2014-2015 Undergraduate Calendar

The information published in this Undergraduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2014-2015 academic year, including the Summer Semester 2014, the Fall Semester 2014 and the Winter Semester 2015.

For your convenience the Undergraduate Calendar is available in PDF format.

If you wish to link to the Undergraduate Calendar please refer to the Linking Guidelines.

The University is a full member of:

- The Association of Universities and Colleges of Canada

Contact Information:

University of Guelph
Guelph, Ontario, Canada
N1G 2W1
519-824-4120
http://www.uoguelph.ca

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Disclaimer

University of Guelph 2014

The information published in this Undergraduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2014-2015 academic year, including the Summer Semester 2014, the Fall Semester 2014 and the Winter Semester 2015.

The University reserves the right to change without notice any information contained in this calendar, including fees, any rule or regulation pertaining to the standards for admission to, the requirements for the continuation of study in, and the requirements for the granting of degrees or diplomas in any or all of its programs. The publication of information in this calendar does not bind the University to the provision of courses, programs, schedules of studies, or facilities as listed herein.

The University will not be liable for any interruption in, or cancellation of, any academic activities as set forth in this calendar and related information where such interruption is caused by fire, strike, lock-out, inability to procure materials or trades, restrictive laws or governmental regulations, actions taken by faculty, staff or students of the University or by others, civil unrest or disobedience, public health emergencies, or any other cause of any kind beyond the reasonable control of the University.

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Introduction

Collection, Use and Disclosure of Personal Information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) http://www.e-laws.gov.on.ca/index.html. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes. Certain personal information is disclosed to external agencies, including the Ontario Universities Application Centre, the Ministry of Training, Colleges and Universities, and Statistics Canada, for statistical and planning purposes, and is disclosed to other individuals or organizations in accordance with the Office of Registrarial Services Departmental Policy on the Release of Student Information. For details on the use and disclosure of this information call the Office of Registrarial Services at the University at (519) 824-4120 or see http://www.uoguelph.ca/registrar/registrar/index.cfm?index.

Statistics Canada - Notification of Disclosure

For further information, please see Statistics Canada's web site at http://www.statcan.ca and Section XIV Statistics Canada.

Address for University Communication

Depending on the nature and timing of the communication, the University may use one of these addresses to communicate with students. Students are, therefore, responsible for checking all of the following on a regular basis:

Email Address

The University issued email address is considered an official means of communication with the student and will be used for correspondence from the University. Students are responsible for monitoring their University-issued email account regularly. See Section I--Statement of Students' Academic Responsibilities for more information.

Home Address

Students are responsible for maintaining a current mailing address with the University. Address changes can be made, in writing, through Enrolment Services.

Name Changes

The University of Guelph is committed to the integrity of its student records, therefore, each student is required to provide either on application for admission or on personal data forms required for registration, his/her complete, legal name. Any requests to change a name, by means of alteration, deletion, substitution or addition, must be accompanied by appropriate supporting documentation.

Student Confidentiality and Release of Student Information Policy Excerpt

The University undertakes to protect the privacy of each student and the confidentiality of his or her record. To this end the University shall refuse to disclose personal information to any person other than the individual to whom the information relates where disclosure would constitute an unjustified invasion of the personal privacy of that person or of any other individual. All members of the University community must respect the confidential nature of the student information which they acquire in the course of their work.

Complete policy at http://www.uoguelph.ca/policies/pdf/ORSInfoReleasePolicy060610.pdf.

Table of Contents

Bachelor of Science in Agriculture [B.Sc.(Agr.)]

The B.Sc.(Agr.) degree program is a 4 year honours science program designed to provide a fundamental education in the science of agriculture. The curriculum includes courses in the agricultural sciences, the physical, biological and social sciences, and in the arts.

Program Information

Agricultural scientists must be effective communicators and problem solvers, self-directed in their learning, and have a global perspective of the agrifood systems. Students will be involved in co-operative group learning activities and will experience courses that are multidisciplinary and integrate the teaching activities of many faculty and departments.

Students will have the option of completing a broad agricultural program (honours agricultural science) or another major in which they take a minimum of 6.00 credits. The curriculum provides opportunities for students to select courses that will help them prepare for professional careers as entrepreneurs, scientists, marketing specialists, financial managers, technical advisors, or communication specialists. Students will have a comprehensive understanding of the food system when they graduate. They will be able to integrate their knowledge of production agriculture, environmental management, resource allocation and business management as it applies to the food system nationally and globally.

Students will be encouraged to integrate their academic program with a well-planned series of employment activities in the summer months and to develop their leadership and interpersonal skills in on-campus and community activities. There is a strong commitment in the curriculum to the philosophy of "whole person development" and students are encouraged to identify personal goals that they wish to accomplish in each of these areas of their development.

Graduates meet the educational requirements for membership in the Ontario Institute of Agrologists. The Ontario Institute of Agrologists is the professional organization in agriculture in the Province of Ontario. Professional institutes in the various provinces in Canada and the scientific societies in agriculture collectively comprise the Agricultural Institute of Canada. The program received full accreditation from the Agricultural Institute of Canada in April 2007.

B.Sc.(Agr.) Majors:

Animal Science

Crop, Horticulture and Turfgrass Science

Honours Agricultural Science

Organic Agriculture

Declaration of a Major

All students are admitted into an undeclared major upon entry. Students will be required to select a major by semester 3 through consultation with the Program Counsellor and Faculty Advisors. The course requirements are listed for each major in the following section.

Students may, with appropriate approvals, elect to complete Minors associated with other degree programs as listed in the undergraduate calendar.

Study Abroad

The B.Sc.(Agr.) degree program is similar in many respects to programs offered at faculties of agricultural science in other provinces in Canada. Students are strongly encouraged to consider studying for 1 or 2 semesters in other faculties of agricultural science in Canada and in selected countries around the world.

