

2020-2021 Undergraduate Calendar

The information published in this Undergraduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2020-2021 academic year, including the Summer Semester 2020, the Fall Semester 2020 and the Winter Semester 2021.

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:

- Universities Canada

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Disclaimer

University of Guelph 2020

The information published in this Undergraduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2020-2021 academic year, including the Summer Semester 2020, the Fall Semester 2020 and the Winter Semester 2021.

The University reserves the right to change without notice any information contained in this calendar, including but not limited to that related to tuition and other fees, standards of admission, course delivery or format, continuation of study, and the offering or requirements for the granting of, degrees or diplomas in any or all of its programs. The publication of this calendar does not bind the University to the provision of courses, programs, schedules of study, or facilities as listed herein.

The University will not be liable for any failure or delay in performance arising out of any cause or causes beyond its reasonable control. Such causes may include but are not limited to fire, strike, lock-out, inability to procure materials or trades, war, mass-casualty event, flood, local, regional or global outbreak of disease or other public health emergency, social distancing or quarantine restriction, legislative or regulatory requirements, unusually severe weather, failure of public utility or common carrier, or attacks or other malicious act, including but not limited to attacks on or through the internet, or any internet service, telecommunications provider or hosting facility.

In March 2020 the World Health Organization declared a global pandemic of the virus leading to COVID-19. The Governments of Canada, the Province of Ontario, and local Governments responded to the pandemic with legislative amendments, controls, orders, by-laws, requests and requirements (collectively, the "Governmental Response"). It is uncertain how long the pandemic, and the related Governmental Response, will continue, and it is unknown whether there may be a resurgence of the virus leading to COVID-19 or any mutation thereof (collectively, the "Virus") and resulting or supplementary renewed Government Response. Without limiting the foregoing paragraph, the University shall not be liable for costs associated with any failure or delay in performance arising out of:

- a. the continued spread of the Virus;
- b. the continuation of or renewed Governmental Response to control the spread of the Virus; and
- c. a University decision, made on an organization-wide basis and in good faith, to control the spread of the Virus, even if exceeding the then current specific Government Response.

In particular, the COVID-19 pandemic may necessitate a revision of the format of course offerings such that courses are offered in whole or in part on an alternate delivery model to in-person classes. Tuition and mandatory fees have been set regardless of the method of instruction and will not be refunded in the event instruction occurs remotely for any part of the academic year.

Dates or times of performance including the Schedule of Dates may be extended as appropriate and the University will notify students promptly of the existence and nature of such delay and shall, so far as practicable, use reasonable efforts to minimize and mitigate any such delay or non-performance.

In the event of a discrepancy between a print version (downloaded) and the Web version, the Web version will apply,

Published by: Enrolment Services

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 Registrar Services Departmental Policy on the Release of Student Information. For details on the use and disclosure of this information call the Office of Registrar Services at the University at (519) 824-4120 or see <http://www.uoguelph.ca/registrar/registrar/index.cfm?index>.

Disclosure of Personal Information to the Ontario Ministry of Colleges and Universities

The University of Guelph is required to disclose personal information such as characteristics and educational outcomes to the Minister of Colleges and Universities under s. 15 of the Ministry of Training, Colleges and Universities Act, R.S.O. 1990, Chapter M.19, as amended. The Ministry collects this data for purposes including but not limited to planning, allocating and administering public funding to colleges, universities and other post-secondary educational and training institutions.

Amendments made to the Ministry of Training, Colleges and Universities Act, authorizing the collection and use of personal information from colleges and universities by the Minister which were set out in Schedule 5 of the Childcare Modernization Act, 2014, came into force on March 31, 2015.

The amendments strengthen the ability of the Minister to directly or indirectly collect and use personal information about students as required to conduct research and analysis, including longitudinal studies, and statistical activities conducted by or on behalf of the Ministry for purposes that relate to post-secondary education and training, including,

- i. understanding the transition of students from secondary school to post-secondary education and training,
- ii. understanding student participation and progress, mobility and learning and employment outcomes,
- iii. understanding linkages among universities, colleges, secondary schools and other educational and training institutions prescribed by regulation,
- iv. understanding trends in post-secondary education or training program choices made by students,
- v. understanding sources and patterns of student financial resources, including financial assistance and supports provided by government and post-secondary educational and training institutions,
- vi. planning to enhance the affordability and accessibility of post-secondary education and training and the quality and effectiveness of the post-secondary sector,
- vii. identifying conditions or barriers that inhibit student participation, progress, completion and transition to employment or future post-secondary educational or training opportunities, and
- viii. developing key performance indicators.

Information that the University is required to provide includes but is not limited to: first, middle and last name, Ontario Educational Number, citizenship, date of birth, gender, first three digits of a student's postal code, mother tongue, degree program and major(s) in which the student is enrolled, year of study and whether the student has transferred from another institution.

Further information on the collection and use of student-level enrolment-related data can be obtained from the Ministry of Colleges and Universities website: <https://www.ontario.ca/page/ministry-colleges-universities> (English) or <https://www.ontario.ca/fr/page/ministere-des-colleges-et-universites> (French) or by writing to the Director, Postsecondary Finance and Information Management Branch, Postsecondary Education Division, 7th Floor, Mowat Block, 900 Bay Street, Toronto, ON M7A 1L2.

