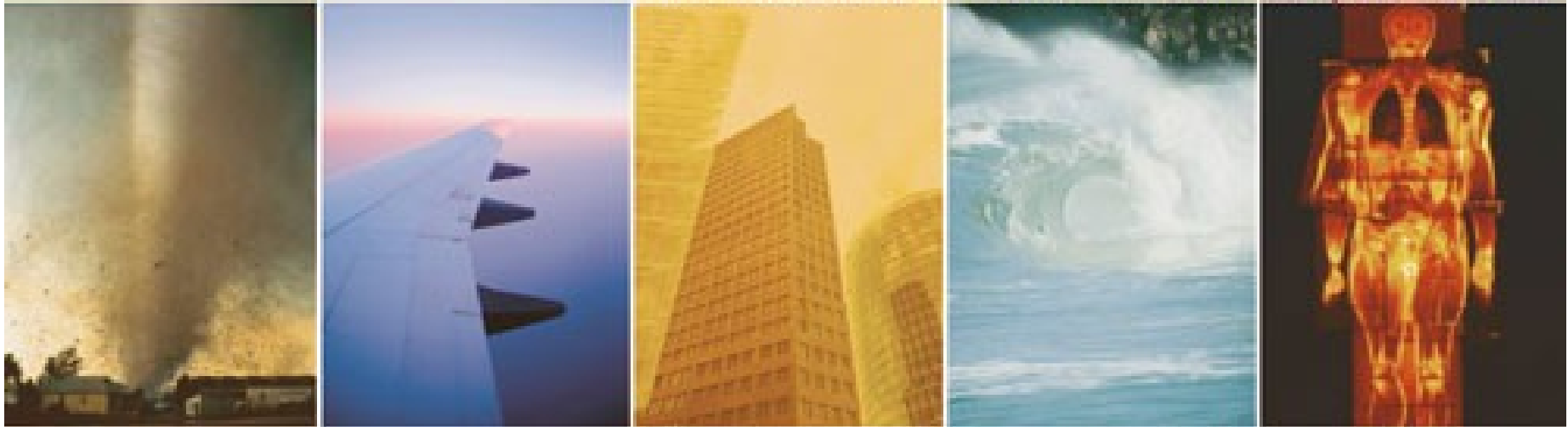


computational mathematics

the intersection of mathematics and computer science



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)

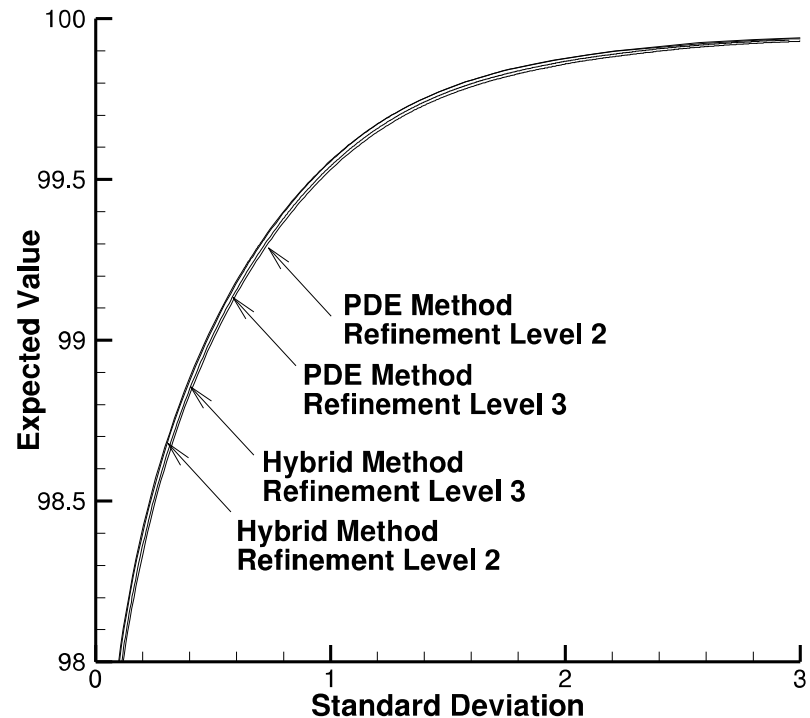
+ research paper

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
 - ...

