

# 2009-2010 Graduate Calendar

The information published in this Graduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2009-2010 academic years, including the Fall Semester 2009, the Winter Semester 2010 and the Summer Semester 2010.

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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## Disclaimer

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The Office of Graduate Program Services 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 <http://www.uoguelph.ca/registrar/registrar/index.cfm?index>.

## 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 Graduate Program Services.

## 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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## Molecular and Cellular Biology

The MCB graduate program offers opportunities for interdisciplinary studies in molecular and cellular biology leading to the MSc and PhD degrees. The research groups directed by the faculty are engaged in the pursuit of fundamental and applied research questions involving diverse biological systems (plants, humans and other animals, prokaryotic and eukaryotic microbes). In general, they follow lines of scientific enquiry at the level of molecules to cells. The areas of emphasis and the faculty associated with those areas are:

- **Biochemistry (BCH)** – Brauer, Clarke, Coppolino, Dawson, Emes, Graether, Harauz, Jones, Josephy, Kimber, Lam, Mangroo, Merrill, Nazar, Seah, Sharom, Tetlow, Van Raay, Whitfield, Wood, Yankulov
- **Cell Biology (CEB)** – Bag, Bendall, Coppolino, Greenwood, Harauz, Jones, Lu, Mangroo, Mathur, Mosser, Mullen, Nazar, Robb, van der Merwe, Van Raay, Whitfield, Wood
- **Microbiology (MICR)** – Allen-Vercos, Clarke, Kaushik, Kimber, Krell, Lam, Lo, Lu, Meng, Merrill, Mutharia, Seah, Stevenson, van der Merwe, Whitfield, Wood
- **Molecular Biology and Genetics (MBG)** – Allen-Vercos, Bag, Baker, Bendall, Colasanti, Jones, Kaushik, Krell, Lo, Lu, Mathur, Meng, Mosser, Mutharia, Nassuth, Nazar, Robb, Rothstein, Van Raay, Yankulov
- **Plant Biology (PBIO)** – Colasanti, Emes, Greenwood, Mathur, Meng, Mullen, Nassuth, Nazar, Posluszny, Robb, Rothstein, Tetlow.

Faculty in Molecular and Cellular Biology also participate in the interdepartmental programs in Aquaculture, Biophysics, Neuroscience and Toxicology.

### Administrative Staff

#### Chair

Chris Whitfield (4477 Science Complex, Ext. 53362)  
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#### Graduate Co-ordinator

Reggie Lo (3250 Science Complex, Ext. 53363)  
rlo@uoguelph.ca

#### Graduate Secretary

Carol V. Schlaht (3481 Science Complex, Ext. 53815)  
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#### CBS Graduate Admissions Secretary

