The information published in this Graduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2019-2020 academic year, including the Summer Semester 2019, Fall Semester 2019 and the Winter Semester 2020.

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

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

The University is a full member of:

- Universities of Canada

Contact Information:

University of Guelph
Guelph, Ontario, Canada
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519-824-4120

Revision Information:

<table>
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<th>Description</th>
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<td>May 1, 2019</td>
<td>Initial Publication</td>
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<tr>
<td>June 28, 2019</td>
<td>Revision 1</td>
</tr>
<tr>
<td>September 2, 2019</td>
<td>Revision 2</td>
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Disclaimer
The Office of Graduate and Postdoctoral Studies has attempted to ensure the accuracy of this on-line Graduate Calendar. However, the publication of information in this document does not bind the university to the provision of courses, programs, schedules of studies, fees, or facilities as listed herein.

Limitations
The University of Guelph reserves the right to change without notice any information contained in this calendar, including 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 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 the 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.

The University of Guelph reaffirms section 1 of the Ontario Human Rights Code, 1981, which prohibits discrimination on the grounds of race, ancestry, place of origin, colour, ethnic origin, citizenship, creed, sex, sexual orientation, handicap, age, marital status or family status.

The university encourages applications from women, aboriginal peoples, visible minorities, persons with disabilities, and members of other under-represented groups.
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/DBLaws/Statutes/English/90f31_e.htm. 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 Advanced Education and Skills Development, 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 https://www.uoguelph.ca/registrar/.

Statistics Canada - Notification of Disclosure

For further information, please see Statistics Canada's web site at http://www.statcan.gc.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.

Home Address

Students are responsible for maintaining a current mailing address with the University. Address changes can be made, in writing, through Registrarial 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, their 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 their 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://www.uoguelph.ca/secretariat/office-services/university-secretariat/university-policies.
Learning Outcomes

Graduate Degree Learning Outcomes

On May 27, 2013, the University of Guelph Senate approved the following five University-wide Learning Outcomes as the basis from which to guide the development of graduate degree programs, specializations and courses:

1. Critical and Creative Thinking
2. Literacy
3. Global Understanding
4. Communication
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.

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. At the graduate level, originality in the application of knowledge (master’s) and undertaking of research (doctoral) is expected.

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

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.

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.

Communication

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

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. At the graduate level, intellectual independence is needed for professional and academic development and engagement.

In addition, Professional and Ethical Behaviour includes, but is not limited to, the following outcomes: Teamwork, Ethical Reasoning, Leadership, Personal Organization and Time Management, and Intellectual Independence.
Table of Contents

Animal Biosciences ................................................................. 39
  Administrative Staff ............................................................. 39
  Graduate Faculty ................................................................. 39
MSc Program ............................................................................. 39
PhD Program ............................................................................ 40
Collaborative Specializations ..................................................... 40
Courses .................................................................................... 40
Animal Biosciences

In addition to a core group of faculty members the Department of Animal Biosciences works closely with professionals from the Ontario Ministry of Agriculture and Food (OMAF), Agriculture and Agri-Food Canada (AAFC), and other affiliated organizations. The graduate program encompasses MSc by course-work, MSc by thesis, and PhD options in four main fields:

- Animal Breeding and Genetics (quantitative or molecular)
- Animal Nutrition (monogastric or ruminant)
- Animal Physiology (environmental and reproductive)
- Animal Behaviour and Welfare

Administrative Staff

**Chair**
James Squires (223 ANNU, Ext. 53928)
jsquires@uoguelph.ca

**Graduate Program Coordinator**
Niel Karrow (123 ANNU, Ext. 53646)
nkarrow@uoguelph.ca

**Graduate Program Assistant**
Wendy McGrattan (144 ANNU, Ext. 56215)
wmcgratt@uoguelph.ca

Graduate Faculty

*Please see the Department's webpage at [www.aps.uoguelph.ca](http://www.aps.uoguelph.ca) for an updated listing of faculty.*

