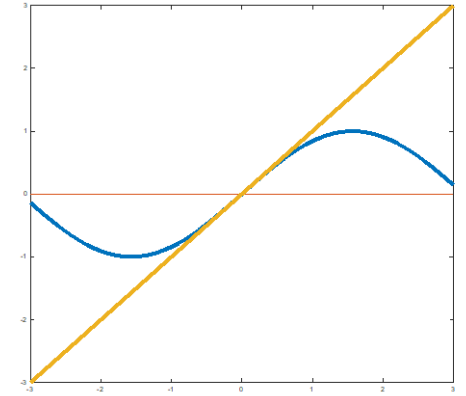
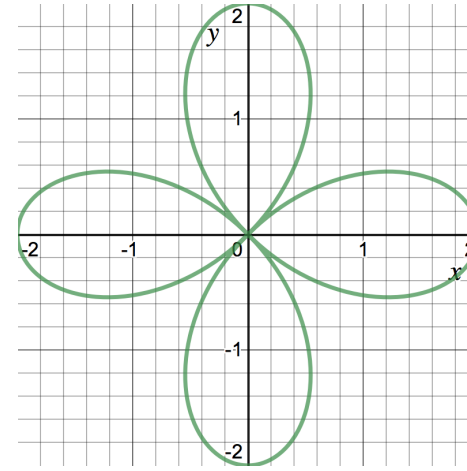


WPI Undergraduate Experience

- Flexibility with four terms per year
- Collaborating with faculty active in fundamental research (MQP)
- 1st year at WPI: **Mathematics**, Science, Humanities or Social Sciences



**“Traditional”
Calculus
MA1021-
1024**

MA1021 – Derivatives and applications

MA1022 - Integrals and applications

MA1023 – Infinite Series, Parametric Curves, Vectors

MA1024 – Partial Derivatives and Multiple Integrals

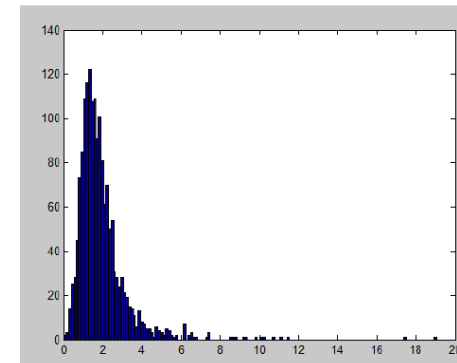
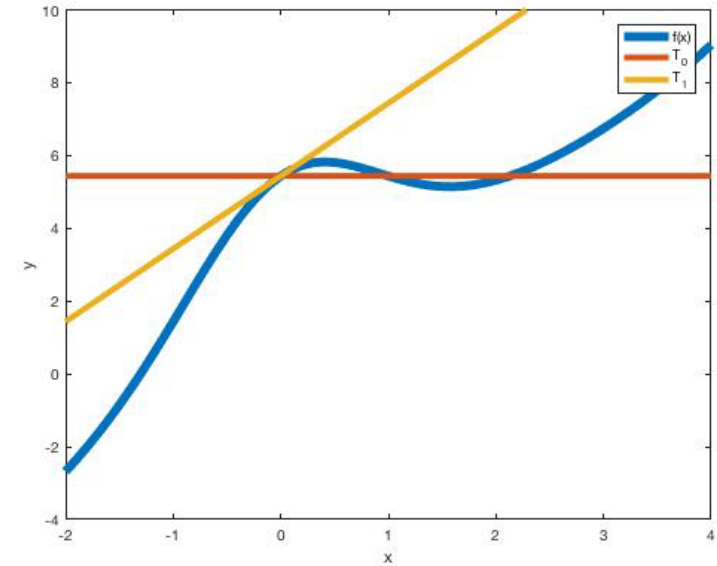
All are term-length courses for 1/3 unit credit