An update on Institutional and Ministry of Training, Colleges and Universities Act Notice of Disclosure Activities is posted at <https://www.ontario.ca/page/ministry-colleges-universities> Frequently Asked Questions related to the Ministry's enrolment and OEN data activities are also posted at: <http://www.tcu.gov.on.ca/pepg/publications/NoticeOfCollection.pdf>

Authority to Disclose Personal Information to Statistics Canada

The Ministry of Colleges and Universities discloses student-level enrolment-related data it collects from the colleges and universities as required by Statistics Canada in accordance with Section 13 of the Federal Statistics Act. This gives the Ministry authority to disclose personal information in accordance with s. 42(1) (e) of FIPPA

Notification of Disclosure of Personal Information to Statistics Canada

For further information, please see the Statistics Canada's website 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, the student's 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 the student's 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 <https://uoguelph.civicweb.net/document/68892/ORSInfoReleasePolicy060610.pdf?handle=FF982F8A9AEA4076BE4F3D88147172B8>.

Learning Outcomes

On December 5, 2012, the University of Guelph Senate approved five University-wide Learning Outcomes as the basis from which to guide the development of undergraduate degree programs, specializations and courses:

1. Critical and Creative Thinking
2. Literacy
3. Global Understanding
4. Communicating
5. Professional and Ethical Behaviour

These learning outcomes are also intended to serve as a framework through which our educational expectations are clear to students and the broader public; and to inform the process of outcomes assessment through the quality assurance process (regular reviews) of programs and departments.

An on-line guide to the learning outcomes, links to the associated skills, and detailed rubrics designed to support the development and assessment of additional program and discipline-specific outcomes, are available for reference on the [Learning Outcomes website](#).

1. Critical and Creative Thinking

Critical and creative thinking is a concept in which one applies logical principles, after much inquiry and analysis, to solve problems with a high degree of innovation, divergent thinking and risk taking. Those mastering this outcome show evidence of integrating knowledge and applying this knowledge across disciplinary boundaries. Depth and breadth of understanding of disciplines is essential to this outcome.

In addition, **Critical and Creative Thinking** includes, but is not limited to, the following outcomes: **Inquiry and Analysis; Problem Solving; Creativity; and Depth and Breadth of Understanding.**

2. Literacy

Literacy is the ability to extract information from a variety of resources, assess the quality and validity of the material, and use it to discover new knowledge. The comfort in using quantitative literacy also exists in this definition, as does using technology effectively and developing visual literacy.

In addition, **Literacy** includes, but is not limited to, the following outcomes: **Information Literacy, Quantitative Literacy, Technological Literacy, and Visual Literacy.**

3. Global Understanding:

Global understanding encompasses the knowledge of cultural similarities and differences, the context (historical, geographical, political and environmental) from which these arise, and how they are manifest in modern society. Global understanding is exercised as civic engagement, intercultural competence and the ability to understand an academic discipline outside of the domestic context.

In addition, **Global Understanding** includes, but is not limited to, the following outcomes: **Global Understanding, Sense of Historical Development, Civic Knowledge and Engagement, and Intercultural Competence.**

4. Communicating

Communicating is the ability to interact effectively with a variety of individuals and groups, and convey information successfully in a variety of formats including oral and written communication. Communicating also comprises attentiveness and listening, as well as reading comprehension. It includes the ability to communicate and synthesize information, arguments, and analyses accurately and reliably.

In addition, **Communicating** includes, but is not limited to, the following outcomes: **Oral Communication, Written Communication, Reading Comprehension, and Integrative Communication.**

5. Professional and Ethical Behaviour

Professional and ethical behaviour requires the ability to accomplish the tasks at hand with proficient skills in teamwork and leadership, while remembering ethical reasoning behind all decisions. The ability for organizational and time management skills is essential in bringing together all aspects of managing self and others. Academic integrity is central to mastery in this outcome.

In addition, **Professional and Ethical Behaviour** includes, but is not limited to, the following outcomes: **Teamwork, Ethical Reasoning, Leadership, and Personal Organization and Time Management**

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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 courses towards a more focused subject area. 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.

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

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.

Honours Minor

A minor is a group of courses which provides for exposure to and mastery of the fundamental principles of a subject. A minor consists of a minimum of 5.00 credits (normally 10 courses). It may also require certain other courses from other areas to be taken along with the specified courses of the minor. A minor is taken in conjunction with a major.

A maximum of 2.50 credits required in a major program may be applied to meet the requirements of a minor.

Students should seek advice from the B.Sc.(Agr.) Program Counsellor about the addition of a minor. Students in the B.Sc.(Agr.) are not eligible for a minor in Agriculture.