**Christine Baes**
BSc Guelph, MSc Hohenheim, PhD Christina-Albrechts - Assistant Professor

**Gregory Bedecarrats**
Licence de Biochimie, MSc, Dipl. Rennes (France), PhD McGill - Associate Professor

**Dominique P. Bureau**
BSc (Agr), MSc Laval, PhD Guelph - Professor

**Angela Canovas**
BSc Lledia, MSc Valencia, PhD Lledia - Assistant Professor

**John P. Cant**
BSc (Agr) Nova Scotia, MS, PhD California - Professor

**Abigail Carpenter**
BS Michigan, MS Minnesota, PhD Kansas State - Assistant Professor

**Trevor Devries**
BSc, PhD British Columbia - Associate Professor

**Jennifer Ellis**
BSc, MSc, PhD Guelph - Assistant Professor

**Ming Z. Fan**
BS Xinjiang, MS Harbin, PhD Alberta - Professor

**Alexandra Harlander**
DVM, DVSC Vienna, Ph.D. Germany - Assistant Professor

**Lee-Anne Huber**
BSc, MSc, PhD Guelph - Assistant Professor

**Niel A. Karrow**
BSc Guelph, MSc, PhD Waterlo - Associate Professor

**Elijah Kiarie**
BSc, MSc Nairobi, PhD Manitoba - Assistant Professor

**Julang Li**
MSc Changchun Veterinary College (China), PhD Ottawa - Professor

**Ira B. Mandell**
BS, MS Ohio State, PhD Saskatchewan - Associate Professor

**Georgia Mason**
BA, PhD Cambridge - Professor

**Katrina Merkies**
BSc, PhD Guelph - Associate Professor

**Richard D. Moccia**
BSc, MSc Guelph - Professor

**Vern R. Osborne**
BSc, MSc, PhD Guelph - Associate Professor

**Wendy Pearson**
BSc, MSc, PhD Guelph - Assistant Professor

**Eduardo Ribeiro**
DVM Santa Catarina State, MSc, PhD Florida - Assistant Professor

**J. Andrew B. Robinson**
BSc (Agr), MSc Guelph, PhD Cornell - Associate Professor

**Flavio S. Schenkel**
BBA, BSc, and MSc Brazil, PhD Guelph - Professor

**Anna Kate Shoveller**
BSc Guelph, PhD Alberta - Assistant Professor

**E. James Squires**
BSc, MSc, PhD Memorial - Professor and Interim Chair

**Michael Steele**
BSc, MSc, PhD Guelph - Assistant Professor

**Dan Tulpan**
BSc Burcharest, PhD British Columbia - Assistant Professor

**Tina M. Widowski**
BS, MS, PhD Illinois - Professor

**Katie Wood**
BSc, MSc, PhD Guelph - Assistant Professor

MSc Program

The MSc program involves advanced courses and the completion of a research project. These are means of developing the skills and intellectual curiosity that may further qualify the student for a leadership role within animal organizations and industries or serve as a prerequisite for doctoral studies. The MSc degree may be completed via two routes: by thesis or by coursework and major paper. The MSc by coursework and major paper is offered in four areas of specialization: 1) animal breeding and genetics, 2) animal nutrition, 3) animal behaviour and welfare and 4) animal physiology.

**Admission Requirements**

An honours baccalaureate, with a minimum average grade of ‘B’ during the last 2 years of full-time equivalent study. For Canadian degrees, we interpret this as the last 20 semester courses, however we do not split a semester and we will not consider any fewer than 16 courses.

**Program Requirements**

Students enrol in one of two study options: 1) thesis, or 2) course work and major research paper.

**Thesis**

Candidates for the thesis-based MSc degree must successfully complete a prescribed series of courses, conduct a research project, prepare a thesis based on their results and defend this in a final examination. The number of course credits required in this option will be decided by the student’s advisory committee in consultation with the student, and may exceed the minimum 1.5 credits required by the Faculty of Graduate Studies. Generally, 4 or 5 courses (1.5-2.0 credits) will be taken, including the mandatory Seminar course, ANSC*6600 and ANSC*6610 (0.25 credits each).

**Course Work and Major Research Paper (MRP)**

Candidates for the MSc degree by course work and major paper option must complete a minimum of 4.0 credits (7 courses). Of these courses, one will be the Major Paper in Animal and Poultry Science, ANSC*6900 (1.0 credit). The major paper will be a detailed, critical review of an area of study related to the specialization chosen by the student and should include analyses and interpretations of relevant data.

At the beginning of the program, the student and student's advisory committee will design the coursework program according to the program guidelines and the aspirations and background of the student. Students will normally choose a minimum of 4 courses in the area of specialization, and a minimum of two courses outside the area of specialization. These latter courses can be offered by departments other than Animal Biosciences.

A maximum of one approved senior-level undergraduate course can be included in the list of prescribed courses. Recommended graduate courses in the three areas of specialization are as follows:

**Animal Breeding and Genetics**

ANSC*6900 [1.00] Major Paper in Animal and Poultry Science

ANSC*6621 [0.50] Principles of Selection in Animal Breeding

ANSC*6370 [0.50] Quantitative Genetics and Animal Models

ANSC*6390 [0.50] QTL and Markers

ANSC*6450 [0.50] Topics in Animal Biotechnology

**Animal Nutrition and Metabolism**

ANSC*6900 [1.00] Major Paper in Animal and Poultry Science

ANSC*6610 [0.50] Topics in Comparative Animal Nutrition

ANSC*6630 [0.50] Metabolism of Ruminants

ANSC*6360 [0.50] Techniques in Animal Nutrition Research

ANSC*6450 [0.50] Topics in Animal Biotechnology

ANSC*6460 [0.50] Lactation Biology

ANSC*6470 [0.50] Advanced Animal Nutrition and Metabolism I

ANSC*6480 [0.50] Advanced Animal Nutrition and Metabolism II

**Animal Behaviour and Welfare**

ANSC*6900 [1.00] Major Paper in Animal and Poultry Science

ANSC*6440 [0.50] Advanced Critical Analysis in Applied Ethology

ANSC*6700 [0.50] Animals in Society: Historical and Global Perspectives on Animal Welfare

