DOCTORATE IN PHILOSOPHY CELLULAR AND MOLECULAR MEDICINE AND SPECIALIZATION BIOINFORMATICS

Overview

Summary

- Degrees offered: Doctorate in Philosophy (PhD)
- Registration status option: Full-time
- Language of instruction: English
- Primary program: PhD Cellular and Molecular Medicine
- Collaborative specialization: Bioinformatics
- Program option (expected duration of the program):
  - with thesis (12 full-time terms; 48 consecutive months)
- Academic units: Faculty of Medicine (http://med.uottawa.ca/graduate-postdoctoral/), Department of Cellular and Molecular Medicine (https://med.uottawa.ca/cellular-molecular/)

Program Description

The programs prepare candidates for a variety of careers in teaching and research both within and outside of academia. During training, the student will develop a critical approach to published work and to his own work. Graduates acquire an excellent knowledge of their chosen field and a general understanding of the areas related to their own particular research project. They must demonstrate research skills and credibility as professionals in their area of research.

The Department is a participating unit in the collaborative programs in Bioinformatics (at the master's level), in Human and Molecular Genetics (at the master's and doctoral levels), and in Pathology and Experimental Medicine (at the master's and doctoral levels).

Collaborative Program Description

Bioinformatics is an emerging and increasingly important scientific discipline dedicated to the pursuit of fundamental questions about the structure, function and evolution of biological entities through the design and application of computational approaches. Fundamental research in these areas is expected to increase our understanding of human health and disease which translates into innovation in industry.

Bioinformaticians today must be able to appreciate significant research in other fields and therefore require an understanding of the basic principles of other disciplines. The degree awarded specifies the primary program and indicates "specialization in Bioinformatics."

Main Areas of Research

Most research groups in the Department are part of a research centre. These centres include the Centre for Neuromuscular Disease, the Kidney Research Centre, and the Centre for Research in Biopharmaceuticals. Members of the Department are involved in three main research fields:

- Growth and development
- Pharmacology
- Physiology

Other Programs Offered Within the Same Discipline or in a Related Area

- Doctorate in Philosophy Cellular and Molecular Medicine (PhD)
- Doctorate in Philosophy Cellular and Molecular Medicine Specialization in Human and Molecular Genetics (PhD)
- Doctorate in Philosophy Cellular and Molecular Medicine Specialization in Pathology and Experimental Medicine (PhD)
- Doctorate in Philosophy Neuroscience (PhD)
- Doctorate in Philosophy Neuroscience Specialization in Human and Molecular Genetics (PhD)
- Doctorate in Philosophy Neuroscience Specialization in Pathology and Experimental Medicine (PhD)

Fees and Funding

Program fees:

- The estimated amount for university fees (https://www.uottawa.ca/study/fees-financial-support/university-fees/) associated with this program are available under the section Finance your studies (https://www.uottawa.ca/study/graduate-studies/funding-financing/).
- International students enrolled in a French-language program of study may be eligible for a differential tuition fee exemption (https://www.uottawa.ca/study/fees-financial-support/differential-tuition-fee-exemption-scholarship/).
- To learn about possibilities for financing your graduate studies, consult the Awards and financial support (https://www.uottawa.ca/study/graduate-studies/awards-financial-support/) section.

Notes

- Programs are governed by the academic regulations (https://www.uottawa.ca/about-us/leadership-governance/policies-regulations/)in effect for graduate studies.
- In accordance with the University of Ottawa regulation, students have the right to complete their assignments, examinations, research papers, and theses in French or in English.

Program Contact Information

Graduate Studies Office, Faculty of Medicine (https://med.uottawa.ca/graduate-postdoctoral/)

451 Smyth Road, Room RGN 2016

Ottawa, Ontario, Canada

K1N 6N5

Tel.: 613-562-5215

Email: grad.med@uottawa.ca

Twitter | Faculty of Medicine (https://twitter.com/uOttawaMed/)

Youtube | Faculty of Medicine (https://www.youtube.com/channel/UCP2nDlrjFEEtyfMiOmle2HA/)

Flickr | Faculty of Medicine (https://www.flickr.com/photos/uottawamed/)

Admission Requirements

For the most accurate and up to date information on application deadlines, language tests and other admission requirements, please visit the specific requirements (https://www.uottawa.ca/graduate-studies/programs-admission/apply/specific-requirements/) webpage.

To be eligible, candidates must:

- Have a master's degree in science (with a background in biology, biochemistry, human kinetics, pharmacology, physiology or biopharmaceutical sciences) with a minimum average of B+ (75%).

