

# 2017-2018 Graduate Calendar

The information published in this Graduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2017-2018 academic years, including the Summer Semester 2017, Fall Semester 2017 and the Winter Semester 2018.

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:

- The Association of Universities and Colleges of Canada

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UNIVERSITY  
of GUELPH

CHANGING LIVES  
IMPROVING LIFE

## **Disclaimer**

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The Office of Graduate 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**

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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**

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### **Collection, Use and Disclosure of Personal Information**

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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](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 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 <https://www.uoguelph.ca/registrar/>

### **Statistics Canada - Notification of Disclosure**

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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**

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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**

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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**

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Students are responsible for maintaining a current mailing address with the University. Address changes can be made, in writing, through the Office of Graduate Studies.

### **Name Changes**

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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**

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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>.



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## 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

Georgia Mason (138 ANNU, Ext. 56804)  
asgc@uoguelph.ca

#### Graduate Program Assistant

Wendy McGratt (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

#### Ming Z. Fan

BS Xinjiang, MS Harbin, PhD Alberta - Professor

#### James France

BSc Cardiff, MSc, PhD, DSc Hull (United Kingdom), CMath, CSci, FIMA - Professor and Senior Canada Research Chair

#### 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 Waterloo - 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

#### 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.

### Degree 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 (9 courses). Of these courses, one will be the departmental Seminar course, ANSC\*6600 (0.25 credit), and another will be 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. The content of the major paper will be presented to the department in the Seminar course.

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*6210	[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*6010	[0.50]	Topics in Comparative Animal Nutrition
ANSC*6030	[0.50]	Modelling Metabolic Processes
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
ANSC*6730	[0.50]	Applied Environmental Physiology and Animal Housing

ANSC\*6740 [0.50] Special Topics in Applied Animal Welfare Science  
 UNIV\*6030 [0.50] Seminars and Analysis in Animal Behaviour and Welfare  
 The MSc by coursework and major paper degree will require a minimum of three semesters of full-time study (or the equivalent).

### PhD Program

The PhD program is research oriented and provides instruction and experiences that develop the student's ability to independently formulate hypotheses and design and execute experiments or conduct observational studies to reach definitive conclusions.

### Admission Requirements

Students entering a PhD program should show potential for independent, productive, and original research. A PhD program can be entered by three routes: following completion of an MSc program; following transfer prior to completion of an MSc program; and directly from a bachelor degree.

In general, a minimum average grade of 'B' for a completed MSc program plus strong letters of reference are required. Students wishing to be considered for transfer to a PhD program prior to completion of the MSc program must request the transfer before the end of the fourth semester and have an excellent academic record as well as a strong aptitude for research.

Direct admission to the PhD program may be permitted for applicants who hold a bachelor's degree and have an excellent academic history and strong indications of research potential.

### Degree Requirements

Satisfactory completion of a PhD program requires a comprehensive knowledge of the area of emphasis and the ability to conduct original research in this area, plus a sound general background in two related areas of study. This competence is demonstrated in a qualifying examination and through the design and execution of a substantial and original research project. Based on this research, a thesis is prepared and defended in a final examination.

The number of courses required for a PhD program will be decided by the student's advisory committee in consultation with the student. The minimum requirement is ANSC\*6620 and ANSC\*6630.

### Collaborative Specializations

#### Neuroscience

The Department of Animal Biosciences participates in the MA/MSc/PhD collaborative specialization in neuroscience. Please consult the Neuroscience listing for a detailed description of the MA/MSc/PhD collaborative specialization.

#### Toxicology

The Department of Animal Biosciences participates in the MSc/PhD collaborative specialization in toxicology. The research and teaching expertise of these faculty include aspects of toxicology; they may serve as advisors for MSc and PhD students in Toxicology. Students choosing this option must meet the requirements of the Toxicology collaborative specialization, as well as those of their home department. Please consult the Toxicology listing for a detailed description of the MSc/PhD collaborative specialization.

### Courses

Although the courses offered are listed by field, several are relevant to more than one field. Some courses are only offered when there is a certain minimum enrolment.

### Animal Breeding and Genetics

#### ANSC\*6210 Principles of Selection in Animal Breeding W [0.50]

Definition of selection goals, prediction of genetic progress and breeding values, and the comparison of selection programs.

*Department(s):* Department of Animal Biosciences

#### ANSC\*6240 Topics in Animal Genetics and Genomics F [0.50]

Current literature and classical papers pertaining to quantitative genetics, animal breeding and animal genomics are reviewed in detail through presentation, discussion and critical analysis.

*Department(s):* Department of Animal Biosciences

#### ANSC\*6370 Quantitative Genetics and Animal Models F [0.50]

The course covers quantitative genetics theory associated with animal models; linear models applied to genetic evaluation of animals; estimation of genetic parameters for animal models; and computing algorithms for large datasets.