ANSC*6710 [0.50] Assessing Animal Welfare in Practice

ANSC*6720 [0.50] Scientific Assessment of Affective States in Animals
Applied Environmental Physiology and Animal Housing
ANSC*6730 [0.50]

Applied Environmental Physiology and Animal Housing
ANSC*6740 [0.50]

Seminars and Analysis in Animal Behaviour and Welfare
UNIV*6030 [0.50]

The course will explore current methods and recent advances of biotechnology, innovation, and emerging translational products of significance to animal production and human health.

Prerequisite(s):
MCB*2050 / MBG*2040 / ANSC*4050 or equivalent

Department(s):
Department of Animal Biosciences

Animal Nutrition

ANSC*6010 Topics in Comparative Animal Nutrition F [0.50]

Current topics in the feeding and nutrition of agricultural, companion and captive animal species. Emphasis is placed on the influence of nutrients on metabolic integration at tissue, organ and whole-animal levels. A nutritional case study will be conducted to allow students to solve practical feeding problems by applying basic nutritional principles. The course is offered annually.

Department(s):
Department of Animal Biosciences

ANSC*6030 Modelling Metabolic Processes F [0.50]

Building and testing of mathematical models of metabolic processes using continuous simulation software to assist in weekly assignments. Choice of model based on students' research interests (e.g. protein synthesis, nutrient uptake, rumen fermentation). Term project to reproduce model from scientific knowledge.

Department(s):
Department of Animal Biosciences

ANSC*6360 Techniques in Animal Nutrition Research W [0.50]

Theory and/or practices of techniques to evaluate feedstuffs and determine nutrient utilization in poultry, swine and ruminants is covered through lectures, short laboratories and a major project.

Department(s):
Department of Animal Biosciences

ANSC*6470 Advanced Animal Nutrition and Metabolism I F [0.50]

A systematic review of key aspects of energy, protein, amino acid and carbohydrate utilization and metabolism in farm animals.

Department(s):
Department of Animal Biosciences

ANSC*6480 Advanced Animal Nutrition and Metabolism II W [0.50]

A systematic review of key aspects of lipid, vitamin and mineral utilization and metabolism in farm animals.

Department(s):
Department of Animal Biosciences

Animal Physiology

ANSC*6400 Mammalian Reproduction W [0.50]

Discussions and applications of methodology for collection and examination of gametes and embryos and for measurements of hormones in biological fluids.

Offering(s):
Offered in odd-numbered years.

Department(s):
Department of Animal Biosciences

ANSC*6460 Lactation Biology F [0.50]

An in-depth systems analysis of lactation, comparing the cow, pig, rat, human and seal. Mammary development from conception through to lactogenesis, lactation and involution will be covered. Hypotheses of regulation of the biochemical pathways of milk synthesis will be tested in relation to experimental observations.

Department(s):
Department of Animal Biosciences

ANSC*6250 Growth and Metabolism W [0.50]

Animal growth and metabolism are considered at the cellular level in a manner that extends beyond the basic disciplines of biometrics and biochemistry with attention focused on the main carcass components — muscle, fat and bone.

Department(s):
Department of Animal Biosciences

Animal Behaviour and Welfare

ANSC*6440 Advanced Critical Analysis in Applied Ethology F [0.50]

Students explore the process of scientific inquiry and experimental design within the context of applied ethology research. Discussions include the peer review process, critical analyses and applications of methods for applied animal behaviour research.

Department(s):
Department of Animal Biosciences

ANSC*6700 Animals in Society: Historical and Global Perspectives on Animal Welfare F [0.50]

A seminar course covering society's duties to animals. Students will learn about the major ethical theories that deal with society's duties towards animals, the main scientific approaches to animal welfare, and the relationship of science to ethics. A brief history of human-animal relationships will be covered and cultural differences described. Students will use this to analyze some current issues.

Department(s):
Department of Animal Biosciences
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Offerings</th>
<th>Prerequisites</th>
<th>Restriction(s)</th>
</tr>
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<td>ANSC*6710</td>
<td>Assessing Animal Welfare in Practice W [0.50]</td>
<td>Winter offering on-campus, Summer offering Distance Education.</td>
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<td>Biometry for Animal Sciences W [0.50]</td>
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<td>ANSC*6800</td>
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<td>ANSC*6900</td>
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<td>ANSC*6900</td>
<td>Thesis Proposal and Professional Development I F,W [0.00]</td>
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<td></td>
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<td>UNIV*6030</td>
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