



## **Course Curriculum**

### **Master of Science by Coursework/Major Research Paper (MRP)**

#### **Field of Specialization in Animal Behaviour & Animal Welfare**

Welfare is a high priority for all animals in the food, laboratory, companion, sport and the various entertainment industries, and there is growing pressure for science-based welfare standards and assurance schemes in all areas. Animal welfare science is also a fast-growing research field, integrating diverse disciplines from animal sciences to neuroscience. This MSc. non-thesis degree program equips students to meet the needs of the various animal industries, and allows students to rapidly gain the knowledge and skills necessary for a scientific career in the discipline of animal welfare. The program, currently offered through the Department of Animal Biosciences in collaboration with other departments, also serves as a potential entry degree to veterinary medicine or further graduate studies, and for those students aiming for research careers in the expanding and popular science of animal welfare.

#### **Learning Objectives for the Program**

- To develop an understanding of the historical, ethical and cultural roots of animal welfare
- To develop an understanding of the physical and behavioural requirements of animals managed by humans
- To develop skills in evaluating animal welfare in scientific studies and in practical application
- To develop a broad appreciation of animal welfare issues across animal industries (farm, laboratory, zoo/wildlife, sport, companion)
- To develop in depth knowledge of animal welfare issues and application in an area of specialization

#### **Degree Requirements**

Candidates for the non-thesis MSc degree must complete a minimum of 4.0 credits. Within these credits, students are required to take the Major Research Paper in Animal Bioscience (ANSC 6900 [1.0 credits]). The Major Paper requires a detailed critical review of an area of study in animal welfare and should include analysis and interpretations of relevant data. Students will complete several core courses in animal welfare and several graduate level electives in their area of interest. One course may be at the advanced undergraduate level (4000).

## **Program of Study and Course Descriptions**

Each course is denoted by its departmental coding and full descriptive name. The semester during which the course is offered, Fall (F), Winter (W), Summer (S), or Unspecified (U) is included, along with the number of credits earned for successful completion of the course. Any important notes are denoted \*\*

### **Introductory courses**

**ANSC 6700**, Animals in Society: Historical and Global Perspectives on Animal Welfare, F [0.5] **\*\*Core course**

**UNIV 6030**, Seminars and Analysis in Animal Behaviour and Welfare, F/W [0.5]

**ANSC 4090**, Applied Animal Behaviour F [0.5]

**\*\*Students may take a maximum of ONE upper level undergraduate course to count towards their Degree Requirements**

### **Statistical Methods**

**\*\*Students are strongly recommended to complete one statistics course. It may be required by individual faculty.**

**STAT 6950**, Statistical Analysis for the Life Sciences, F [0.5]

**ANSC 6050**, Biometry for Animal Sciences, W [0.5]

**PLNT 6170**, Statistics in Plant Agriculture, W [0.5]

### **Critical analysis**

**\*\*Students are strongly recommended to complete one critical analysis course**

**ANSC 6440**, Advanced Critical Analysis in Applied Ethology, F [0.5]

**POPM 6230**, Applied Clinical Research, F [0.5]

**ANSC 4610**, Critical Analysis in Animal Science, W [0.5]

## **Animal Welfare Assessment**

**\*\*Students are strongly recommended to complete one welfare assessment course**

**ANSC 4010**, Animal Welfare Judging and Evaluation F [0.5]

**ANSC 6710**, Assessing Animal Welfare in Practice W (S, as DE) [0.5]

**ANSC 6720**, Scientific Assessment of Affective States in Animals W [0.5]

## **Research Project and Directed Study**

**ANSC 6100**, Special Projects, U [0.5]

Self-directed study (for example, a literature review) or special courses offered through course exchange with other universities

**ANSC 6900**, Major Paper in Animal Welfare, U [1.0]

**\*\*Required course**; Students can take up to 2 semesters to complete this course. If registered Full Time, students must enroll in either Winter or Summer semesters

## **Selected Electives**

**ANSC 6730**, Applied Environmental Physiology, W [0.5]

**ANSC 6740**, Special Topics in Applied Animal Welfare Science.  
Section 01: Dairy Cattle Welfare, offered in S [0.5]

## **Additional Electives of Potential Interest**

### **Animal Biosciences**

<https://www.uoquelp.ca/registrar/calendars/graduate/current/apdxa/apdxa-ansc.shtml>

ANSC\*4020 Genetics of Companion Animals F (3-0) [0.50]

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

ANSC\*6020 Poultry and Swine Nutrition W [0.50]

ANSC\*6400 Mammalian Reproduction W [0.50]

ANSC\*6460 Lactation Biology F [0.50]

ANSC\*6490 Advanced Dairy Management W [0.50]

### **Biomedical Sciences**

<https://www.uoquelp.ca/registrar/calendars/graduate/current/apdxa/apdxa-biom.shtml>

BIOM\*6070 Pregnancy, Birth and Perinatal Adaptations S [0.50]  
BIOM\*6130 Vertebrate Developmental Biology U [0.50]

### **Food Safety and Quality Assurance**

<https://www.uoquelfh.ca/registrar/calendars/graduate/current/apdxa/apdxa-fsqa.shtml>