Karen White (3479 Science Complex, Ext. 52730)  
cbsgrad@uoguelph.ca

### Graduate Faculty

#### Emma Allen-Vercos

BSc London UK, PhD Open UK - Assistant Professor

#### Jnanankur Bag

BSc, MSc, PhD Calcutta - Professor

#### Mark D. Baker

BSc Laurentian, MSc, PhD Waterloo - Associate Professor

#### Andrew J. Bendall

BSc, MSc Australian National, PhD Macquarie - Assistant Professor

#### Manfred Brauer

BSc Calgary, MSc, PhD Wisconsin - Associate Professor

#### Anthony J. Clarke

BSc, MSc, PhD Waterloo - Professor

#### Joseph L. Colasanti

BSc, PhD Western Ontario - Assistant Professor

#### Marc Coppolino

BSc Waterloo, MSc, PhD Toronto - Assistant Professor

#### John Dawson

BSc Wilfrid Laurier, PhD Alberta - Assistant Professor

#### Michael J. Emes

BSc, PhD Sheffield - Professor and Dean of the College of Biological Science

#### Steffen P. Graether

BSc, MSc, PhD Queen's - Assistant Professor

#### John S. Greenwood

BSc, MSc McMaster, PhD Calgary - Associate Professor

#### George Harauz

BASc, MSc, PhD Toronto - Professor

#### Nina Jones

BSc Guelph, PhD Toronto - Assistant Professor

#### David Josephy

BSc Toronto, PhD British Columbia - Professor

#### Azad Kaushik

BVSc, MVSc Haryana, DSc Inst. Pasteur - Associate Professor

#### Cezar Khursigara

BSc Ryerson, PhD McGill - Assistant Professor

#### Matthew S. Kimber

BSc, PhD Toronto - Assistant Professor

#### Peter J. Krell

BSc, MSc Carleton, PhD Dalhousie - Professor

#### Joseph S.L. Lam

BSc, PhD Calgary - Professor

#### Reggie Y.C. Lo

BSc, PhD Alberta - Professor

#### Ray Lu

BSc Wuhan (China), MSc Beijing Medical, PhD Saskatchewan - Assistant Professor

#### Devakanand Mangroo

BSc, PhD McMaster - Associate Professor

#### Jaideep Mathur

BSc, MSc Lucknow (India), PhD Gorakhpur (India) - Associate Professor

#### Baozhong Meng

BSc, MSc Hebei Agricultural Univ. (China) - Assistant Professor

#### Rod Merrill

BSc Lethbridge, PhD Ottawa - Professor

#### Richard D. Mosser

BSc, PhD Waterloo - Associate Professor

#### Robert T. Mullen

BSc, PhD Alberta - Associate Professor

#### Lucy M. Mutharia

BSc, MSc Nairobi, PhD British Columbia - Associate Professor

#### Annette Nassuth

BSc, MSc Free University, Amsterdam, PhD Leiden - Associate Professor

#### Ross N. Nazar

BSc, PhD Toronto - Professor

#### Usher Posluszny

BSc, PhD McGill - Professor

#### E. Jane Robb

BSc York, PhD British Columbia - Professor

#### Steven Rothstein

BA Swarthmore College, PhD Wisconsin - Professor

#### Stephen Y.K. Seah

BSc, MSc National University of Singapore, PhD Sheffield - Associate Professor

#### Frances Sharom

BSc Guelph, PhD Western Ontario - Professor

#### Roselynn M.W. Stevenson

BSc, PhD Manitoba - Associate Professor

#### Ian Tetlow

BSc Newcastle (UK), PhD North Wales - Assistant Professor

#### George van der Merwe

BSc, MSc, PhD Stellenbosch (South Africa) - Assistant Professor

#### Terry Van Raay

BSc Windsor, MSc Guelph, PhD Utah - Assistant Professor

#### Christopher Whitfield

BSc Newcastle, PhD Edinburgh - Professor and Chair

#### Janet M. Wood

BSc Victoria, PhD Edinburgh - Professor

#### Krassimir (Joseph) Yankulov

BSc Sophia, PhD ICRF London - Assistant Professor

### MSc Program

The objective of the MCB MSc program is to provide graduate students with a high level of relevant knowledge and expertise in contemporary molecular and cellular biology, including experimental techniques, library research, writing and communication skills. Graduates will have the knowledge and skills needed to carry out high quality scientific research and will be prepared for employment in positions with some responsibility in the research and teaching enterprises of academic institutions (as instructors and technical staff), in science-related positions in the broad biotechnology sector (e.g. food and beverage industries, pharmaceuticals, biomedical, and agriculture-related industries), or in government sector institutes and laboratories. They will be well prepared to continue their graduate education at the PhD level. Alternatively they may opt to complete a professional degree (such as law, medicine, or business) or a teaching certificate.

### Admission Requirements

To be considered, applicants must have completed a four-year honours undergraduate degree (or its equivalent) in a relevant discipline. Normally, the applicant must have achieved a "B" (75%) average or higher during the last two years of full-time study. In exceptional circumstances, students with a "B-minus" average (70%) will be considered provided there is strong supporting evidence of research aptitude and potential.

Applicants must obtain the support of a faculty member willing to serve as their thesis advisor.

Applications for the program will be considered at any time and admission may be granted for entry in January, May or September.

### Admission Process

Graduate student applications to programs in the College of Biological Science are handled by the Office of the Associate Dean, Research (ADR). Before submitting an application, you are strongly encouraged to view the "Before you Apply" webpage on the ADR Future Student's site. NOTE: The name of a potential advisor(s) is required in order to complete the submission summary.

On-line applications, required documents and instructions can be found on the Graduate Program Services webpage or in the Graduate Calendar

Completed applications should be submitted to the CBS Graduate Admissions Secretary.

### Degree Requirements

Students in the MSc program must complete a minimum of 3 courses (1.5 credits) at the graduate level. Courses MCB\*6100 Research Topics in Molecular & Cellular Biology (0.5) and MCB\*6200 Scientific Communication in Molecular & Cellular Biology (0.5) are mandatory. Normally these two courses must be completed in the first year of study. Senior undergraduate courses may be taken on the recommendation of the Advisory Committee but these will not count towards the 1.5 credit requirement. An average of "B-minus" (70%) must be achieved in the prescribed courses.

The MSc thesis research must involve original enquiry into a well-defined question in the molecular biosciences. It is expected that the research will not have been previously reported in the literature and, wherever possible, the research should yield publishable data.

All students beyond year 1 in the program are expected to participate annually in the CBS Graduate Student Symposium by presenting a poster or giving a short talk describing their research progress.

### PhD Program

The objective of the MCB PhD program is to develop independent and creative scientists specializing in molecular and cellular biology. Graduates will be prepared for positions as scholars in academic institutions, as leaders in the research and development sector of the biomedical and other industries or government agencies, and in social institutions.

### Admission Requirements

To be considered, applicants must have completed a recognized Masters degree in a relevant discipline with a minimum academic standing of "A-minus" (80%). Students may transfer from the MSc program to the PhD program with the approval of Graduate Program Services. Transfers must be initiated with a request to the MCB Graduate Program Coordinator no earlier than the end of the second semester and no later than the end of the fourth semester. The transfer must be supported by the student's Advisory Committee and requires a minimum academic standing of "A-minus" (80%) in the graduate program, as well as strong supporting evidence of research aptitude and potential. Direct entry into the PhD program from a four-year honours BSc program (or its equivalent) will be considered for students of exceptional promise. Normally, such students will have achieved an "A-minus" (80%) average or higher during the last two years of full-time study and there must be strong supporting evidence of research aptitude and potential.