Students interested in studying at another institution should consult the B.Sc.(Agr.) Program Counsellor to discuss their plans, and refer to the scholarship section for financial support.

For more specific information on these opportunities refer to Section V--International Study in this calendar, or contact the OAC Dean's Office.

Doctor of Veterinary Medicine

Students in the B.Sc.(Agr.) program normally apply for admission to the D.V.M. program after semester 4 or later. Applications must be submitted to the Admissions Services, Office of Registrarial Services. Students should consult the D.V.M. Section of the calendar. Students who do not gain admission to the D.V.M. program are eligible to continue in the B.Sc.(Agr.) program through to graduation.

Students planning to enter the D.V.M. program are advised to include 12U biology, 12U chemistry, and 12U physics in addition to calculus in secondary school.

Continuation of Study

Students are advised to consult the regulations for continuation of study within the program which are outlined in detail in Section VIII--Undergraduate Degree Regulations & Procedures.

Conditions of Graduation

To qualify for the degree Bachelor of Science (Agriculture), the student must successfully complete a minimum of 20.00 credits as set out in the Schedule of Studies listed below. In addition, students must meet the continuation of study requirements at the time of graduation and have a minimum of 60% cumulative average.

Honours Agriculture (AGRS)

Departments of Plant Agriculture and Animal and Poultry Science

The Honours Agriculture major combines a core curriculum of agricultural science courses with a wide range of electives focusing on agri-food business, animal and plant production, land stewardship and sustainability. This major allows students to create a curriculum uniquely tailored to their career goals and provides diverse opportunities to explore international agriculture and leading edge agricultural research in animal production, plant biotechnology and pest management. The flexibility provided in semesters 5 and 6 permits students to participate in international exchanges and semesters abroad. Students can also incorporate a variety of field trips, experiential learning in the workplace and independent study into their program of studies. The combination of a solid understanding of life science and current agricultural practice with specialized skills and experience provided by this program is greatly valued by prospective employers in this essential sector of Canada's economy.

Semester 1

AGR*1110	[1.00]	Introduction to the Agrifood Systems
BIOL*1050	[0.50]	Biology of Plants & Animals in Managed Ecosystems
CHEM*1040	[0.50]	General Chemistry I
MATH*1080	[0.50]	Elements of Calculus I

Semester 2

AGR*2050	[0.50]	Agroecology
BIOL*1090	[0.50]	Introduction to Molecular and Cellular Biology
CHEM*1050	[0.50]	General Chemistry II
FARE*1400	[1.00]	Economics of the Agri-Food System

Semester 3

AGR*2320	[0.50]	Soils in Agroecosystems
AGR*2350	[0.50]	Animal Production Systems, Health and Industry
AGR*2470	[0.50]	Introduction to Plant Agriculture
FARE*2700	[0.50]	Survey of Natural Resource Economics
MBG*2400	[0.50]	Fundamentals of Plant and Animal Genetics

Semester 4

ANSC*2340	[0.50]	Structure of Farm Animals
ENVS*2340	[0.50]	Current Issues in Agriculture and Landscape Mgmt
STAT*2040	[0.50]	Statistics I

1.00 electives or restricted electives

Semester 5 to 8

Students must choose either Option A (Production and Management) or B (Research).

Option A - Production and Management

Semester 5

FOOD*3090	[0.50]	Food Science and Human Nutrition

2.00 electives or restricted electives

Semester 6

2.50 electives or restricted electives

Semester 7

2.50 electives or restricted electives

Semester 8

AGR*4600	[1.00]	Agriculture and Food Issues Problem Solving

1.50 electives or restricted electives

Restricted Electives - Option A

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

- A minimum of 1.00 credits from the list of restricted electives below:

AGR*2500	[0.50]	Field Course in International Agriculture
AGR*3010	[0.50]	Special Studies in Agricultural Science I
AGR*3450	[0.50]	Research Methods in Agricultural Science
AGR*3500	[0.50]	Experiential Education I
ANSC*4230	[0.50]	Challenges and Opportunities in Animal Production
ANSC*4610	[0.50]	Critical Analysis in Animal Science
CROP*4260	[0.50]	Crop Science Field Trip
EDRD*2020	[0.50]	Interpersonal Communication
EDRD*3050	[0.50]	Agricultural Communication I
EDRD*3140	[0.50]	Organizational Communication
FARE*3310	[0.50]	Operations Management
FARE*4220	[0.50]	Advanced Agribusiness Management
FARE*4310	[0.50]	Resource Economics
FARE*4360	[0.50]	Marketing Research
FARE*4550	[0.50]	Independent Studies I

- A minimum of 2.00 credits from the following lists:

  A minimum of 0.50 credits from the following list:

CROP*3300	[0.50]	Grain Crops
CROP*3310	[0.50]	Protein and Oilseed Crops
CROP*3340	[0.50]	Managed Grasslands
ENVS*4090	[0.50]	Soil Management
ENVS*4160	[0.50]	Soil and Nutrient Management
HORT*2450	[0.50]	Introduction to Turfgrass Science
HORT*3150	[0.50]	Principles and Applications of Plant Propagation
HORT*4380	[0.50]	Tropical and Sub-Tropical Crops
PBIO*3110	[0.50]	Crop Physiology
PBIO*3750	[0.50]	Plant Tissue Culture
PBIO*4100	[0.50]	Soil Plant Relationships

A minimum of 0.50 credits from the following list:

CROP*4240	[0.50]	Weed Science
ENVS*2020	[0.50]	Agrometeorology
ENVS*2040	[0.50]	Plant Health and the Environment
ENVS*3020	[0.50]	Pesticides and the Environment
ENVS*3210	[0.50]	Plant Pathology
ENVS*3230	[0.50]	Agroforestry Systems