FSQA\*6100 Food Law and Policy F (DE only) [0.50]  
FSQA\*6200 Food Safety Systems Management W (DE only) [0.50]

### **Integrative Biology**

<https://www.uoquelfh.ca/registrar/calendars/graduate/current/apdxa/apdxa-ibio.shtml>

IBIO\*6000 Advances in Ecology and Behaviour U [0.50]  
IBIO\*6010 Advances in Physiology U [0.50]  
IBIO\*6020 Advances in Evolutionary Biology U [0.50]

### **Pathobiology**

<https://www.uoquelfh.ca/registrar/calendars/graduate/current/apdxa/apdxa-pabi.shtml>

PABI\*6100 Immunobiology F [0.50]  
PABI\*6104 Mechanisms of Disease W [0.50]  
PABI\*6550 Epidemiology of Zoonoses W [0.50]  
PABI\*6700 Laboratory Animal Science U [0.50]  
PABI\*6710 Applied Laboratory Animal Science I U [0.50]  
PABI\*6740 Avian Diseases U [0.50]

### **Philosophy**

<https://www.uoquelfh.ca/registrar/calendars/graduate/current/apdxa/apdxa-phil.shtml>

PHIL\*6740 Philosophy of Biology U [0.50]  
PHIL\*6760 Science and Ethics U [0.50]

### **Population Medicine**

<https://www.uoquelfh.ca/registrar/calendars/graduate/current/apdxa/apdxa-popm.shtml>

POPM\*6350 Safety of Foods of Animal Origins (DE only) F [0.50]  
POPM\*6400 Dairy Health Management \* S [0.50]  
POPM\*6610 Theriogenology of Cattle \* U [0.50]  
POPM\*6630 Theriogenology of Horses \* U [0.50]  
POPM\*6650 Theriogenology of Dogs and Cats \* U [0.50]  
POPM\*6670 Theriogenology of Small Ruminants \* U [0.50]  
POPM\*6700 Swine Health Management \* U [0.50]

### **Psychology**

<https://www.uoguelph.ca/registrar/calendars/graduate/current/apdxa/apdxa-psyc.shtml>

PSYC\*6630 Developmental Psychology U [0.50]

PSYC\*6790 Memory and Cognition U [0.50]

PSYC\*6800 Neurobiology of Learning U [0.50]

### **University-wide**

<https://www.uoguelph.ca/registrar/calendars/graduate/current/apdxa/apdxa-univ.shtml>

UNIV\*6050 The Integration of Science and Business in Agrifood Systems F-W [1.00]

UNIV\*6070 Topics and Analysis in Sustainability F [0.50]

UNIV\*6600 Animal Care Short Course S,F,W [0.00]

UNIV\*6800 University Teaching: Theory and Practice F [0.50]

UNIV\*7100 Academic Integrity for Graduate Students S,F,W [0.00]

Please see the current Undergraduate and Graduate Calendars for all course offerings  
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/pdf/c10bsc.pdf>

### **Some Example Programs of Study**

\*\*The following are just examples. Please meet with your Advisor to select the most appropriate courses for your program

For a student with an interest in food animal welfare:

#### **Semester 1 (FALL)**

ANSC 6700 Animals in Society [0.5]

STAT 6950 Statistical Analysis for the Life Sciences [0.5]

ANSC 6440 Critical Analysis in Applied Ethology [0.5]

Elective such as UNIV 6030 Seminars and Analysis in Animal Behaviour and Welfare [0.5] (2 semesters)

#### **Semester 2 (WINTER)**

ANSC 6710 Assessing Animal Welfare in Practice [0.5]

Elective such as UNIV 6030 Seminars and Analysis in Animal Behaviour and Welfare [0.5] (2 semesters)

Elective such as FSQA 6200 Food Safety Systems Management [0.5]

#### **Semester 3 (SUMMER)**

ANSC 6900 Major Paper project focusing on food animals [1.0]

Total course credits: 4.0 credits

For a student with an interest in laboratory animal welfare:

**Semester 1 (FALL)**

ANSC 6700 Animals in Society [0.5]

ANSC 6440 Advanced Critical Analysis in Applied Ethology [0.5]

ANSC 4010 Animal Welfare Judging [0.5]

**Semester 2 (WINTER)**

ANSC 6710 Assessing Animal Welfare in Practice [0.5]

PLNT 6170, Statistics in Plant Agriculture, [0.5]

ANSC 6730, Applied Environmental Physiology [0.5]

**Semester 3 (SUMMER)**

ANSC 6900 Major Paper project focusing on lab animals [1.0]

Total course credits: 4.0 credits

For a student with an interest in zoo animal welfare:

**Semester 1 (FALL)**

ANSC 6700 Animals in Society [0.5]

STAT 6950 Statistical Analysis for the Life Sciences [0.5]

ANSC 6440 Advanced Critical Analysis in Applied Ethology [0.5]

**Semester 2 (WINTER)**

ANSC 6710 Assessing Animal Welfare in Practice [0.5]

