

BIOTECHNOLOGY

This interdepartmental program focuses on molecular approaches and provides both scientific and business discipline-specific training. The Master of Biotechnology program provides graduates with advanced education, knowledge, technical and business expertise in the broad field of biotechnology. Courses promote effective communication of knowledge of the scientific discipline, as well as place it in a business context. It fosters academic and intellectual growth, as well as interactions between graduate students, faculty, the university, and the wider research community and the private sector. Students will be trained as highly competent, independent, and creative researchers/managers who are familiar with and able to integrate both the science and business environments. Furthermore, the program encourages the development of entrepreneurial activities in this area, which is crucial for the formation of new private sector companies. The ultimate goal of the program is to advance and encourage biotechnology research on campus, both amongst the graduate students enrolled in the program, as well as amongst and between faculty.

Administrative Staff

Director

Ian Tetlow (4471 Summerlee Science Complex, Ext. 52735)
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Graduate Program Coordinator

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Graduate Program Assistant

Carol Hannam (4451 Summerlee Science Complex, Ext. 56474)
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Graduate Faculty

This program is offered by the Department of Molecular and Cellular Biology, in partnership with the Departments of Food, Agriculture and Resource Economics, Food Science, Integrative Biology, Management, Pathobiology, Physics, and Plant Agriculture.

This list may include Regular Graduate Faculty, Associated Graduate Faculty and/or Graduate Faculty from other universities.

Tariq Akhtar

B.Sc., M.Sc. Waterloo, PhD Florida - Assistant Professor
Graduate Faculty

Joseph L. Colasanti

B.Sc., PhD Western Ontario - Associate Professor
Graduate Faculty

Marc Coppolino

B.Sc. Waterloo, M.Sc., PhD Toronto - Associate Professor and Chair
Graduate Faculty

Georgina Cox

B.Sc., PhD Leeds - Assistant Professor
Graduate Faculty

John Dawson

B.Sc. Wilfrid Laurier, PhD Alberta - Professor and Associate Dean
(Academic), College of Biological Sciences
Graduate Faculty

John R. Dutcher

B.Sc. Dalhousie, M.Sc. British Columbia, PhD Simon Fraser - Professor
Graduate Faculty

Michael J. Emes

B.Sc., PhD Sheffield - Professor
Graduate Faculty

Jennifer Geddes-McAlister

B.Sc., M.Sc. Lethbridge, PhD British Columbia - Assistant Professor
Graduate Faculty

Steffen P. Graether

B.Sc., M.Sc., PhD Queen's - Professor
Graduate Faculty

Robert Hanner

B.Sc. Eastern Michigan, PhD Oregon - Associate Professor
Graduate Faculty

Nina Jones

B.Sc. Guelph, PhD Toronto - Professor
Graduate Faculty

Cezar Khursigara

B.Sc. Ryerson, PhD McGill - Professor
Graduate Faculty

Matthew S. Kimber

B.Sc., PhD Toronto - Associate Professor
Graduate Faculty

Jasmin Lalonde

BA Ottawa, MA, PhD McGill - Assistant Professor
Graduate Faculty

Ray Lu

B.Sc. Wuhan (China), M.Sc. Beijing Medical, PhD Saskatchewan -
Associate Professor
Graduate Faculty

Jaideep Mathur

B.Sc., M.Sc. Lucknow (India), PhD Gorakhpur (India) - Associate Professor
Graduate Faculty

Baozhong Meng

B.Sc., M.Sc. Hebei Agricultural (China) - Professor
Graduate Faculty

Robert T. Mullen

B.Sc., PhD Alberta - Professor
Graduate Faculty

Annette Nassuth

B.Sc., M.Sc. Free (Amsterdam), PhD Leiden - Retired Faculty
Associated Graduate Faculty

Steven G. Newmaster

B.Sc. Guelph, PhD Alberta - Associate Professor
Graduate Faculty

K. Peter Pauls

B.Sc., M.Sc., PhD Waterloo - Professor
Graduate Faculty

Melissa Perreault

B.Sc., M.Sc., PhD McMaster - Associate Professor

Graduate Faculty

Davar Rezania

M.Sc. Utrecht, MBA Derby, PhD Ramon LLULL, CPA, CMA - Associate Professor and Chair
Graduate Faculty

Scott Ryan

B.Sc. Memorial, PhD Ottawa - Associate Professor
Graduate Faculty

Stephen Y. K. Seah

B.Sc., M.Sc. National (Singapore), PhD Sheffield - Professor
Graduate Faculty

Rebecca Shapiro

B.Sc. McGill, PhD Toronto - Assistant Professor
Graduate Faculty

Paul Spagnuolo

B.Sc., M.Sc. Guelph, PhD Waterloo - Associate Professor
Graduate Faculty

Ian Tetlow

B.Sc. Newcastle (UK), PhD North Wales - Professor
Graduate Faculty

James Uniacke

B.Sc., PhD Concordia - Assistant Professor
Graduate Faculty

George van der Merwe

B.Sc., M.Sc., PhD Stellenbosch (South Africa) - Associate Professor
Graduate Faculty

Terry Van Raay

B.Sc. Windsor, M.Sc. Guelph, PhD Utah - Associate Professor
Graduate Faculty

John Vessey

B.Sc., M.Sc. Dalhousie, PhD Eberhard Karls (Tübingen) - Assistant Professor
Graduate Faculty

Michael von Massow

BA Manitoba, B.Sc., M.Sc. Guelph, PhD McMaster - Associate Professor
Graduate Faculty