A minimum of 0.50 credits from the following list:

ACCT*2220	[0.50]	Financial Accounting
ECON*1050	[0.50]	Introductory Microeconomics
ECON*1100	[0.50]	Introductory Macroeconomics
ECON*2310	[0.50]	Intermediate Microeconomics
FARE*2410	[0.50]	Agrifood Markets and Policy
FARE*3170	[0.50]	Cost-Benefit Analysis

Students may also take any of the following courses as restricted electives:

BIOC*2580	[0.50]	Introduction to Biochemistry
BOT*2100	[0.50]	Life Strategies of Plants
MBG*2040	[0.50]	Foundations in Molecular Biology and Genetics
MBG*3060	[0.50]	Quantitative Genetics

- A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level. Refer to Program Counsellor for list of agricultural science courses.
- A humanities or social science courses (0.50 credits) at the 1000-level or above. See Program Counsellor for acceptable list of courses.

Option B - Research

Semester 5

AGR*3450	[0.50]	Research Methods in Agricultural Science
FOOD*3090	[0.50]	Food Science and Human Nutrition

1.50 electives or restricted electives

Semester 6

2.50 electives or restricted electives

Semester 7

AGR*4450	[1.00]	Research Project I

1.50 electives or restricted electives

Semester 8

AGR*4460	[1.00]	Research Project II

1.50 electives or restricted electives

Restricted Electives - Option B

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

1. minimum of 2.00 credits from the list of restricted electives below:

A minimum of 0.50 credits from the following list:

CROP*3300	[0.50]	Grain Crops
CROP*3310	[0.50]	Protein and Oilseed Crops
CROP*3340	[0.50]	Managed Grasslands
ENVS*4090	[0.50]	Soil Management
ENVS*4160	[0.50]	Soil and Nutrient Management
HORT*2450	[0.50]	Introduction to Turfgrass Science
HORT*3150	[0.50]	Principles and Applications of Plant Propagation
HORT*4380	[0.50]	Tropical and Sub-Tropical Crops
PBIO*3110	[0.50]	Crop Physiology
PBIO*3750	[0.50]	Plant Tissue Culture
PBIO*4100	[0.50]	Soil Plant Relationships

A minimum of 0.50 credits from the following list:

CROP*4240	[0.50]	Weed Science
ENVS*2020	[0.50]	Agrometeorology
ENVS*2040	[0.50]	Plant Health and the Environment
ENVS*3020	[0.50]	Pesticides and the Environment
ENVS*3210	[0.50]	Plant Pathology
ENVS*3230	[0.50]	Agroforestry Systems

A minimum of 0.50 credits from the following list:

ACCT*2220	[0.50]	Financial Accounting
ECON*1050	[0.50]	Introductory Microeconomics
ECON*1100	[0.50]	Introductory Macroeconomics
ECON*2310	[0.50]	Intermediate Microeconomics
FARE*2410	[0.50]	Agrifood Markets and Policy
FARE*3170	[0.50]	Cost-Benefit Analysis

Students may also take any of the following courses as restricted electives:

BIOC*2580	[0.50]	Introduction to Biochemistry
BOT*2100	[0.50]	Life Strategies of Plants
MBG*2040	[0.50]	Foundations in Molecular Biology and Genetics
MBG*3060	[0.50]	Quantitative Genetics
OAGR*2070	[1.00]	Introduction to Organic Agriculture

2. A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level. Refer to Program Counsellor for list of agricultural science courses.
3. . A humanities or social science courses (0.50 credits) at the 1000-level or above. See Program Counsellor for acceptable list of courses.

Agriculture (AGR)

OAC Dean's Office

Minor (Honours Program)

The requirement of 5.00 credits for the minor is divided into three groups of courses: required courses and two lists of restricted electives. Students should ensure that they obtain the necessary prerequisites for required and restricted elective courses. Students should seek academic counselling from the B.Sc.(Agr) Program Counsellor early in their program. This minor is not open to students in the B.Sc.(Agr) Program.

Minor

A minimum of 5.00 credits is required including:

AGR*1110	[1.00]	Introduction to the Agrifood Systems

1.50 credits from the following Restricted Elective list:

AGR*2050	[0.50]	Agroecology
AGR*2320	[0.50]	Soils in Agroecosystems
AGR*2350	[0.50]	Animal Production Systems, Health and Industry
AGR*2470	[0.50]	Introduction to Plant Agriculture
AGR*2500	[0.50]	Field Course in International Agriculture
EDRD*3400	[0.50]	Sustainable Communities
FARE*1400	[1.00]	Economics of the Agri-Food System
FOOD*3090	[0.50]	Food Science and Human Nutrition

2.50 credits from the following Restricted Elective list, without regard to group:

Note: At least 0.50 credits from the following list must be at the 4000 level and 1.00 credits at the 3000 level or higher.

