Mathematical Sciences at WPI

The Undergraduate Experience

Marcel Blais, Associate Head
WPI Undergraduate Experience

- Flexibility with four terms per year
- Close interaction with faculty
- Collaborating with faculty active in fundamental research (MQP)
- Good 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 Programs

We have two BS/MS programs, which enable students to obtain both a BS and MS degree with 5 years of study:

- The 5-year BS/MS Program
- The “standard” BS/MS Program
The 5-year BS/MS Program

- Exclusive to Math Sciences Dept
- Apply when applying for admission as a freshman
- If accepted, progress reviewed in junior year
- Work as a PLA while an undergraduate
- 5th year is tuition-free; work as half-time TA
“Standard” 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
200+ students have worked on 110+ industrial projects from 50+ companies
For More Information

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