500, **ECON** 526, **ECON** 527, and two field courses, which may be at the senior	~~The coursework provides students with rigorous training in applied economics and quantitative methods. Students develop specialized research skills by working with faculty throughout UBC on important real-world issues.~~ ~~FRE faculty members have been involved with projects in a variety of countries throughout Asia and other parts of the world (e.g., Dr. Barichello has extensive experience with food security issues in Indonesia). Formal educational linkages exist that allow FRE graduate students to study and research abroad.~~ **Master of Science** ***Admission Requirements*** Students admitted to the M.Sc. degree program will normally possess a bachelor's degree in agricultural economics or a related area, and are expected to meet the admission requirements of the *Faculty of Graduate Studies*. ***Program Requirements*** The M.Sc. program can normally be completed in 18 to 20 months. After completing at least 18 credits of coursework, a thesis is written under the guidance of a UBC-wide committee that is chaired by a FRE faculty member. On occasion a course-based option is pursued. With the thesis option, students with an adequate undergraduate background in economic theory, mathematical economics, and quantitative methods must complete AGEC 501, Econ 500, Econ 526, Econ 527, and two field courses, which may be at the senior undergraduate level. Students without an adequate background must take additional preparatory courses. The thesis normally involves identifying a research topic mutually agreed upon by the student and supervising faculty, undertaking an extensive review of the literature, developing the appropriate theoretical framework, and then

undergraduate level. Students without an adequate background must take additional preparatory courses. The thesis normally involves identifying a research topic mutually agreed upon by the student and supervising faculty, undertaking an extensive review of the literature, developing the appropriate theoretical framework, and then performing some form of empirical analysis. **Master of Food and Resource Economics** ***Admission Requirements*** **Students admitted to the M.F.R.E. degree program will normally possess a bachelor's degree in agricultural economics or a related area, and are expected to meet the admission requirements of the *Faculty of Graduate Studies*.** ***Program Requirements*** **The M.F.R.E. program requires 30 credits of course work over 12 months of intensive study, beginning in September. In Winter Session, students complete 18 credits of required graduate courses and 6 credits of restricted electives. The required graduate courses are:** **AGEC 501(3): Applied Demand Analysis** **AGEC 502(3): Topics in Food Market Analysis** **AGEC 503(3): Policy Analysis for Food, Environment and Resources** **AGEC 515(3): Agribusiness Management** **AGEC 520(3): Topics in Land and Forest Resource Economics** **FRST 530 (3): Multiple Regression Methods or FRST 533 (3): Problems in Statistical Methods** **For the list of restricted elective courses, please see the Faculty website (www.landfood.ubc.ca).** **In Summer Session, students undertake a 6-credit research project (AGEC 547) under**	performing some form of empirical analysis. **Contact Information** Faculty of Land and Food Systems 270–2357 Main Mall Vancouver, BC, Canada V6T 1Z4 Tel: 604-822-4593 Fax: 604-822-4400 Email: gradapp@interchange.ubc.ca Web: www.landfood.ubc.ca/programs/agec_grad.htm **Kirsten Cameron**, Graduate Programs Manager **Type of Action: New Program** **Rationale:** The M.F.R.E. degree program will provide a new opportunity for students from B.C., Canada, and the world to obtain the necessary skills and knowledge for careers as professional economists in the food and resource sectors, locally and globally.

the supervision of FRE faculty and professional economists in industry and government. **Contact Information** Graduate Programs Office Faculty of Land and Food Systems 270–2357 Main Mall Vancouver, BC, Canada V6T 1Z4 Tel: 604-822-4593 Fax: 604-822-4400 Email: gradapp@interchange.ubc.ca Web: www.landfood.ubc.ca	
Proposed Calendar Entry: AGEC 515 (3) Agribusiness Management	**Type of Action:** New Course **Rationale:** This course ensures that students in the new Master of Food and Resource Economics degree program achieve learning outcomes in the area of agribusiness management. This is necessary for professional economists working in the food and resource sectors, in Canada and abroad.
Proposed Calendar Entry: AGEC 547 (6) Graduating Project	**Type of Action:** New Course **Rationale:** This course allows students in the new Master of Food and Resource Economics degree program to apply the concepts and skills acquired from 18 credits of required AGEC graduate courses plus 6 credits of restricted electives to a real world research problem.