  Note: International candidates must check the admission equivalencies (https://www.uottawa.ca/study/graduate-studies/international-equivalencies/) for the diploma they received in their country of origin.

- Demonstrate a good academic performance in previous studies as shown by official transcripts, research reports, abstracts or any other documents demonstrating research skills.
- The requirements outlined above are a minimum. The Admission Committee reserves the right to add any course considered essential in light of the student's background. The courses BNF 5106 and/or BNF 6100 could be added to the student's program requirements.

- Identify at least one professor who is willing to supervise your research and thesis.
  - We recommend that you contact potential thesis supervisors as soon as possible.
  - To register, you need to have been accepted by a thesis supervisor.
  - The thesis director must be a member of the collaborative program.

Language Requirements

Applicants must be able to understand and fluently speak the language of instruction in the program to which they are applying. Proof of linguistic proficiency may be required.

Applicants whose first language is neither French nor English must provide proof of proficiency in the language of instruction.

Note: Candidates are responsible for any fees associated with the language tests.

Notes

- The admission requirements listed above are minimum requirements and do not guarantee admission to the program.
- Admissions are governed by the academic regulations (https://www.uottawa.ca/about-us/leadership-governance/policies-regulations/) in effect for graduate studies.
- Candidates must apply to the primary program and indicate in their application for admission to the PhD program in Cellular and Molecular Medicine that they wish to be accepted into the collaborative-specialization in Bioinformatics. Students are normally informed about their acceptance into the collaborative program at the same time as being informed about their admission into the primary program. To be admitted to the collaborative program, candidates must also be accepted in the primary program.

Fast-Track from Master's to PhD

Students enrolled in the master's program in Cellular and Molecular Medecine at the University of Ottawa may be eligible to fast-track directly into the doctoral program without writing a master's thesis, provided the following conditions are met:

- Successful completion of the seminar and all the core courses required for the master's program.
- Satisfactory progress in the research program.
- Written recommendation by the supervisor and the advisory committee.
- Approval by the graduate studies committee.

Note: The transfer must take place within sixteen months of initial enrollment in the master's. Please note that the minimal admission average requirements for the doctoral program must also be met. Following transfer, all of the requirements of the doctoral program must be met

Program Requirements Doctorate with Collaborative Specialization

Students must meet the following requirements:

Compulsory Courses: [1, 2]		
MED 8166	Professionalism and Professional Skills	
Seminars:		
CMM 8325S	Seminars II [3]	3 Units
BNF 8166	Seminar in Bioinformatics [4]	3 Units
Comprehensive Examination:		
CMM 9998	Comprehensive Examination (PhD) [5]	
Thesis:		
THD 9999	Doctoral Thesis [6, 7]	

Note (s)

1. The Department may require students to take additional courses, depending on their backgrounds.
2. Students in the BNF PhD program who already have taken BNF 5106 will be required to take one of BCH 5101, BCH 8110, BIO 8301, BNF 5107 or CHM8309.
3. The seminar course involves the presentation of a seminar and attendance at the seminars approved by the Department.
4. The seminar course in bioinformatics involves a written report, the presentation of a seminar, and regular attendance at departmental seminars.
5. Successful completion of a comprehensive examination in the form of a written research proposal followed by an oral examination.
6. Successful presentation and defence of a research thesis on a topic in bioinformatics based on original research carried out under the

supervision of a faculty member participating in the bioinformatics collaborative program.

7 Students are responsible for ensuring they have met all of the thesis requirements. (https://www.uottawa.ca/study/graduate-studies/thesis/)

Research

Research at the University of Ottawa

Located in the heart of Canada's capital, a few steps away from Parliament Hill, the University of Ottawa ranks among Canada's top 10 research universities. Our research is founded on excellence, relevance and impact and is conducted in a spirit of equity, diversity and inclusion.

Our research community thrives in four strategic areas:

- Creating a sustainable environment
- Advancing just societies
- Shaping the digital world
- Enabling lifelong health and wellness

From advancing healthcare solutions to tackling global challenges like climate change, the University of Ottawa's researchers are at the forefront of innovation, making significant contributions to society and beyond.

Research at the Faculty of Medicine

"The Faculty of Medicine has a long history of conducting both basic and clinical research of the highest quality. Many of our high profile research projects are conducted in partnership with affiliated-teaching hospitals and research institutes. These partnerships lead to biomedical discoveries that have a significant impact on health care. In the process they educate the next generation of Canadian scientists. Our research activity also attracts significant investment, which stimulates the Ottawa economy."

