Master’s in Computational Mathematics
Faculty of Mathematics, University of Waterloo
Master’s in Computational Mathematics

- One-year, interdisciplinary Master’s, duration of study 12 months (regular) – 20 months (co-op), starts September 2017.
- Options
  - Co-op or Regular,
  - Research paper or Coursework.
- Organized by ‘computational’ professors from CS, AM, CO, STAT, PM (60 faculty members)
- Target audience:
  students with a bachelor’s degree in mathematics, statistics, computer science, or in another program with a strong math component, including engineering, economics, or any of the physical sciences.
Master’s in Computational Mathematics (Research Paper)

Core courses (take 4 out of 5)

1. Numerical Analysis (AM/CS)
2. Fundamentals of Optimization (CO)
3. Computational Statistics (STAT)
4. Introduction to Symbolic Computation (CS)
5. Numerical Solution of Partial Differential Equations (AM)

+ 2 ‘computational’ electives (from any department)

+ research paper
Master’s in Computational Mathematics (Research paper)

• Potential research project areas:
  – computational finance
  – machine learning
  – numerical analysis
  – computational optimization
  – computer algebra
  – computational fluid dynamics
  – image processing
  – ...
Comp Math in Finance/Econ Applications

- Computational finance, game theory, statistical simulation
- E.g. stock prices cannot be predicted with certainty; determine the least cost strategy with minimal risk
Comp Math in Data-Mining Applications

- Visualizing web requests on a single server and different requesters (IP addresses) over time.
Comp Math in Earth and Space Applications

“Ice Age” simulation

Generating “grids”
Master’s in Computational Mathematics (Course work)

Core courses (take 4 out of 5)

1. Numerical Analysis (AM/CS)
2. Fundamentals of Optimization (CO)
3. Computational Statistics (STAT)
4. Introduction to Symbolic Computation (CS)
5. Numerical Solution of Partial Differential Equations (AM)

+ 4 ‘computational’ electives (from any department)
Master’s in Computational Mathematics (Co-op)

Available for both Research paper or Course work option

Sequence

– Fall term 3 courses
– Winter term 3 courses
– Spring term, 4-8 month co-op placement
– Final term (Fall or Winter), 2 courses (course work option) or research paper (research paper option)
Master’s in Computational Mathematics

- **Funding**: approximately $20,000 for domestic students and $26,000 for international students for one year
  - Teaching Assistantships, Research Assistantship

- **Scholarships and Awards**:
  - Eddie Fong Computational Mathematics Graduate Award
  - Keith and Debbie Geddes Graduate Scholarship in Computational Mathematics
  - External scholarships, e.g. NSERC, OGS
Examples of Research Projects

• “Numerical Comparisons of Iterative Methods for Pricing American Options under Regime Switching”
• “Predicting Results of Biological Experiments Using Matrix Completion Algorithms”
• “Minimal Curvature Variation Flow in Image Inpainting”
• “Modelling of Shallow Water Equations and the Weather Research and Forecasting (WRF) Model”
• “The Application of Deep Kernel Machines to Various Types of Data”
• “Computing the Nearest Correlation Matrix using Difference Map Algorithm”
• “Determining Solution of Rational Linear Systems of Polynomials over Abstract Fields”
• “Matrix-Matrix Multiplications on GPUs for Accelerating a Parallel Fluid Dynamics Code”
CM Grads at Work

• Technology Analyst at Citigroup
• Analyst at Deloitte
• Java Developer at Rethink Solutions Inc
• Research Assistant at RNA Diagnostics Inc
• Statistics Canada
• Open Text
• Oracle, California
• GDF Suez Energy, Texas
• Consultant with Accenture
• PhD studies at UW, UoT, McGill, UWO, Stanford
CM Career Panel tomorrow

- Thursday, November 10, 2016 - 4:30 PM to 6:30 PM, MC 4021
- Our panelists include professionals from Magnet Forensics, Sortable, Claronav, Open Text and the University of Waterloo.
- These five successful Alumni will talk about the following:
  - What they are doing?
  - What they did?
  - What Computational Math is to them?
- They are also here to answer all those questions you have about your future career

https://uwaterloo.ca/math/events/computational-mathematics-career-panel