Agronomy:

CROP*3300	[0.50]	Grain Crops
CROP*3310	[0.50]	Protein and Oilseed Crops
CROP*3340	[0.50]	Managed Grasslands
CROP*4220	[0.50]	Cropping Systems
CROP*4240	[0.50]	Weed Science
HORT*4380	[0.50]	Tropical and Sub-Tropical Crops
PBIO*3110	[0.50]	Crop Physiology

Animal Science:

ANSC*1210	[1.00]	Principles of Animal Care and Welfare
ANSC*2330	[0.50]	Horse Management Science
ANSC*2340	[0.50]	Structure of Farm Animals
ANSC*3080	[0.50]	Agricultural Animal Physiology
MBG*2400	[0.50]	Fundamentals of Plant and Animal Genetics
MBG*3060	[0.50]	Quantitative Genetics

Environmental Biology:

ENVS*2040	[0.50]	Plant Health and the Environment
ENVS*3020	[0.50]	Pesticides and the Environment
ENVS*3040	[0.50]	Natural Chemicals in the Environment
ENVS*3210	[0.50]	Plant Pathology
ENVS*4100	[0.50]	Integrated Management of Invasive Insect Pests
ENVS*4240	[0.50]	Biological Activity of Pesticides

Horticultural Science:

HORT*3150	[0.50]	Principles and Applications of Plant Propagation
HORT*3280	[0.50]	Greenhouse Production
HORT*4300	[0.50]	Postharvest Physiology
PBIO*3110	[0.50]	Crop Physiology
PBIO*3750	[0.50]	Plant Tissue Culture

Resource Management:

ENVS*2120	[0.50]	Introduction to Environmental Stewardship
ENVS*2020	[0.50]	Agrometeorology
ENVS*2030	[0.50]	Meteorology and Climatology
ENVS*2340	[0.50]	Current Issues in Agriculture and Landscape Mgmt
ENVS*3050	[0.50]	Microclimatology
ENVS*3080	[0.50]	Soil and Water Conservation

ENVS*3120	[0.50]	Land Utilization
ENVS*4090	[0.50]	Soil Management
ENVS*4160	[0.50]	Soil and Nutrient Management
PBIO*4100	[0.50]	Soil Plant Relationships

Animal Science (ANSC)

Department of Animal and Poultry Science

The animal science curriculum is designed to provide a broad opportunity to study animal physiology, nutrition, genetics, behaviour and welfare across a range of large and small domestic animal species. The program is designed around an option to follow a Production and Management focus or a Research focus in semesters 5-8 with additional flexibility to allow for a semester of study abroad.

Semester 1

AGR*1110	[1.00]	Introduction to the Agrifood Systems
BIOL*1050	[0.50]	Biology of Plants & Animals in Managed Ecosystems
CHEM*1040	[0.50]	General Chemistry I
MATH*1080	[0.50]	Elements of Calculus I

Semester 2

AGR*2050	[0.50]	Agroecology
BIOL*1090	[0.50]	Introduction to Molecular and Cellular Biology
CHEM*1050	[0.50]	General Chemistry II
FARE*1400	[1.00]	Economics of the Agri-Food System

Semester 3

AGR*2320	[0.50]	Soils in Agroecosystems
AGR*2350	[0.50]	Animal Production Systems, Health and Industry
AGR*2470	[0.50]	Introduction to Plant Agriculture
MBG*2400	[0.50]	Fundamentals of Plant and Animal Genetics

One of:

FARE*2700	[0.50]	Survey of Natural Resource Economics
MBG*2040	[0.50]	Foundations in Molecular Biology and Genetics

Semester 4

ANSC*2340	[0.50]	Structure of Farm Animals
BIOC*2580	[0.50]	Introduction to Biochemistry
MICR*2420	[0.50]	Introduction to Microbiology
STAT*2040	[0.50]	Statistics I

0.50 electives

Semester 5 to 8

Students must choose either Option A (Production and Management) or B (Research).

Option A - Production and Management

Semester 5

ANSC*3080	[0.50]	Agricultural Animal Physiology
ANSC*3120	[0.50]	Introduction to Animal Nutrition
NUTR*3210	[0.50]	Fundamentals of Nutrition

1.00 electives or restricted electives

Semester 6

MBG*3060	[0.50]	Quantitative Genetics

2.00 electives or restricted electives

Semester 7

POPM*4230	[0.50]	Animal Health

2.00 electives or restricted electives

Semester 8

AGR*4600	[1.00]	Agriculture and Food Issues Problem Solving

1.50 electives or restricted electives

Restricted Electives - Option A

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

1. A minimum of 1.00 credits from the list:

AGR*2500	[0.50]	Field Course in International Agriculture
AGR*3010	[0.50]	Special Studies in Agricultural Science I
AGR*3450	[0.50]	Research Methods in Agricultural Science
AGR*3500	[0.50]	Experiential Education I
ANSC*4230	[0.50]	Challenges and Opportunities in Animal Production
ANSC*4610	[0.50]	Critical Analysis in Animal Science
CROP*4260	[0.50]	Crop Science Field Trip
EDRD*2020	[0.50]	Interpersonal Communication
EDRD*3050	[0.50]	Agricultural Communication I
EDRD*3140	[0.50]	Organizational Communication
FARE*3310	[0.50]	Operations Management
FARE*4220	[0.50]	Advanced Agribusiness Management
FARE*4310	[0.50]	Resource Economics
FARE*4360	[0.50]	Marketing Research
FARE*4550	[0.50]	Independent Studies I

2. A minimum of 3.00 credits is required from the following lists:

   A minimum of 0.50 credits from the following list:

ANSC*4020	[0.50]	Genetics of Companion Animals
ANSC*4050	[0.50]	Biotechnology in Animal Science
MBG*4030	[0.50]	Animal Breeding Methods and Applications

   A minimum of 1.00 credits from the following list:

ANSC*3170	[0.50]	Nutrition of Fish and Crustacea
ANSC*3180	[0.50]	Wildlife Nutrition
ANSC*4260	[0.50]	Beef Cattle Nutrition
ANSC*4270	[0.50]	Dairy Cattle Nutrition
ANSC*4280	[0.50]	Poultry Nutrition
ANSC*4290	[0.50]	Swine Nutrition
ANSC*4470	[0.50]	Animal Metabolism
ANSC*4560	[0.50]	Pet Nutrition
EQN*4020	[0.50]	Feeding the Performance Horse

   A minimum of 1.00 credits from the following list:

ANSC*3210	[0.50]	Introduction to Animal Nutrition
ANSC*4090	[0.50]	Applied Animal Behaviour
ANSC*4100	[0.50]	Applied Environmental Physiology and Animal Housing
ANSC*4490	[0.50]	Applied Endocrinology
ANSC*4650	[0.50]	Comparative Immunology
EQN*3050	[0.50]	Equine Exercise Physiology

3. A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level. Refer to Program Counsellor for list of agricultural science courses.
4. A humanities or social science courses (0.50 credits) at the 1000-level or above. See Program Counsellor for acceptable list of courses.