- Dr. Jocelyn Côté, Vice-Dean, Research

Facilities, Research Centres and Institutes at the Faculty of Medicine

- Centre for Neural Dynamics (https://www.uottawa.ca/recherche-innovation/cerveau/recherche/dynamique-neuronale/)
- University of Ottawa Centre for Neuromuscular Disease (http://med.uottawa.ca/neuromuscular/)
- Centre for Research in Biopharmaceuticals and Biotechnology (https://www.uottawa.ca/faculty-medicine/research-and-innovation/centres-shared-resources/)
- Canadian Partnership for Stroke Recovery (https://canadianstroke.ca/)
- Kidney Research Centre (http://www.ohri.ca/centres/KRC/default.asp)
- University of Ottawa Skills and Simulation Centre (http://uossc.ca/)
- Medical Devices Innovation Institute
- Ottawa Institute of Systems Biology (http://med.uottawa.ca/oisb/)
- University of Ottawa Brain and Mind Research Institute (https://www.uottawa.ca/research-innovation/brain/)

For more information, refer to the list of faculty members and their research fields on **Uniweb**.

IMPORTANT: Candidates and students looking for professors to supervise their thesis or research project can also consult the website of the faculty or department (https://www.uottawa.ca/graduate-studies/students/academic-unit-contact-information/) of their program of choice. Uniweb does not list all professors authorized to supervise research projects at the University of Ottawa.

Courses

Not all of the listed courses are given each year. The course is offered in the language in which it is described.

BNF 5106 Bioinformatics (3 units)
Major concepts and methods of bioinformatics. Topics may include, but are not limited to: genetics, statistics & probability theory, alignments, phylogenetics, genomics, data mining, protein structure, cell simulation and computing.
Course Component: Lecture

BNF 5107 Applied Bioinformatics (3 units)
Computational knowledge discovery in and the dynamic nature of cellular networks. Includes, but is not limited to, knowledge representation, large scale data integration, data mining and computational systems biology. This course is equivalent to BIOL 5516 at Carleton University.
Course Component: Lecture

BNF 5506 Bioinformatique (3 crédits)
Concepts et méthodes en bioinformatique. Les sujets abordés peuvent inclure, entre autres, la génétique, les statistiques et les théories des probabilités, les alignements, la phylogénétique, la génomique et la structure de protéines.
Volet : Cours magistral

BNF 6100 MSc Seminar (3 units)
Current topics in bioinformatics presented by program professors and invited speakers. Oral presentation and written report required. Graded S (Satisfactory) / NS (Not satisfactory).
Course Component: Lecture

BNF 6500 Séminaire de maîtrise (3 crédits)
Sujets courants en bioinformatique présentés par des professeurs membres du programme et des conférenciers invités. Présentation orale et rapport écrit requis. Noté S (satisfaisant) ou NS (non satisfaisant).
Volet : Cours magistral

BNF 8166 Seminar in Bioinformatics (3 crédits)
Current research topics in bioinformatics presented by PhD students and invited speakers. Oral presentation required. Graded S (Satisfactory) / NS (Not satisfactory).

BNF 8766 Séminaire en bioinformatique (3 crédits)
Sujets courants en bioinformatique présentés par des étudiants en PhD et des conférenciers invités. Présentation orale requise. Noté S (satisfaisant) ou NS (non satisfaisant).

CMM 5001 The Pathological Basis of Disease (3 crédits / 3 units)
Introductory course for non-medical graduate students in Life Sciences. This course will consist of a brief introduction to pathology describing the manifestation of disease at the macroscopic and microscopic level. This will be followed by
(i) a description of various types of microscopy and methodology;
(ii) concepts in flow cytometry, tissue/cell fractionation;
(iii) histo-/cytochemistry and immunohisto-cytochemistry;
(iv) normal cells and tissues;
(v) organs;
(vi) the general pathology of cells and tissues including hypertrophy, aplasia, atrophy, hyperplasia, metaplasia, dysplasia, neoplasia, storage diseases, extracellular space pathologies, necrosis and apoptosis. Blood vessel and cardiac pathologies will be covered as well as concepts in neuropathology, organ/system specific pathologies and genetic diseases.

Volet / Course Component: Cours magistral / Lecture

CMM 5105 Introduction to Cancer Biology (3 units)
An introduction to the biology of cancer. Major topics in cancer biology include the following: tumor suppression/oncogenes;