DOCTORATE IN PHILOSOPHY
MATHEMATICS AND
STATISTICS SPECIALIZATION
IN BIOINFORMATICS

Overview

Summary

• Degree offered: Doctorate in Philosophy (PhD)
• Registration status option: Full-time
• Language of instruction: English
• Primary program: PhD in Mathematics and Statistics
• Collaborative specialization: Bioinformatics
• Program option (expected duration of the program):
  • with thesis (12 full-time terms; 48 consecutive months)

Program Description

The programs prepare candidates for a variety of careers in teaching and research both within and outside of academia. Graduate students are actively involved in laboratory research, course work, and presentation of research seminars. Thus, they acquire autonomy in conducting research and in preparing publications. The programs create a stimulating and challenging environment which will allow students to achieve excellence in research. Graduates of the programs must demonstrate research skills and credibility as professionals in their area of research. The Department is a participating unit in the Bioinformatics collaborative program.

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. Bioinformatics 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

• Genomics, transcriptomics, and proteomics
• Probability and statistics
• Discrete mathematics
• Machine learning

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

• Doctorate in Philosophy Mathematics and Statistics (PhD)
• Master of Science Mathematics and Statistics Concentration in Mathematics (MSc)
• Master of Science Mathematics and Statistics Concentration in Statistics (MSc)
• Master of Science Mathematics and Statistics Specialization in Bioinformatics (MSc)
• Master of Science Mathematics and Statistics Specialization in Biostatistics (MSc)

Fees and Funding

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

Notes

• Programs are governed by the general regulations (http://www.uottawa.ca/graduate-studies/students/general-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.
• Research activities can be conducted either in English, French or both, depending on the language used by the professor and the members of his or her research group.

Program Contact Information

Graduate Studies Office, Faculty of Science (https://science.uottawa.ca/en/faculty-services/graduate-studies/)
30 Marie-Curie street, Gendron Hall, Room 181
Ottawa, Ontario, Canada
K1N 6N5
Tel.: 613-562-5800 x 3145
Email: gradsci@uOttawa.ca
Twitter | Faculty of Science (https://twitter.com/uOttawaScience/?lang=en)
Facebook | Faculty of Science (https://www.facebook.com/uOttawaScience/)
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 (or equivalent) with a minimum average of 75% (B+).

Note: International candidates must check the admission equivalencies (https://www.uottawa.ca/graduate-studies/international/study-uottawa/admission-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 general regulations (http://www.uottawa.ca/graduate-studies/students/general-regulations/) in effect for graduate studies.

• Students must indicate in their initial application for admission to the master’s program in Biochemistry that they wish to be accepted into the collaborative program in Bioinformatics. Students must be admitted in one of the primary programs participating in the collaborative program. Students will normally be informed about their acceptance into the collaborative program at the same time as being informed about their admission into the primary program.

• Research activities can be conducted either in English, French or both, depending on the language used by the professor and the members of his or her research group.

Fast-Track from Master’s to PhD
Students enrolled in the master’s program in Mathematics and Statistics with specialization in Bioinformatics 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:

• Maintain an A- average during their graduate studies and in the last two years of undergraduate studies.

• Complete all the core courses required for the M.Sc.

• Demonstrate a satisfactory progress in the research program.

• Provide a written recommendation by the thesis supervisor.

• Provide a written recommendation by the Departmental 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 specialization
Students must meet the following requirements:

Compulsory Courses:
18 optional course units in mathematics (MAT) at the graduate level 1

6 course units in Bioinformatics (BNF) at the 5000 or 8000 level 1,2,3

Seminar:
BNF 8166 Seminar in Bioinformatics 4 3 Units

Comprehensive Examination:
Two options from the following 2,3
Option 1: Real Analysis
MAT 9900 Comprehensive Exam: Real Analysis 1
MAT 9901 Comprehensive Exam: Real Analysis II

Option 2: Algebra
MAT 9902 Comprehensive Exam: Algebra I
MAT 9903 Comprehensive Exam: Algebra II

Option 3: Topology
MAT 9904 Comprehensive Exam: Topology I
MAT 9905 Comprehensive Exam: Topology II

Option 4: Differential Equations
MAT 9906 Comprehensive Exam: Differential Equations I
MAT 9907 Comprehensive Exam: Differential Equations II

Option 5: Discrete Mathematics
MAT 9908 Comprehensive Exam: Discrete Mathematics I
MAT 9909 Comprehensive Exam: Discrete Mathematics II

Option 6: Probability Theory

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<th>Course Code</th>
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<tr>
<td>MAT 9910</td>
<td>Comprehensive Exam: Probability Theory I</td>
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<td>MAT 9911</td>
<td>Comprehensive Exam: Probability Theory II</td>
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<td>Option 7: Mathematical Statistics</td>
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<tr>
<td>MAT 9912</td>
<td>Comprehensive Exam: Mathematical Statistics I</td>
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<td>MAT 9913</td>
<td>Comprehensive Exam: Mathematical Statistics II</td>
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**Comprehensive Examination:**
- MAT 9998 Advanced Comprehensive Examination

**Thesis:**
- THD 9999 Doctoral Thesis

**Note(s)**
1. The Department may require students to take additional courses, depending on their backgrounds.
2. Students in the PhD with specialization in bioinformatics program who already have taken BNF 5106 and BNF 6100 (or only one of them) will be required to take two (or only one, respectively) of BNF 5107, BNF 5504, or BNF 8301.
3. The optional course units may be selected from other approved graduate courses in related disciplines 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 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.
6. Students are responsible for ensuring they have met all of the thesis requirements.

**Research**

**Research Fields & Facilities**

Located in the heart of Canada’s capital, a few steps away from Parliament Hill, the University of Ottawa is among Canada’s top 10 research universities.

uOttawa focuses research strengths and efforts in four Strategic Areas of Development in Research (SADRs):

- Canada and the World
- Health
- e-Society
- Molecular and Environmental Sciences

With cutting-edge research, our graduate students, researchers and educators strongly influence national and international priorities.

**Research at the Faculty of Science**

The Faculty of Science has become a true centre of excellence in research through its world-class professors as well as its programs and infrastructure in Biology, Chemistry, Earth Sciences, Mathematics and Statistics, and Physics.

The research accomplished by its 140 internationally recognized professors, its approximately 400 graduate students and its dozens of postdoctoral researchers and visiting scientists has positioned the Faculty of Science as one of the most research intensive science faculties in Canada. Our professors have received many international and national awards including three NSERC Gerhard Herzberg Gold Medal winners and numerous Fellows of the Royal Society of Canada.

The Faculty of Science, through its strategic use of infrastructure programs, hosts world-class Core Facilities and is at the leading edge for the study of Catalysis, Experimental and Computational Chemistry, Environmental Toxins, Nuclear Magnetic Resonance, Isotope Analysis, Molecular Biology and Genomics, X-Ray Spectrometry/Diffraetmetry, Geochemistry, Mass Spectrometry, Physiology and Genetics of Aquatic Organisms, and Photonics. The Faculty is also associated with the Fields Institute for research in mathematical science and the Centre de recherche mathématiques (CRM) at the Université de Montréal, providing a unique setting for mathematical research.

**Courses**