Option B - Research

Semester 5

AGR*3450	[0.50]	Research Methods in Agricultural Science
ANSC*3080	[0.50]	Agricultural Animal Physiology
ANSC*3120	[0.50]	Introduction to Animal Nutrition
NUTR*3210	[0.50]	Fundamentals of Nutrition

0.50 electives or restricted electives

Semester 6

MBG*3060	[0.50]	Quantitative Genetics

2.00 electives or restricted electives

Semester 7

POPM*4230	[0.50]	Animal Health

2.00 electives or restricted electives

Semester 8

2.50 electives or restricted electives

Restricted Electives - Option B

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

1. A minimum of 1.00 credits from the following list (normally to be taken during semesters 7 and 8):

ANSC*4610	[0.50]	Critical Analysis in Animal Science
ANSC*4700	[0.50]	Research in Animal Biology I
ANSC*4710	[0.50]	Research in Animal Biology II

2. A minimum of 3.00 credits is required from the following lists:

   A minimum of 0.50 credits from the following list:

ANSC*4020	[0.50]	Genetics of Companion Animals
ANSC*4050	[0.50]	Biotechnology in Animal Science
MBG*4030	[0.50]	Animal Breeding Methods and Applications

   A minimum of 1.00 credits from the following list:

ANSC*3170	[0.50]	Nutrition of Fish and Crustacea
ANSC*3180	[0.50]	Wildlife Nutrition
ANSC*4260	[0.50]	Beef Cattle Nutrition
ANSC*4270	[0.50]	Dairy Cattle Nutrition
ANSC*4280	[0.50]	Poultry Nutrition
ANSC*4290	[0.50]	Swine Nutrition
ANSC*4470	[0.50]	Animal Metabolism
ANSC*4560	[0.50]	Pet Nutrition
EQN*4020	[0.50]	Feeding the Performance Horse

   A minimum of 1.00 credits from the following list:

ANSC*3210	[0.50]	Introduction to Animal Nutrition
ANSC*4090	[0.50]	Applied Animal Behaviour
ANSC*4100	[0.50]	Applied Environmental Physiology and Animal Housing

ANSC*4490	[0.50]	Applied Endocrinology
ANSC*4650	[0.50]	Comparative Immunology
EQN*3050	[0.50]	Equine Exercise Physiology

3. A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level. Refer to Program Counsellor for list of agricultural science courses.
4. A humanities or social science courses (0.50 credits) at the 1000-level or above from the College of Arts or College of Social and Applied Human Sciences. See Program Counsellor for acceptable list of courses.

Crop, Horticulture and Turfgrass Sciences (CHAT)

Department of Plant Agriculture

The Crop, Horticultural and Turfgrass Sciences major is for students who want to apply the latest advancements in the biological sciences to contemporary problems in the plant production industries. This major is appropriate for students with a focus on the production of field crops for food, fuel or biomaterials, management of today's advanced commercial greenhouses, horticultural production, breeding improved crop varieties, or using turfgrass and other plant species to enhance urban environments. The flexibility provided in semester 6 permits students to participate in international exchanges and semesters abroad. Students can also incorporate a variety of field trips, experiential learning in the workplace and independent study into their program of studies.

Semester 1

AGR*1110	[1.00]	Introduction to the Agrifood Systems
BIOL*1050	[0.50]	Biology of Plants & Animals in Managed Ecosystems
CHEM*1040	[0.50]	General Chemistry I
MATH*1080	[0.50]	Elements of Calculus I

Semester 2

AGR*2050	[0.50]	Agroecology
BIOL*1090	[0.50]	Introduction to Molecular and Cellular Biology
CHEM*1050	[0.50]	General Chemistry II
FARE*1400	[1.00]	Economics of the Agri-Food System

Semester 3

AGR*2320	[0.50]	Soils in Agroecosystems
AGR*2350	[0.50]	Animal Production Systems, Health and Industry
AGR*2470	[0.50]	Introduction to Plant Agriculture
FARE*2700	[0.50]	Survey of Natural Resource Economics
MBG*2400	[0.50]	Fundamentals of Plant and Animal Genetics

Semester 4

BIOC*2580	[0.50]	Introduction to Biochemistry
BOT*2100	[0.50]	Life Strategies of Plants
ENVS*2040	[0.50]	Plant Health and the Environment
STAT*2040	[0.50]	Statistics I

0.50 electives or restricted electives

Note: Students who wish to add business courses to their program are advised to takeACCT*2220 in semester 4 and ACCT*2230 in semester 5.

Semester 5 to 8

Students must choose either Option A (Production and Management) or B (Research).

