Marcel Blais,
Associate Department Head

WPI
Mathematical Sciences
at WPI

The Undergraduate Experience

Open House
Mathematical Sciences
WPI Undergraduate Experience

• Flexibility with four terms per year

• Close interaction with faculty

• Collaborating with faculty active in fundamental research (MQP)

• Excellent job and graduate school prospects
WPI First Year Focus

• Mathematics

• Science

• Humanities or Social Science
First Year Mathematics

- Traditional Calc Sequence: MA1021-1024
- Calculus with Review: MA1020, 1120
- Analysis Sequence: MA1033-1034
- Bridge to Higher Math: MA1971
- Linear Algebra, Differential Equations, Probability, Statistics...
"Traditional" Calculus MA1021-1024

- **MA1021** – Derivatives and applications
- **MA1022** - Integrals and applications
- **MA1023** – Infinite Series, Parametric Curves, Vectors
- **MA1024** – Partial Derivatives and Multiple Integrals

All are term-length courses for 1/3 unit credit
Calculus with Pre-Calculus Review

• **MA1020** – Derivatives and applications
  – Semester-long (14 weeks) course in the fall
  – Pre-Calculus Review!

• **MA1120** – Integrals and applications
  – Semester-long course in the spring
The Analysis Sequence

MA1033 in A term, MA1034 in B term,

- Rigorous treatment of calculus III and IV (with proofs)
- Appropriate for math majors and those who want the theory behind the calculus
MA1971: Bridge to Higher Mathematics

- Introduction to mathematical thinking
- Develop mathematical logic and reasoning skills
- Learn to explain, justify, defend, disprove, conjecture and verify mathematical ideas, both verbally and in writing
- Recommended for all Mathematical Sciences majors (MA & MAC)
Advanced Placement Credit

• College Transfer Credit

• Advanced Placement (AP) Exam

• WPI Retroactive Credit
AP Exam Credit

• 4 or 5 on AB exam
  – Credit for Calculus I and Calculus II
  – Take Calculus III in A term
  – Take Calculus IV in B term

• 4 or 5 on BC exam
  – Credit for Calculus I, II, and III
  – Take special Calculus IV in A term
  – Take special Differential Equations in B term
  – Take special Linear Algebra MA2072 in C term
Retroactive Credit

• Get free credit for Calculus I if*
  – Take and pass Calculus II in first year
  – Take and pass Calculus III in first year

• Get free credit for Calculus I and II if*
  – Take and pass Calculus III in first year
  – Take and pass Calculus IV in first year

* No changes and no substitutes, no math NRs
For Math Majors after the First Year

• Choose a Concentration... Transition Courses
  — Math Modeling with Differential Equations
  — Graph Theory, Combinatorics
  — Probability Theory
  — Linear Algebra II

• Upper Level Courses for breadth and depth
• Major Qualifying Project as a capstone
Some Mathematical Sciences MQPs

- Mathematical Model of Brain Tumors
- Differential power analysis side-channel attacks in cryptography
- Robustifying Logistic Regression for Nonresponse: An Application to BMI
- One-dimensional Viscoelastic Cell Motility Model
- Optimal Portfolio Analysis with Turnover Constraints
- Optimization of the Sierpinski Carpet Fractal Antenna
- An Investigation of Polya's Function
- Regulatory Network Models for Biology
- Thin-film Ferrofluidics
- Nanoionic Particle Composite Homogenization
- Network Anomaly Detection Using Robust Principal Component Analysis
- Calibration of an Optimal Bidding Model for the Mobile Advertisement Markets
BS/MS Program

• Apply in junior year
• If accepted, can double-count courses to enable BS and MS in 5 years
• Available for the following Math Sciences MS programs:
  – Applied Mathematics
  – Applied Statistics
  – Financial Mathematics
  – Industrial Mathematics
Mathematical Sciences Minors

- Can minor in Mathematics or Statistics
- Take 5 Courses + 1 Capstone
Center for Industrial Mathematics and Statistics

• Build connections between academics and business and industry
• Students work on real-world projects that come directly from industry, government and finance

http://www.wpi.edu/+CIMS
CIMS Industrial Partners

200+ students have worked on
110+ industrial projects from
50+ companies
For More Information

http://www.wpi.edu/+MATH

(a) Lognormal distribution

(b) Trading Volume time series.