Biomedical Sciences: MBS, MSc, PhD

The Department of Biomedical Sciences provides unique opportunities for translating fundamental research into practical applications that enhance animal and human health. Our expertise spans several disciplines including biomechanics, cancer biology, endocrinology, neuroscience, pharmacology and toxicology, reproductive biotechnology, cardiovascular biology, and stem cell and regenerative biology.

ovc.uoguelph.ca/biomedical-sciences

Program

The Master of Biomedical Sciences (MBS) is a course work program with a major research project/paper or an experiential learning practicum (depending on the research area), to be completed in approximately three semesters. Students can pursue applied training in Reproductive Biotechnologies or Toxicology through practicum placements and in-house training. Graduates who have completed the Applied Repro training have found jobs in repro-related industry positions at a success rate of 90%.

The Master of Science (MSc) program requires the preparation and defense of a research-based thesis, to be completed in approximately six semesters.

The PhD program requires the successful completion of a qualifying exam and the completion and defense of a research-based thesis, to be completed in approximately twelve semesters.

Research Fields

- Reproductive Biology and Development
- Cardiovascular Physiology
- Cellular and Molecular Basis of Health and Disease
- Cancer Biology
- Toxicology and Pharmacology
- Neuroscience
- Stem Cell Biology and Regenerative Medicine

Our research is all about exploring why some species and organisms can regenerate parts of their body, whereas others cannot. Understanding the mechanisms of regeneration could have important biomedical implications, especially following injury.
– Laura Austin, MSc candidate in Biomedical Sciences

Admission Requirements

For admission to a Master's program, our department requires an Honours BSc in Biological Sciences or a degree in veterinary medicine or equivalent with a minimum B+ (77% Ontario equivalent GPA) over the last two years of full-time study.

For admission to the PhD program, our department requires the completion of an approved MSc program by thesis, a minimum B+ average (77% Ontario equivalent GPA) in the prescribed courses taken during the Master's degree program.

A letter of interest and two academic letters of reference are required with the application for either the Masters or PhD program.

Students must confirm a faculty advisor before they can be considered for admission.

Application Deadline:

Fall: August 1
Winter: December 1
Summer: April 1

ARE YOU INTERESTED IN:

- How the brain works
- How the heart and circulatory system work
- How pregnancy is maintained and regulated
- How drugs and toxins affect the body
- How cancer cells grow and spread

CAREER OPPORTUNITIES:

- Dentist/Pharmacist Professor/ Scientist
- Doctor (Veterinary or Medical)
- Government
- Healthcare professions
- Industry
- Physiotherapist

CONTACT INFORMATION

Graduate Program Coordinator, MSc & PhD:
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Departmental Graduate Faculty with Research Areas

CANCER CELL BIOLOGY

Roger Anthony Moorehead - Breast and lung tumor development and progression

Anthony J. Mutsaers - Metronomic chemotherapy and tumour angiogenesis

James Petrik - Novel therapies for the treatment of advanced stage ovarian cancer

Alicia M. Viloria-Petit - Molecular mechanisms of breast cancer invasion and metastasis

CARDIOVASCULAR HEALTH AND DISEASE

Tami Martino - Circadian regulation of cardiovascular health and disease, chronotherapy, sex differences, cardiac aging, circadian medicine, preclinical translation, "omics" and bioinformatics, heart-brain, microbiome

W. Glen Pyle - Sex differences in cardiovascular health and disease, molecular mechanisms and therapies for heart failure; ageing

Tarek Saleh - Autonomic control of the heart following stroke

NEUROSCIENCE

Craig Bailey - Mechanisms underlying the development and function of the prefrontal cortex and hippocampus, and how these may be altered in developmental brain disorders

Giannina Descalzi - Chronic pain-induced dysregulation of brain circuits and gene function in companion and production animals

Bettina Kalisch - Regulation of gene expression in cholinergic neuron function and Alzheimer Disease

Jibran Khokhar - Using animal models and advanced imaging techniques to study the neurobiological basis, and consequences, of substance use disorders in patients with serious mental illness

Neil J. MacLusky - Neurosteroid modulation of hippocampal structure and function

Dr. Melissa Perreault - Neural Oscillations, Sex Differences, Neuropsychiatric Disorders, Molecular and Cellular Biology

PHARMACOLOGY AND TOXICOLOGY

Ronald Johnson - Veterinary clinical pharmacology; pharmacokinetics, clinical trials; human food safety, drug depletion studies

Gordon M. Kirby - Molecular Toxicology and Diagnostics

REPRODUCTIVE BIOLOGY

Pawel M. Bartlewski - Hormonal control of ovarian antral follicle development in domestic ruminants

Laura Favetta - Endocrine Disrupting Compounds and their molecular/genetic effects during in vitro early embryonic development

W. Allan King - Cytogenetic and morphologic aspects of fertilization and early development

Jonathan LaMarre - Small RNAs in the control of gene expression in gametes and embryos

Pavneesh Madan - Cellular, molecular and genetic mechanisms regulating preimplantation embryogenesis

STEM CELL AND REGENERATIVE MEDICINE

Thomas G. Koch - Stem cell isolation, function and application, tissue-engineering, canine and equine studies

Matthew Vickaryous - Wound healing and tissue regeneration, stem cells, non-mammalian species

OTHER

Brad Hanna - Assessment of the teaching of critical thinking and scientific literacy in DVM and BSc curricula, and development of new methods

Peter D. Conlon - Communications: Veterinary-client interactions

Jeffrey J. Thomason - Biomechanics of the mammalian musculoskeleton

"Within the biomedical sciences major there are so many areas you can specialize in. It really opens up a lot of doors," says Prof. Tarek Saleh, chair of OVC's Department of Biomedical Sciences. "Not only are graduates well-prepared for further studies in medical or veterinary medicine or biomedical research, they can also pursue any allied health profession such as dentistry, speech or physical therapy, optometry – anything you can do that is associated with human or animal health."

Facilities

Facilities include individual labs, multi-investigator labs and common equipment areas that have been renovated with the aid of funding from the Canadian Foundation for Innovation.

Research equipment includes:

- Applied Biosystems ViiA7
- multiple BioRad CFX96 Real-Time PCR Detection Systems
- NanoDrop Spectrophotometers
- Accuri C6 System Flow cytometers
- full Proteomics suite consisting of a Typhoon scanner, spot picker and DeCyder analysis Software
- ChemiDoc XRS+ Systems
- Histology core facility
- Fluoview FV1200 Laser Scanning Confocal Microscope
- fluorescent microscopes
- Neuronal Cell Imaging System
- fluorescent plate readers
- Analytical HPLC Facility
- specialized laboratory equipment