*Department(s):* Department of Animal Biosciences

#### ANSC\*6390 QTL and Markers W [0.50]

Advanced training in QTL mapping and selection assisted by genetic markers.

*Department(s):* Department of Animal Biosciences

#### ANSC\*6450 Topics in Animal Biotechnology F [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 every other year on even years.

*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



**ANSC\*6710 Assessing Animal Welfare in Practice W,S [0.50]**

A lecture/seminar course covering the principles of applied animal welfare assessment. Students will learn what influences an animal welfare assessment and will understand the components necessary to create an effective and targeted animal welfare program for industry or regulatory application.

*Offering(s):* Winter offering on-campus, Summer offering Distance Education.

*Prerequisite(s):* ANSC\*6700

*Department(s):* Department of Animal Biosciences

**ANSC\*6730 Applied Environmental Physiology and Animal Housing W [0.50]**

A lecture/seminar course covering the principles of applied environmental physiology including temperature regulation, space requirements, animal responses to light and other aspects of the physical environment. Students pursue a topic in depth to develop or update recommended codes of practice and resource-based standards.

*Department(s):* Department of Animal Biosciences

**ANSC\*6720 Scientific Assessment of Affective States in Animals W [0.50]**

Graduate students will explore the biology and validity of behavioural and physiological techniques used in animal welfare assessment of such phenomena as: sympathetic activation, HPA functioning, stereotypic behaviour and preference responses. A combination of lecture, instructor-led discussion and student-led discussion will explore these areas of animal welfare assessment.

*Department(s):* Department of Animal Biosciences

**ANSC\*6740 Special Topics in Applied Animal Welfare Science S [0.50]**

A lecture/seminar course covering in depth topics in applied animal welfare science. The course will review the scientific research into the welfare of a specific animal species or a specific animal welfare problem common across species, focusing on the main threats to welfare, relevant indicators of welfare, and possible solutions to improve welfare.

*Department(s):* Department of Animal Biosciences

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

**General****ANSC\*6050 Biometry for Animal Sciences W [0.50]**

For students involved in animal research. The course will provide outlines of appropriate presentation and analysis of experimental data with emphasis on different analytical techniques.

*Department(s):* Department of Animal Biosciences

**ANSC\*6100 Special Project F,W,S [0.50]**

Supervised program of study in some aspect of animal and poultry science that can involve an experimental project and/or detailed analysis of the literature.

*Department(s):* Department of Animal Biosciences

**ANSC\*6490 Advanced Dairy Management W [0.50]**

A comprehensive systems science and integrative capstone course that encompasses the "closing of the loop" education of dairy production systems. Students will be exposed to real-time issues relating to dairy production from, environment, economics, nutrition, housing, health, welfare, society and agrology. This course will allow the student to practice their training from the courses they have been exposed to as undergraduates into many case study evaluations on farms provincially, nationally and internationally.

*Restriction(s):* Instructor consent required.

*Department(s):* Department of Animal Biosciences

**ANSC\*6600 Scientific Communication I U [0.25]**

This course is required for completion of a thesis-based MSc degree. Via, reading, guest lectures, online modules and in-class discussion, students will learn about the principles of effective communication, and with training and feedback create a departmental webpage and oral presentation outlining their research plans.

*Restriction(s):* Restricted to Animal Biosciences students.

*Department(s):* Department of Animal Biosciences

**ANSC\*6610 Thesis Proposal and Professional Development I U [0.25]**

This course is required for successful completion of an MSc thesis degree. With guidance and instruction, students complete a research proposal, or a literature review for their thesis. Students will also spend 8 hours on professional (e.g. via mygradskills.ca, MITAC Step workshops).

*Restriction(s):* Restricted to Animal Biosciences students.

*Department(s):* Department of Animal Biosciences

**ANSC\*6620 Scientific Communication II U [0.00]**

This course is required for successful completion of a PhD degree. Via reading, guest lectures, online modules and in-class discussion, students will learn about the principles of effective communication, and with training and feedback, create a departmental webpage and oral presentation outlining their research plans.

*Prerequisite(s):* ANSC\*6600

*Restriction(s):* Restricted to Animal Biosciences PhD students.

*Department(s):* Department of Animal Biosciences

**ANSC\*6630 Thesis Proposal and Professional Development II U [0.00]**

This course is required for successful completion of a PhD degree. Via reading, guest lectures, online modules and in-class discussion, students will learn about the principles of effective communication, and with training and feedback, create a departmental webpage and oral presentation outlining their research plans.

*Prerequisite(s):* ANSC\*6610

*Restriction(s):* Restricted to Animal Biosciences PhD students.

*Department(s):* Department of Animal Biosciences

**ANSC\*6900 Major Paper in Animal and Poultry Science F,W,S [1.00]**

A detailed, critical review of an area of study related to the specialization of students in the MSc by course work and major paper option that includes analysis and interpretation of relevant data.

*Department(s):* Department of Animal Biosciences