



COMBINATORICS AND OPTIMIZATION

Combinatorics is the study of discrete structures, and related algorithms. Optimization deals with determining the values of variables that maximize or minimize an objective.

At Waterloo, we research and teach in six areas that work together in ways you might not at first expect. A student in quantum computing may use tools from continuous optimization, while effective algorithms for combinatorial optimization can depend on sophisticated ideas from graph theory.

Our research and teaching emphasizes six areas:

- 1 Algebraic combinatorics
- 2 Combinatorial/discrete optimization
- 3 Cryptography
- 4 Continuous optimization
- 5 Graph theory
- 6 Quantum computing

PROGRAMS

MASTER OF MATHEMATICS (MMATH) IN COMBINATORICS AND OPTIMIZATION

Co-op option available

Quantum Information specialization available

The MMath degree involves about a year of graduate courses and either a research report or thesis supervised by a faculty member.

Co-op option: Students gain valuable experience while earning their degree by spending one or more terms working in industry. Recently, students have chosen co-op as their research focused on financial applications of optimization.

Quantum specialization: The Institute for Quantum Computing offers graduate students unique opportunities to learn about and engage in world-leading research in quantum information.



DOCTOR OF PHILOSOPHY (PHD) IN COMBINATORICS AND OPTIMIZATION

Quantum Information specialization available

The PhD involves about two years of graduate courses followed by research and a dissertation that typically lasts four years. The quantum specialization is a collaborative program with the Institute for Quantum Computing.

ADMISSION REQUIREMENTS

MMATH

A four-year Honours Bachelor's degree or equivalent in mathematics or a related field, with a minimum overall average of 78%.

Application materials

- > Supplementary information form
- > Transcript(s)
- > Three academic references
- > English Language Proficiency (ELP)

Note: Applicants from foreign countries must normally take the Graduate Record Examinations (GRE) General Test and Subject Tests.

PHD

A Master's degree in combinatorics and optimization or a related field, with a minimum overall average of 89% in Master's level coursework. Completion of Master's thesis with evidence of research ability or potential.

Application materials

- > Supplementary information form
- > Transcript(s)
- > Three academic references
- > English Language Proficiency (ELP)

DEADLINES

FALL 2021

February 1, 2021

WINTER 2022

July 1, 2021

SPRING 2022

October 1, 2021

CONTACT US

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Visit our website to
learn more:

Combinatorics and Optimization
Graduate Studies