Elective such as ANSC 6730, Applied Environmental Physiology [0.5]

Elective such as ANSC 6400 Mammalian Reproduction) [0.5]

**Semester 3 (SUMMER)**

ANSC 6900 Major Paper project focusing on zoo animals [1.0]

Total course credits: 4.0 credits

## Course Descriptions:

### **ANSC 4010 Animal Welfare Judging and Evaluation**

This course provides senior level students with a structured opportunity to practice assessing animal welfare using scientific evidence. Students learn to present their evaluations in a logical and persuasive manner. They learn general criteria and approaches used to assess welfare and then apply that knowledge for assessment of four different species in practical settings. The course will comprise weekly class meetings involving lectures, discussions and animal welfare assessment exercises. Additional field trips and a “mock live team assessment” at an animal facility will be scheduled outside of the normal class meeting time. The course will involve students interacting and learning / training together: undergraduate and graduate students, and DVM students (not enrolled for course credit).

### **ANSC 4090 Applied Animal Behaviour**

This is a team-taught fourth year undergraduate course which deals with why animals behave as they do with reference to causation, function, ontogeny and phylogeny. Basic principles are illustrated by examples taken from agricultural, lab, companion and zoo species. Ways in which animal keeping systems may be improved by applying behavioural knowledge are discussed, and strategies for designing animal facilities and management procedures to suit the behaviour of the animals are also considered. Students' projects for this course involve designing an educational poster on an applied behavioural issue, and writing individual papers on the science behind this topic (in groups of four, each student tackling one of Tinbergen's 'four whys').

### **ANSC 6100 Special Project**

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.

### **ANSC 6440 Advanced Critical Analysis in Applied Ethology**

Graduate students enrolled in this course explore the process of scientific inquiry and experimental design within the context of research in applied ethology. Each student selects an individual behaviour topic for the semester, identifies how scientists have developed research questions and hypotheses to study the topic and then critically analyses how experiments were designed to answer those questions. We discuss and practice the peer review process for scientific publication. For their final assignment, students develop a conceptual model for their behaviour topic, identify an outstanding research question and design an experiment to answer that question. Evaluation is based on a series of written assignments and oral presentations to the class.

### **ANSC 6700 Animals in Society: Historical and Global Perspectives on Animal Welfare**

This graduate level course will review and discuss society's relationship with animals. It will explore how animals are affected by the ways that human beings keep them, use them, and conflict with them. The main ethical theories that deal with humanity's duties to animals will be introduced, traced through history, and their strengths and weakness discussed. The relationship of science to ethics will be considered and the importance of

being able to justify a moral point of view will be emphasized. Various scientific approaches to animal welfare will be described and the crucial importance of sentience in these approaches will be discussed. The acceptance of sentience in animals through history will be considered and the problems associated with assessing subjective feelings will be discussed. Society's attitudes to animals in Canada will be compared to elsewhere and cultural differences will be considered. Society's willingness to pay for improved welfare will be discussed. The inadequacies of Canadian laws to protect animal welfare will be discussed. Finally, a variety of contemporary welfare problems will be described arising from the use of animals in agriculture, biomedical science, product testing, as service and working animals, and as animals in entertainment and sport and possible solutions will be explored.

**ANSC 6710 Assessing Animal Welfare in Practice**

This graduate level course explores the underlying concepts and steps in developing animal care auditing/assessment schemes for industry and regulatory bodies. Lectures include an overview of assessment tools, and how the goals of the assessment (i.e., accreditation versus self-assessment) influence its structure. The advantages and disadvantages of using engineering versus animal-based standards will also be addressed. Various forms of assessment schemes such as indices, scores and questionnaires will be compared. Students will explore the validity, repeatability, feasibility of different measures in the field and will utilize knowledge of animal welfare assessment in the development of novel assessment schemes.

**ANSC 6720 Scientific Assessment of Affective States**

Graduate students will explore the biology and validity of behavioural and physiological techniques used in animal welfare assessment: in particular, 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.

**ANSC 6730 Applied Environmental Physiology: Application to Animal Care Standards**

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.

**ANSC 6740 Special Topics in Applied Animal Welfare Science. Section: Dairy Cattle Welfare**

This graduate course explores in depth, the scientific evaluation and improvement of dairy cattle welfare. Course content will include an overview of the scientific literature as it pertains to the primary threats to the welfare of dairy cattle. Practical solutions related to the improvement of the welfare of these animals will also be assessed. Students will have a chance to critically analyze the current scientific literature as it pertains to the welfare of dairy cattle, and use their knowledge propose new science to address these issues and improve dairy cattle welfare. The course will be offered in an intense format, with total contact time distributed over a 5-day period, followed up by a presentation day 6 weeks later.



**ANSC 6900 Major Paper in Animal and Poultry Science**

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.

**UNIV 6030 Seminars and Analysis in Animal Behaviour and Welfare**

This seminar-based course offers an interdisciplinary forum for the discussion of broad topics in animal welfare and human-animal relationships. Students analyze topics presented by visiting guest lecturers using perspectives from various disciplines such as animal science, philosophy, history, psychology, ethics, and biology.

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