Option A - Production and Management

Semester 5

FOOD*3090	[0.50]	Food Science and Human Nutrition
PBIO*3110	[0.50]	Crop Physiology

1.50 electives or restricted electives

Semester 6

2.50 electives or restricted electives

Semester 7

One of:

ENVS*4090	[0.50]	Soil Management
ENVS*4160	[0.50]	Soil and Nutrient Management

2.00 electives or restricted electives

Semester 8

AGR*4600	[1.00]	Agriculture and Food Issues Problem Solving

1.50 electives or restricted electives

Restricted Electives - Option A

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

1. A minimum of 1.00 credits from the following list:

AGR*3010	[0.50]	Special Studies in Agricultural Science I
AGR*3450	[0.50]	Research Methods in Agricultural Science
AGR*3500	[0.50]	Experiential Education I
CROP*4260	[0.50]	Crop Science Field Trip
EDRD*3050	[0.50]	Agricultural Communication I
EDRD*3140	[0.50]	Organizational Communication
FARE*3310	[0.50]	Operations Management
FARE*4220	[0.50]	Advanced Agribusiness Management
FARE*4310	[0.50]	Resource Economics
FARE*4550	[0.50]	Independent Studies I

2. Students must select a minimum of 3.00 credits from the below, without regard to group. Courses are organized into three subject areas only to provide guidance to students who wish to concentrate in a particular area of plant agriculture.

Crop Science:

AGR*2500	[0.50]	Field Course in International Agriculture
CROP*3300	[0.50]	Grain Crops
CROP*3310	[0.50]	Protein and Oilseed Crops
CROP*3340	[0.50]	Managed Grasslands
CROP*4220	[0.50]	Cropping Systems
CROP*4240	[0.50]	Weed Science
ENVB*4070	[0.50]	Biological and Cultural Control of Plant Diseases
ENVS*2340	[0.50]	Current Issues in Agriculture and Landscape Mgmt
ENVS*3080	[0.50]	Soil and Water Conservation
ENVS*3210	[0.50]	Plant Pathology
ENVS*4100	[0.50]	Integrated Management of Invasive Insect Pests
HORT*4380	[0.50]	Tropical and Sub-Tropical Crops
MBG*2040	[0.50]	Foundations in Molecular Biology and Genetics
MBG*3100	[0.50]	Plant Genetics
MBG*4160	[0.50]	Plant Breeding
OAGR*2070	[1.00]	Introduction to Organic Agriculture
OAGR*4050	[1.00]	Design of Organic Production Systems
PBIO*3750	[0.50]	Plant Tissue Culture
PBIO*4750	[0.50]	Genetic Engineering of Plants

Horticultural Science:

CROP*4240	[0.50]	Weed Science
ENVB*4070	[0.50]	Biological and Cultural Control of Plant Diseases
ENVS*3210	[0.50]	Plant Pathology
ENVS*4100	[0.50]	Integrated Management of Invasive Insect Pests
HORT*2450	[0.50]	Introduction to Turfgrass Science
HORT*3010	[0.50]	Annual, Perennial and Indoor Plants - Identification and Use
HORT*3150	[0.50]	Principles and Applications of Plant Propagation
HORT*3270	[0.50]	Medicinal Plants
HORT*3280	[0.50]	Greenhouse Production
HORT*3510	[0.50]	Vegetable Production
HORT*4300	[0.50]	Postharvest Physiology
HORT*4420	[0.50]	Fruit Crops
MBG*2040	[0.50]	Foundations in Molecular Biology and Genetics
MBG*3100	[0.50]	Plant Genetics
MBG*4160	[0.50]	Plant Breeding
PBIO*3750	[0.50]	Plant Tissue Culture
PBIO*4750	[0.50]	Genetic Engineering of Plants

Turfgrass Science:

CROP*4240	[0.50]	Weed Science
ENVS*3020	[0.50]	Pesticides and the Environment
ENVS*3140	[0.50]	Management of Turfgrass Diseases
HORT*2450	[0.50]	Introduction to Turfgrass Science
HORT*3050	[0.50]	Management of Turfgrass Insect Pests and Weeds
HORT*4200	[0.50]	Turf, the Environment and Society
HORT*4450	[0.50]	Advanced Turfgrass Science

3. A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level. Refer to Program Counsellor for list of agricultural
4. A humanities or social science courses (0.50 credits) at the 1000-level or above from the College of Arts or College of Social and Applied Human Sciences. See Program Counsellor for acceptable list of courses.

Option B - Research

Semester 5

AGR*3450	[0.50]	Research Methods in Agricultural Science
FOOD*3090	[0.50]	Food Science and Human Nutrition
PBIO*3110	[0.50]	Crop Physiology

1.00 electives or restricted electives

Semester 6

2.50 electives or restricted electives

Semester 7

AGR*4450	[1.00]	Research Project I

One of:

ENVS*4090	[0.50]	Soil Management
ENVS*4160	[0.50]	Soil and Nutrient Management

1.00 electives or restricted electives

Semester 8

AGR*4460 [1.00] Research Project II

1.50 electives or restricted electives

Restricted Electives - Option B

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

1. During semesters 4-8 students must select a minimum of 3.00 credits from the lists of restricted electives below, without regard to group. Courses are organized into three subject areas only to provide guidance to students who wish to concentrate in a particular area of plant agriculture.

   Crop Science:

AGR*2500	[0.50]	Field Course in International Agriculture
CROP*3300	[0.50]	Grain Crops
CROP*3310	[0.50]	Protein and Oilseed Crops
CROP*3340	[0.50]	Managed Grasslands
CROP*4220	[0.50]	Cropping Systems
CROP*4240	[0.50]	Weed Science
ENVB*4070	[0.50]	Biological and Cultural Control of Plant Diseases
ENVS*2340	[0.50]	Current Issues in Agriculture and Landscape Mgmt
ENVS*3080	[0.50]	Soil and Water Conservation
ENVS*3210	[0.50]	Plant Pathology
ENVS*4100	[0.50]	Integrated Management of Invasive Insect Pests
HORT*4380	[0.50]	Tropical and Sub-Tropical Crops
MBG*2040	[0.50]	Foundations in Molecular Biology and Genetics
MBG*3100	[0.50]	Plant Genetics
MBG*4160	[0.50]	Plant Breeding
OAGR*2070	[1.00]	Introduction to Organic Agriculture
OAGR*4050	[1.00]	Design of Organic Production Systems
PBIO*3750	[0.50]	Plant Tissue Culture
PBIO*4750	[0.50]	Genetic Engineering of Plants