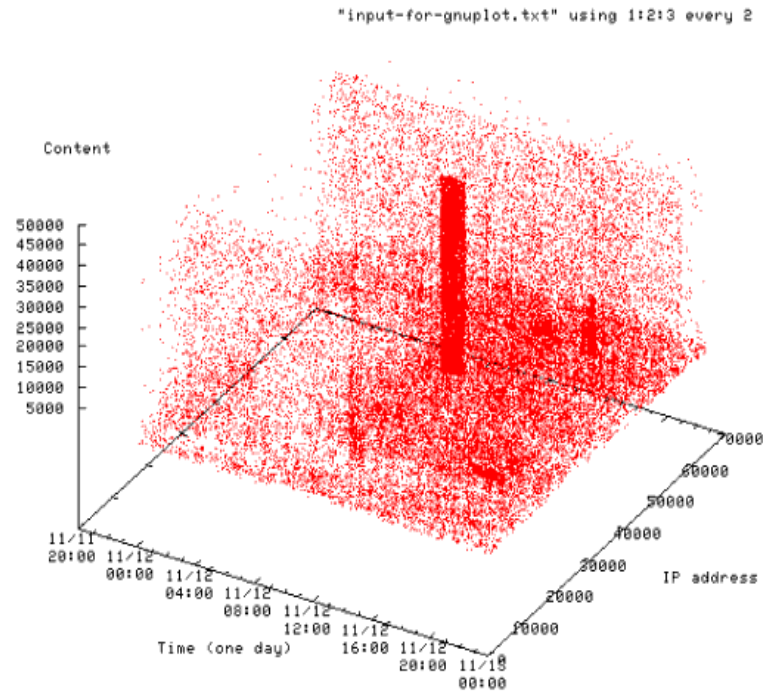
Comp Math in Finance/Econ Applications

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

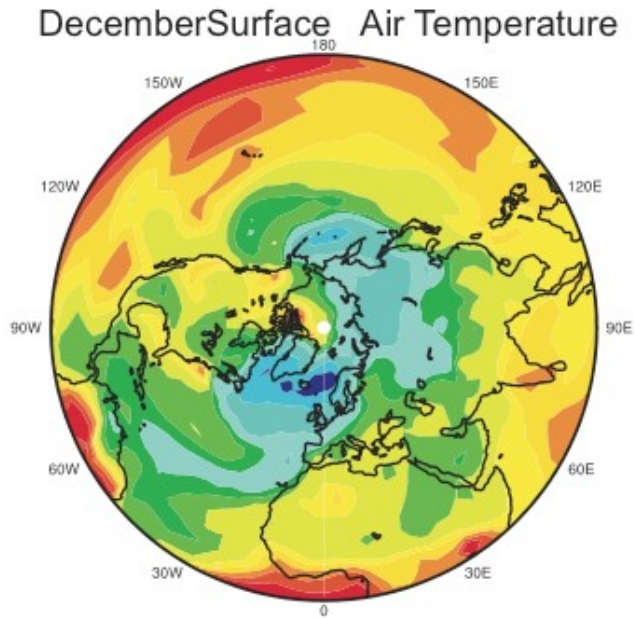


Comp Math in Data-Mining Applications

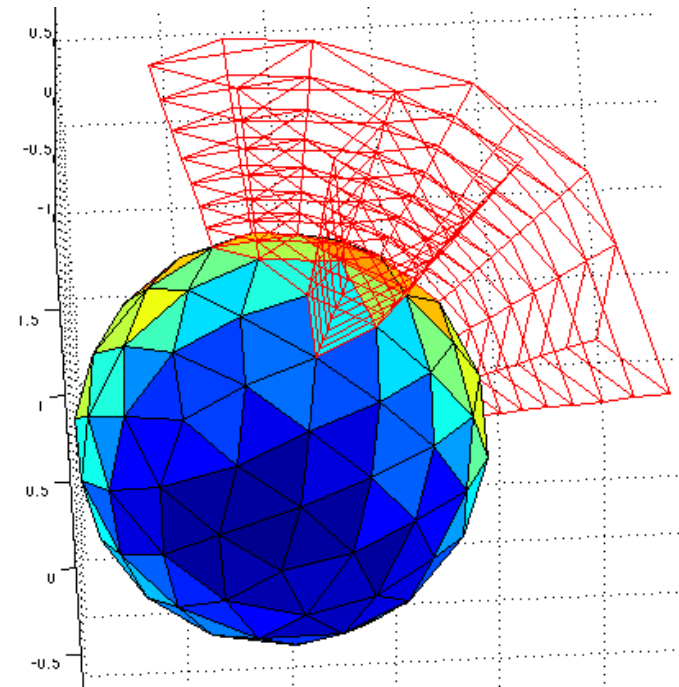
- Visualizing web requests on a single server and different requesters (IP addresses) over time.



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>