

# APPLIED MATHEMATICS

CO-OP OR REGULAR



## *Apply math to real-world problems*

Applied Mathematics is the application of mathematics to real-world problems. It plays a dual role in understanding the real world by providing both explanatory and predictive power. The development of new ideas and methods are very closely coupled to physical reality. Applied Mathematics courses provide the tools for formulating and analyzing mathematical models in a broad range of disciplines. A training in applied mathematics will prepare you to tackle and face the challenges and rigours of the 21st century workplace.

### EMILEE'S FAVOURITE COURSES

- › **AMATH 242/CS 371 Introduction to Computational Mathematics:** This is a great introduction to the interplay between continuous models and their approximate solution via discrete methods with lots of examples of applications that help connect the theory to the practical.
- › **AMATH 382 Computational Modelling of Cellular Systems:** This introduction to dynamic math modelling covers computational tools used to investigate differential equation-based biomolecular networks. Cellular phenomena include metabolism, signal transduction, gene regulatory networks and neuronal excitation.
- › **AMATH 463 Fluid Mechanics:** Everything you would want to know about the mathematical description of fluid mechanics. The fundamentals of laminar and turbulent flow with a focus on vorticity. Wave motion on the surface and in the interior of lakes and oceans. The importance of nonlinearity, and the reason why there is a million-dollar Clay Prize for fluid mechanics.
- › **AMATH 455 Control Theory:** Control is ubiquitous in our lives, playing an essential role in diverse applications such as automobiles, robots, aircraft and physiology. This course covers the mathematical foundations of control theory, illustrated by numerous applications in engineering and biology. A novel aspect of this course is that students, in a series of labs, analyze and design controllers using mathematics learned in class.
- › **AMATH 475 Introduction to General Relativity:** This course is one of the reasons why it's cool to study mathematical physics: it covers curved space-time and the Einstein field equations, tensor analysis, the Schwarzschild solution and applications, and cosmological models.

**5** different options are available in Applied Math to focus your degree

**4** research experimental laboratories complementing theoretical studies

**96.6%** of grads are employed within 2 years

EMILEE

APPLIED MATH CO-OP,  
COMPUTER SCIENCE MINOR

### WHAT'S YOUR TAKE ON APPLIED MATH AT WATERLOO?

First, I love the discipline itself. Applied Math collaborates with a variety of other disciplines to solve problems that have a direct impact on our world. The professors and students in AMATH at Waterloo are a close-knit community. I spent a term doing research in AMATH and I felt supported and was treated so well.

[uwaterloo.ca/applied-mathematics](http://uwaterloo.ca/applied-mathematics)



UNIVERSITY OF  
**WATERLOO**



# WATERLOO IS A GLOBAL LEADER IN CO-OPERATIVE EDUCATION



Emilee's extracurriculars include VP-Applied/Pure Math Club, varsity Cheerleader, co-director of the Math Grad Committee, as well as playing intramural sports.

## CO-OP STUDENTS AT WORK

Co-op bridges the gap between the classroom and the real world. Find opportunities to connect classroom theory with applications in a wide range of employment settings. During your co-op work terms, you will assume various job responsibilities, pick up new work-related skills, and earn competitive salaries.

### TYPICAL CO-OP POSITIONS

- › Applied Math Computing Consultant, University of Waterloo, **Emilee's second work term**
- › Pensions Analyst, University of Waterloo, **Emilee's third work term**
- › Research Assistant, Applied Math Department, University of Waterloo, **Emilee's fourth work term**
- › Ice Model Research Assistant – Data Assimilation, Environment Canada, Ottawa
- › Software Engineering, Kaleidescape Inc., Sunnyvale
- › Data Analyst, Facebook, Menlo Park
- › Software Delivery Analyst, Sun Life Financial, Kitchener

## STUDY AND CO-OP SEQUENCE 1\*

YR.	TERM	REGULAR	SEQ. 1
1	Fall	Study	Study
	Winter	Study	Study
	Spring	Off	<b>Work</b>
2	Fall	Study	Study
	Winter	Study	<b>Work</b>
	Spring	Off	Study
3	Fall	Study	<b>Work</b>
	Winter	Study	Study
	Spring	Off	<b>Work</b>
4	Fall	Study	Study
	Winter	Study	<b>Work</b>
	Spring		Study
5	Fall		<b>Work</b>
	Winter		Study

\* This study-work sequence is one of 4 choices of co-op sequences.

## UNDERGRADUATE RESEARCH OPPORTUNITIES

Each Spring term, the Department of Applied Mathematics organizes an active undergraduate research program supported by NSERC Undergraduate Summer Research Awards (USRAs). There are also research awards available if you're an international student.

You can develop the mathematical tools and expertise necessary to succeed in industry and research through a summer Research Assistantship in core areas of applied mathematics. Our faculty members are engaged in many research fields which can be broadly categorized as:

- › Control and Dynamical Systems
- › Mathematical Physics
- › Scientific Computing
- › Fluid Mechanics
- › Mathematical Medicine and Biology

## FOCUS YOUR STUDIES

You can choose to focus your program with one of 5 different options:

- › **AMATH/Biology:** Follow your interests in math and the life sciences, such as cell biology, molecular biology, and biomedicine.
- › **AMATH/Earth Science:** Combine your interests in math and the environment while you learn about the role played by fluid dynamics in the environment.
- › **AMATH/Economics:** Take key courses in economics and learn how you can apply math to economic systems.
- › **AMATH/Physics:** Strengthen your knowledge of physics as an area of application of mathematics.
- › **AMATH with Engineering electives:** Learn the language of engineering, and how to communicate and work with engineers.

## CAREERS IN APPLIED MATHEMATICS

- › **Aerospace** – Bombardier, CAE, Raytheon, Spar Aerospace
- › **Communications** – Mitel, Rogers Wireless, Telesat Canada
- › **Energy** – Esso, Petro-Canada, Canadian Nuclear Safety Commission
- › **Environment** – Nuclear Safety Solutions
- › **Health and Medical Technology** – Agfa Healthcare
- › **Mathematical Software** – EA, Waterloo Maple



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