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 may 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 Biosciences

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 Agri-Food 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*2040	[0.50]	Plant Health and the Environment
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
ANSC*4010	[0.50]	Animal Welfare Judging and Evaluation
ANSC*4230	[0.50]	Challenges and Opportunities in Dairy Cattle 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
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

A minimum of 0.50 credits from the following list:

CROP*4240	[0.50]	Weed Science
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*1220	[0.50]	Introductory Financial Accounting
ECON*1050	[0.50]	Introductory Microeconomics
ECON*1100	[0.50]	Introductory Macroeconomics
ECON*2310	[0.50]	Intermediate Microeconomics
FARE*2410	[0.50]	Agri-food 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

- 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
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1.50 electives or restricted electives

Semester 8

AGR*4460	[1.00]	Research Project II
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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

A minimum of 0.50 credits from the following list:

CROP*4240	[0.50]	Weed Science
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*1220	[0.50]	Introductory Financial Accounting
ECON*1050	[0.50]	Introductory Microeconomics
ECON*1100	[0.50]	Introductory Macroeconomics
ECON*2310	[0.50]	Intermediate Microeconomics
FARE*2410	[0.50]	Agri-food 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 Agri-Food Systems
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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*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

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*2030	[0.50]	Meteorology and Climatology
ENVS*3050	[0.50]	Microclimatology
ENVS*3080	[0.50]	Soil and Water Conservation
ENVS*4090	[0.50]	Soil Management
ENVS*4160	[0.50]	Soil and Nutrient Management

Students may also count the following courses as restricted electives:

AGR*4600	[1.00]	Agriculture and Food Issues Problem Solving
FARE*4000	[0.50]	Agricultural and Food Policy
FARE*4220	[0.50]	Advanced Agribusiness Management

Animal Science (ANSC)**Department of Animal Biosciences, Ontario Agricultural College**

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 Agri-Food 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*1210	[1.00]	Principles of Animal Care and Welfare
ANSC*2340	[0.50]	Structure of Farm Animals
BIOC*2580	[0.50]	Introduction to Biochemistry
STAT*2040	[0.50]	Statistics I

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

ANSC*3040	[0.50]	Animal Reproduction
ANSC*3270	[0.50]	Animal Disorders
MBG*3060	[0.50]	Quantitative Genetics

1.00 electives or restricted electives

Semester 7

2.50 electives or restricted electives

Semester 8

AGR*4600	[1.00]	Agriculture and Food Issues Problem Solving
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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
ANSC*4010	[0.50]	Animal Welfare Judging and Evaluation
ANSC*4230	[0.50]	Challenges and Opportunities in Dairy Cattle 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
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*4050	[0.50]	Biotechnology in Animal Science
MBG*4020	[0.50]	Genetics of Companion Animals
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]	Advanced Equine Nutrition

A minimum of 1.00 credits from the following list:

ANSC*3090	[0.50]	Principles of Animal Behaviour
ANSC*4090	[0.50]	Applied Animal Behaviour and Welfare
ANSC*4100	[0.50]	Applied Environmental Physiology and Animal Housing
ANSC*4490	[0.50]	Applied Endocrinology
ANSC*4650	[0.50]	Comparative Immunology

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

ANSC*3040	[0.50]	Animal Reproduction
ANSC*3270	[0.50]	Animal Disorders
MBG*3060	[0.50]	Quantitative Genetics

1.00 electives or restricted electives

Semester 7

2.50 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*4350	[0.50]	Experiments in Animal Biology
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*4050	[0.50]	Biotechnology in Animal Science
MBG*4020	[0.50]	Genetics of Companion Animals
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]	Advanced Equine Nutrition

A minimum of 1.00 credits from the following list:

ANSC*3090	[0.50]	Principles of Animal Behaviour
ANSC*4090	[0.50]	Applied Animal Behaviour and Welfare

ANSC*4100	[0.50]	Applied Environmental Physiology and Animal Housing
ANSC*4490	[0.50]	Applied Endocrinology
ANSC*4650	[0.50]	Comparative Immunology

- 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 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, Ontario Agricultural College

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 Agri-Food 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 take ACCT*1220 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
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2.00 electives or restricted electives

Semester 6

PBIO*3110	[0.50]	Crop Physiology
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2.00 electives or restricted electives

Semester 7

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
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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 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
CROP*4260	[0.50]	Crop Science Field Trip

EDRD*3050	[0.50]	Agricultural Communication
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

- 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
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*4070	[0.50]	Biological and Cultural Control of Plant Diseases
PBIO*4750	[0.50]	Genetic Engineering of Plants

Horticultural Science:

CROP*4240	[0.50]	Weed Science
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*3310	[0.50]	Plants, Food and Health
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*4070	[0.50]	Biological and Cultural Control of Plant Diseases
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]	Plants, the Environment and Society
HORT*4450	[0.50]	Advanced Turfgrass Science

- 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

- 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

PBIO*3110	[0.50]	Crop Physiology
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2.00 electives or restricted electives

Semester 7

AGR*4450	[1.00]	Research Project I
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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
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*4070	[0.50]	Biological and Cultural Control of Plant Diseases
PBIO*4750	[0.50]	Genetic Engineering of Plants

Horticultural Science:

CROP*4240	[0.50]	Weed Science
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*3310	[0.50]	Plants, Food and Health
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*4070	[0.50]	Biological and Cultural Control of Plant Diseases
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]	Plants, 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