Applicants must obtain the support of a faculty member willing to serve as their thesis advisor.

Applications for the program will be considered at any time and admission may be granted for entry in January, May or September.

### Admission Process

Graduate student applications to programs in the College of Biological Science are handled by the Office of the Associate Dean, Research (ADR). Before submitting an application, you are strongly encouraged to view the "Before you Apply" webpage on the ADR Future Student's site. NOTE: The name of a potential advisor(s) is required in order to complete the submission summary.

On-line applications, required documents and instructions can be found on the Graduate Program Services webpage or in the Graduate Calendar.

Completed applications should be submitted to the CBS Graduate Admissions Secretary.

### Degree Requirements

Students in the PhD program must complete two mandatory graduate level courses MCB\*6100 Research Topics in Molecular & Cellular Biology (0.5 credit) and MCB\*6200 Scientific Communication in Molecular & Cellular Biology (0.5). Normally, these two courses must be completed in the first year of study. Other courses may be taken on the recommendation of the Advisory Committee. An average of "B-minus" (70%) must be achieved in the prescribed courses. To be a candidate for the PhD degree, each student must pass a PhD Qualifying Exam, normally held within the first 4 semesters in the student's program. In the case of a student transferring from the MSc program, the exam will be held no later than one semester following the transfer.

The PhD thesis research must involve original enquiry into a well-defined question in the molecular biosciences. It is expected to result in the publication of one or more papers in

high-quality peer-reviewed journals. The research must represent a significant contribution to the relevant research field.

All students beyond year 1 in the program are expected to participate annually in the CBS Graduate Student Symposium by presenting a poster or giving a short talk describing their research progress.

### Courses

<b>MCB*6100 Research Topics in Molecular and Cellular Biology U [0.50]</b>
The development and refinement of the skills of scientific communication, emphasizing writing skills, in the context of developing a thesis proposal. This course is mandatory for all students in the MCB graduate program and is normally completed within the first two (2) semesters of the program, and must be taken with the accompanying course MCB*6200.
<b>MCB*6200 Scientific Communication in Molecular and Cell Biology U [0.50]</b>
The development and refinement of the skills of scientific communication emphasizing oral presentation. Students will present a public seminar on a contemporary subject in the molecular biosciences culminating in a description of the proposed research. This course is mandatory for all students in the MCB program and must be taken with the accompanying course MCB*6100.
<b>MCB*6310 Advanced Topics in Developmental and Cellular Biology U [0.50]</b>
A study of selected topics in contemporary developmental and cellular biology. Students will review recent advances in these disciplines at the molecular and cellular level, in biological systems ranging from simple eukaryotes to plants and vertebrates.
<b>MCB*6320 Advanced Topics in Microbiology U [0.50]</b>
A study of selected topics in contemporary microbiology. Students will review recent advances in microbial cell structure, physiology, interactions, gene expression and virulence.
<b>MCB*6330 Molecular Biology of Viruses U [0.50]</b>
Replication strategies of virus genomes including prototypes of different animal, plant and (some) bacterial virus families; mechanism and control of viral gene expression; tumour virology; genetically engineered virus vaccines.
<b>MCB*6340 Advanced Topics in Molecular Genetics U [0.50]</b>
A study of selected topics in contemporary molecular biology and molecular genetics. Students will review recent progress in gene expression and regulation in model organisms, and the application of molecular biology tools to the study of cellular and organismal physiology.
<b>MCB*6350 Advanced Topics in Plant Biology U [0.50]</b>
A study of selected contemporary topics in biochemistry and molecular biology. Proposed course descriptions are considered by the Department of Molecular and Cellular Biology on an ad hoc basis, and the course will be offered according to demand.
<b>MCB*6360 Advanced Topics in Biochemistry and Molecular Biology U [0.50]</b>
A study of selected contemporary topics in biochemistry and molecular biology. Proposed course descriptions are considered by the Department of Molecular and Cellular Biology on an <i>ad hoc</i> basis, and the course will be offered according to demand.
<b>MCB*6370 Protein Structural Biology and Bioinformatics U [0.50]</b>
This course explores structural biology from three perspectives: 1) the fundamental concepts in structural biology; 2) the methods used to determine structures (including x-ray crystallography, NMR, electron microscopy, and computational modeling); 3) the bioinformatic concepts and tools used to compare, contrast and assign biochemical function to protein structures and sequences. The course emphasizes building a conceptual and practical skill set that will be applicable to any structure related problem.
<b>MCB*6380 Structure and Function of Biological Membranes U [0.50]</b>
This course covers multidisciplinary investigations of the basic structure and function of membranes in relation to cell biology. Topics will include structural biology of membrane proteins, experimental approaches for studying membranes, membrane transport systems, import-export systems and/or membrane trafficking.