

FACULTY OF SCIENCE

# MATHEMATICS

Mathematics is the science of number, quantity and space and is often described as the "queen of the sciences."

Mathematics is essential to many fields, including data science, finance, medicine, technology, economics, engineering and the natural sciences. Math is everywhere! Math is used to secure your data when you enter it online, in fraud detection, to understand medical scans, in weather prediction, for modeling wildfires and for creating efficient networks for security systems or air traffic. Studying mathematics fosters strong critical thinking and problem-solving skills.

One branch of mathematics, called cryptography, helps to keep our information safe. When you use your credit card online, mathematics is used to encrypt this information so that a third party cannot read it. Mathematicians are also essential to national security, where their high-level problem-solving skills are used for encryption and decryption for intelligence gathering and computer security. Another branch of mathematics, called graph theory, is used to design and analyze networks, such as security, transportation or social networks.

At UWinnipeg, you have flexibility in designing your course of study. There are core courses that all mathematics majors must take, but you will also choose from a diverse group of additional courses, in areas such as topology, combinatorics and graph theory.

This program leads to a Bachelor of Science degree (3- year, 4-year, or Honours) or a Bachelor of Arts degree (3- year or 4 -year) with a major in mathematics. In the Education program, mathematics can be u

Cryptography and Other Applications of Algebra, a second-year course, introduces algebraic structures and their applications to cryptography, data transmission, error-correcting codes and experimental design.

Group Theory is a third-year course that studies algebraic structures called groups. Symmetry groups are important in many branches of science and group theory is essential to public key cryptography and quantum mechanics.

### MORE SAMPLE COURSES

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|---|--|---|--------------------------------------|---|---|
| x | Number Theory                              | x | Complex Analysis                     | . | 2 |
| x | Combinatorics                              | x | Graph Theory                         |   |   |
| x | Applied Math for Business & Administration | x | Math for Early/Middle Years Teachers |   |   |
|   |  | x | Introduction to Real Analysis        |   |   |

### SAMPLE FIRST YEAR

3

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