   Horticultural Science:

CROP*4240	[0.50]	Weed Science
ENVB*4070	[0.50]	Biological and Cultural Control of Plant Diseases
ENVS*3210	[0.50]	Plant Pathology
ENVS*4100	[0.50]	Integrated Management of Invasive Insect Pests
HORT*2450	[0.50]	Introduction to Turfgrass Science
HORT*3010	[0.50]	Annual, Perennial and Indoor Plants - Identification and Use
HORT*3150	[0.50]	Principles and Applications of Plant Propagation
HORT*3270	[0.50]	Medicinal Plants
HORT*3280	[0.50]	Greenhouse Production
HORT*3510	[0.50]	Vegetable Production
HORT*4300	[0.50]	Postharvest Physiology
HORT*4420	[0.50]	Fruit Crops
MBG*2040	[0.50]	Foundations in Molecular Biology and Genetics
MBG*3100	[0.50]	Plant Genetics
MBG*4160	[0.50]	Plant Breeding
PBIO*3750	[0.50]	Plant Tissue Culture
PBIO*4750	[0.50]	Genetic Engineering of Plants

   Turfgrass Science:

CROP*4240	[0.50]	Weed Science
ENVS*3020	[0.50]	Pesticides and the Environment
ENVS*3140	[0.50]	Management of Turfgrass Diseases
HORT*2450	[0.50]	Introduction to Turfgrass Science
HORT*3050	[0.50]	Management of Turfgrass Insect Pests and Weeds
HORT*4200	[0.50]	Turf, the Environment and Society
HORT*4450	[0.50]	Advanced Turfgrass Science

2. A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level. Refer to the Program Counsellor for the list of agricultural science courses.
3. A humanities or social science courses (0.50 credits) at the 1000-level or above from the College of Arts or College of Social and Applied Human Sciences. See Program Counsellor for acceptable list of courses.

   Business Electives:

   Students in either Option A or Option B who wish to add business courses to their program are advised to select courses from the following list:

FARE*3310	[0.50]	Operations Management
FARE*4220	[0.50]	Advanced Agribusiness Management
FARE*4240	[0.50]	Futures and Options Markets
FARE*4370	[0.50]	Food & Agri Marketing Management
MGMT*3320	[0.50]	Financial Management

Organic Agriculture (OAGR)

Department of Plant Agriculture and School of Environmental Sciences

The Major in Organic Agriculture encompasses agroecology, food safety and security, land stewardship, animal welfare, environmental health, and sustainable rural communities. It offers an integrated systems approach to the design and operation of crop and livestock production systems that are socially responsible, ecologically sound and economically sustainable. The program combines core courses in life sciences and modern agricultural practice with in depth analysis of organic production systems, soil and nutrient management, pest management and farm economies. Linkages between profitability and sustainability are explored through independent and group research projects, experiential learning, field trips and opportunities for study abroad. In addition to the core courses, students can incorporate experiential learning and independent research courses focusing on social, economic and scientific aspects of organic agriculture and sustainability to their program of studies. This innovative and flexible program will provide the knowledge and skills you will need for career success in this dynamic sector.

Semester 1

AGR*1110	[1.00]	Introduction to the Agrifood Systems
BIOL*1050	[0.50]	Biology of Plants & Animals in Managed Ecosystems
CHEM*1040	[0.50]	General Chemistry I
MATH*1080	[0.50]	Elements of Calculus I

Semester 2

AGR*2050	[0.50]	Agroecology
BIOL*1090	[0.50]	Introduction to Molecular and Cellular Biology
CHEM*1050	[0.50]	General Chemistry II
FARE*1400	[1.00]	Economics of the Agri-Food System

Semester 3

AGR*2320	[0.50]	Soils in Agroecosystems
AGR*2350	[0.50]	Animal Production Systems, Health and Industry
AGR*2470	[0.50]	Introduction to Plant Agriculture
FARE*2700	[0.50]	Survey of Natural Resource Economics
MBG*2400	[0.50]	Fundamentals of Plant and Animal Genetics

Semester 4

ENVS*2040	[0.50]	Plant Health and the Environment
OAGR*2070	[1.00]	Introduction to Organic Agriculture
STAT*2040	[0.50]	Statistics I

0.50 electives or restricted electives

Semester 5 to 8

Students must choose either Option A (Production and Management) or B (Research).

Option A- Production and Management

Semester 5

FOOD*3090 [0.50] Food Science and Human Nutrition

2.00 electives or restricted electives

Semester 6

2.50 electives or restricted electives

Semester 7

OAGR*4050 [1.00] Design of Organic Production Systems

1.50 electives or restricted electives

Semester 8

AGR*4600 [1.00] Agriculture and Food Issues Problem Solving

1.50 electives or restricted electives

Restricted Electives - Option A

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

1. A minimum of 1.00 credits from the list:

AGR*2500	[0.50]	Field Course in International Agriculture
AGR*3010	[0.50]	Special Studies in Agricultural Science I
AGR*3450	[0.50]	Research Methods in Agricultural Science
AGR*3500	[0.50]	Experiential Education I
ANSC*4230	[0.50]	Challenges and Opportunities in Animal Production
ANSC*4610	[0.50]	Critical Analysis in Animal Science
CROP*4260	[0.50]	Crop Science Field Trip
EDRD*2020	[0.50]	Interpersonal Communication
EDRD*3050	[0.50]	Agricultural Communication I
EDRD*3140	[0.50]	Organizational Communication
FARE*3310	[0.50]	Operations Management
FARE*4220	[0.50]	Advanced Agribusiness Management
FARE*4310	[0.50]	Resource Economics
FARE*4360	[0.50]	Marketing Research
FARE*4550	[0.50]	Independent Studies I