Christopher Whitfield

B.Sc. Newcastle, PhD Edinburgh - Professor
Graduate Faculty

Krassimir (Joseph) Yankulov

B.Sc. Sophia, PhD ICRF London - Professor
Graduate Faculty

Wei Zhang

B.Sc. Beijing, MA York, PhD Toronto - Assistant Professor
Graduate Faculty

MBIOT Program

Admission Requirements

Students entering the program will normally have completed an Honours Bachelor's degree with a minimum admission average of B (75% and higher) in one of the following fields: biology, molecular biology and

genetics, biotechnology, microbiology, biochemistry, biophysics, food science, agriculture, food production systems, commerce with a strong science background. Anyone lacking the required background will be encouraged to complete them prior to commencing their studies in the new program (typically in the immediately preceding summer semester) or, if approved by the program counsellor, during their studies. Students whose first language is not English require a minimum TOEFL score of 93 with a minimum score of 22 in each of the four categories, or a minimum IELTS score of 7.0, with a minimum of at least 6.5 in each component. Applicants who have completed an undergraduate degree from institutions where the language of instruction was English may be exempt from ESL requirements, pending departmental approval.

All components of the application, including transcript(s), graduate certificate(s), grading scale(s), language test results and assessment forms must be uploaded no later than two months after an application is submitted through the OUAC portal. Applications that are incomplete after this time period will be closed.

Admissions 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, applicants are strongly encouraged to view the "Before you Apply" and "Admission Process" webpages on the ADR Future Student's site.

Space in this program will be limited and applicants are advised to ensure their applications are complete by the application deadline stated on the program website. Application details and the admissions deadline are posted on the program website.

Program Requirements

A total of 4.0 course credits are required to graduate, which must include:

| Code | Title | Credits |
|-----------|--|---------|
| BIOT*6500 | Molecular Biotechnology | 0.50 |
| BIOT*6600 | Innovation Management | 0.50 |
| BIOT*6550 | Biodiversity and Biotechnology | 0.50 |
| BIOT*6610 | Cases in Biotechnology Management | 0.50 |
| BIOT*6700 | Communication in Science and Business | 0.50 |
| BIOT*6800 | Biotechnology Research Project (must be taken in Semester 3) | 1.00 |
| Electives | | 0.50 |

An optional Semester 4 may be added, as a research project extension.

Duration of the Program

Students will normally take three courses per semester for two semesters (3.0 credits) and complete the Biotechnology Masters project (1.0) credit in semester 3. Therefore, the program normally takes 12 months of full-time study. There is, however, the option to continue the Biotechnology Masters project into a second fall semester, in which case the program will take 16 months of full-time study.

Courses

BIOT*6500 Molecular Biotechnology Fall Only [0.50]

This course will provide an overview of molecular approaches relevant to a broad range of biotechnology industries including those found in medical, microbial, protein, pharmaceutical, environmental and agricultural fields.

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

BIOT*6550 Biodiversity and Biotechnology Winter Only [0.50]

Biological diversity includes the variability among living organisms spanning genetic, species, habitat and geographic scales, thereby encompassing all living things and associated systems. This course will provide an overview of DNA-based approaches used to analyze and characterize the main principles of biodiversity followed by discussions of the impact of biologically diverse communities within the biotechnology sector.

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

BIOT*6600 Innovation Management Fall Only [0.50]

This course will focus on the integration of science and business from initial discovery through to commercialization. This integration involves resolving issues related to technical, market and financial feasibility. Topics will include the innovation process, assessment of markets, development of business models and managing projects under high uncertainty.

Department(s): Department of Management

Location(s): Guelph

BIOT*6610 Cases in Biotechnology Management Winter Only [0.50]

This course will examine contemporary issues in biotechnology / science-based business through a case-based approach. Topics from across the spectrum of business disciplines (marketing, management, strategy, intellectual property, etc.) will be examined. Time permitting, a live case with an industry partner will be used.

Prerequisite(s): BIOT*6600

Department(s): Department of Management

Location(s): Guelph

BIOT*6700 Communication in Science and Business Winter Only [0.50]

The goal of this course is to develop written, and oral presentation skills to effectively communicate ideas and experiments in both scientific and business contexts. Students will be asked to write and orally communicate a research proposal.

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

BIOT*6800 Biotechnology Research Project Summer Only [1.00]

The students will be matched with a research advisor in their first semester and write a research proposal on their project in the second semester communication course. During the time they do their research project, they will be expected to do the research work that they propose and then to prepare a written report of their results and conclusions as well as to give a poster presentation on this. The research project can be undertaken with any appropriate faculty member, or with an approved off-campus institution.

Restriction(s): Restricted to Master of Biotechnology students.

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

Electives

College of Biological Sciences

| Code | Title | Credits |
|-----------|---|---------|
| MCB*6310 | Advanced Topics in Molecular and Cellular Biology | 0.50 |
| MCB*6370 | Protein Structural Biology and Bioinformatics | 0.50 |
| HHNS*6440 | Nutrition, Gene Expression and Cell Signalling | 0.50 |

Bioinformatics

| Code | Title | Credits |
|-----------|--|---------|
| BINF*6110 | Genomic Methods for Bioinformatics | 0.50 |
| BINF*6210 | Software Tools for Biological Data Analysis and Organization | 0.50 |

Gordon S. Lang School of Business and Economics

| Code | Title | Credits |
|-----------|--|---------|
| UNIV*6050 | Innovation and Entrepreneurship in Agri-Food Systems | 1.00 |
| MGMT*6200 | Leadership Assessment and Development | 0.50 |
| MGMT*6400 | Project Management | 0.50 |

Ontario Agricultural College

| Code | Title | Credits |
|-----------|---|---------|
| ANSC*6450 | Topics in Animal Biotechnology | 0.50 |
| ENVS*6040 | Molecular Basis of Plant-Microbe Interactions | 0.50 |
| PLNT*6500 | Applied Bioinformatics | 0.50 |