2. Students must select a minimum of 3.50 credits from the following lists:

Minimum of 2.50 credits from the following list

ANSC*2340	[0.50]	Structure of Farm Animals
ANSC*3120	[0.50]	Introduction to Animal Nutrition
ANSC*3210	[0.50]	Introduction to Animal Nutrition
CROP*3300	[0.50]	Grain Crops
CROP*3310	[0.50]	Protein and Oilseed Crops
CROP*3340	[0.50]	Managed Grasslands
CROP*4220	[0.50]	Cropping Systems
CROP*4240	[0.50]	Weed Science
ENVS*2340	[0.50]	Current Issues in Agriculture and Landscape Mgmt
ENVS*3080	[0.50]	Soil and Water Conservation
ENVS*3210	[0.50]	Plant Pathology
ENVS*4090	[0.50]	Soil Management
ENVS*4100	[0.50]	Integrated Management of Invasive Insect Pests
ENVS*4160	[0.50]	Soil and Nutrient Management
HORT*3510	[0.50]	Vegetable Production
HORT*4420	[0.50]	Fruit Crops
PBIO*3110	[0.50]	Crop Physiology
PBIO*4100	[0.50]	Soil Plant Relationships

A minimum of 0.50 credits from the following list:

EDRD*3400	[0.50]	Sustainable Communities
GEOG*3320	[0.50]	Food Systems: Issues in Security and Sustainability
PHIL*2070	[0.50]	Philosophy of the Environment

Students may also take the following courses:

ACCT*2220	[0.50]	Financial Accounting
BIOC*2580	[0.50]	Introduction to Biochemistry
BOT*2100	[0.50]	Life Strategies of Plants
ECON*1050	[0.50]	Introductory Microeconomics
ECON*1100	[0.50]	Introductory Macroeconomics
ECON*2310	[0.50]	Intermediate Microeconomics
FARE*2410	[0.50]	Agrifood Markets and Policy
MBG*2040	[0.50]	Foundations in Molecular Biology and Genetics
MBG*3060	[0.50]	Quantitative Genetics
NUTR*3210	[0.50]	Fundamentals of Nutrition

3. A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level. Refer to Program Counsellor for list of agricultural science courses.
4. A humanities or social science courses (0.50 credits) at the 1000-level or above from the College of Arts or College of Social and Applied Human Sciences. See Program Counsellor for acceptable list of courses.

Option B - Research

Semester 5

AGR*3450	[0.50]	Research Methods in Agricultural Science
FOOD*3090	[0.50]	Food Science and Human Nutrition

1.50 electives or restricted electives

Semester 6

2.50 electives or restricted electives

Semester 7

AGR*4450	[1.00]	Research Project I
OAGR*4050	[1.00]	Design of Organic Production Systems

0.50 electives or restricted electives

Semester 8

AGR*4460	[1.00]	Research Project II

1.50 electives or restricted electives

Restricted Electives - Option B

Students should note that some restricted electives require other courses not included among the required courses for the major as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

1. Students in Option B must select a minimum of 3.50 credits from the following lists:

   Minimum of 2.50 credits from the following list:

ANSC*2340	[0.50]	Structure of Farm Animals
ANSC*3120	[0.50]	Introduction to Animal Nutrition
ANSC*3210	[0.50]	Introduction to Animal Nutrition
CROP*3300	[0.50]	Grain Crops
CROP*3310	[0.50]	Protein and Oilseed Crops
CROP*3340	[0.50]	Managed Grasslands
CROP*4220	[0.50]	Cropping Systems
CROP*4240	[0.50]	Weed Science
ENVS*2340	[0.50]	Current Issues in Agriculture and Landscape Mgmt
ENVS*3080	[0.50]	Soil and Water Conservation
ENVS*3210	[0.50]	Plant Pathology
ENVS*4090	[0.50]	Soil Management
ENVS*4100	[0.50]	Integrated Management of Invasive Insect Pests
ENVS*4160	[0.50]	Soil and Nutrient Management
HORT*3510	[0.50]	Vegetable Production
HORT*4420	[0.50]	Fruit Crops
PBIO*3110	[0.50]	Crop Physiology
PBIO*4100	[0.50]	Soil Plant Relationships

   A minimum of 0.50 credits from the following list:

EDRD*3400	[0.50]	Sustainable Communities
GEOG*3320	[0.50]	Food Systems: Issues in Security and Sustainability
PHIL*2070	[0.50]	Philosophy of the Environment

   Students may also take the following courses as restricted electives:

ACCT*2220	[0.50]	Financial Accounting
BIOC*2580	[0.50]	Introduction to Biochemistry
BOT*2100	[0.50]	Life Strategies of Plants
ECON*1050	[0.50]	Introductory Microeconomics
ECON*1100	[0.50]	Introductory Macroeconomics
ECON*2310	[0.50]	Intermediate Microeconomics
FARE*2410	[0.50]	Agrifood Markets and Policy
MBG*2040	[0.50]	Foundations in Molecular Biology and Genetics
MBG*3060	[0.50]	Quantitative Genetics
NUTR*3210	[0.50]	Fundamentals of Nutrition

2. A minimum of 7.00 credits must be at the 3000 level or higher, of which 5.00 credits must be in agricultural science and of which 3.50 credits must be at the 4000 level. Refer to Program Counsellor for list of agricultural science courses.
3. A humanities or social science courses (0.50 credits) at the 1000-level or above from the College of Arts or College of Social and Applied Human Sciences. See Program Counsellor for acceptable list of courses.