The Analysis Sequence

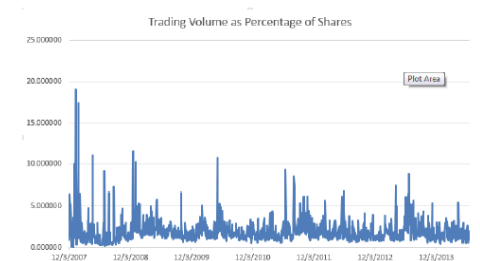
MA1033 in A term

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



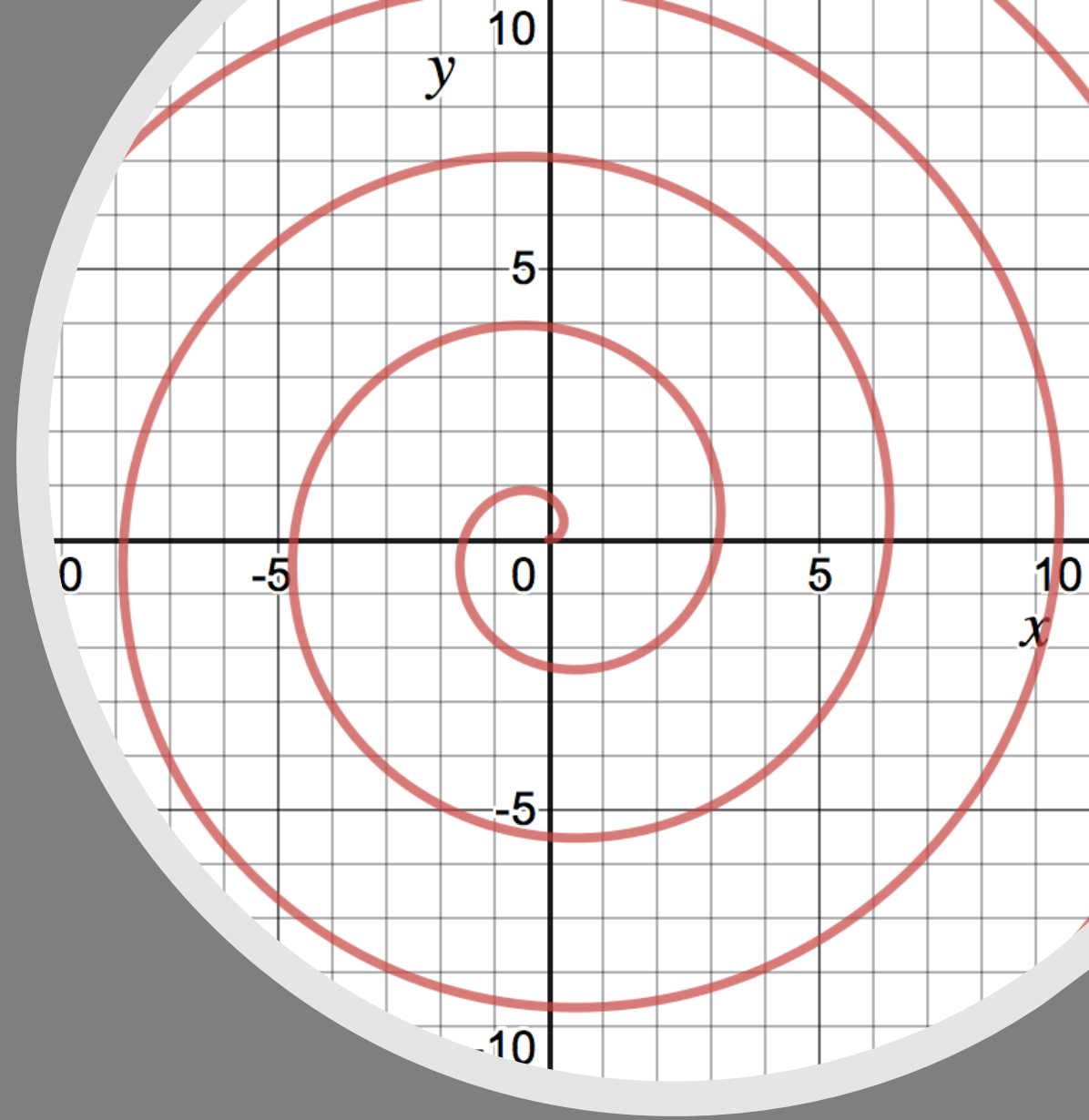
(a) Lognormal distribution



(b) Trading Volume time series.

AP Exam Credit

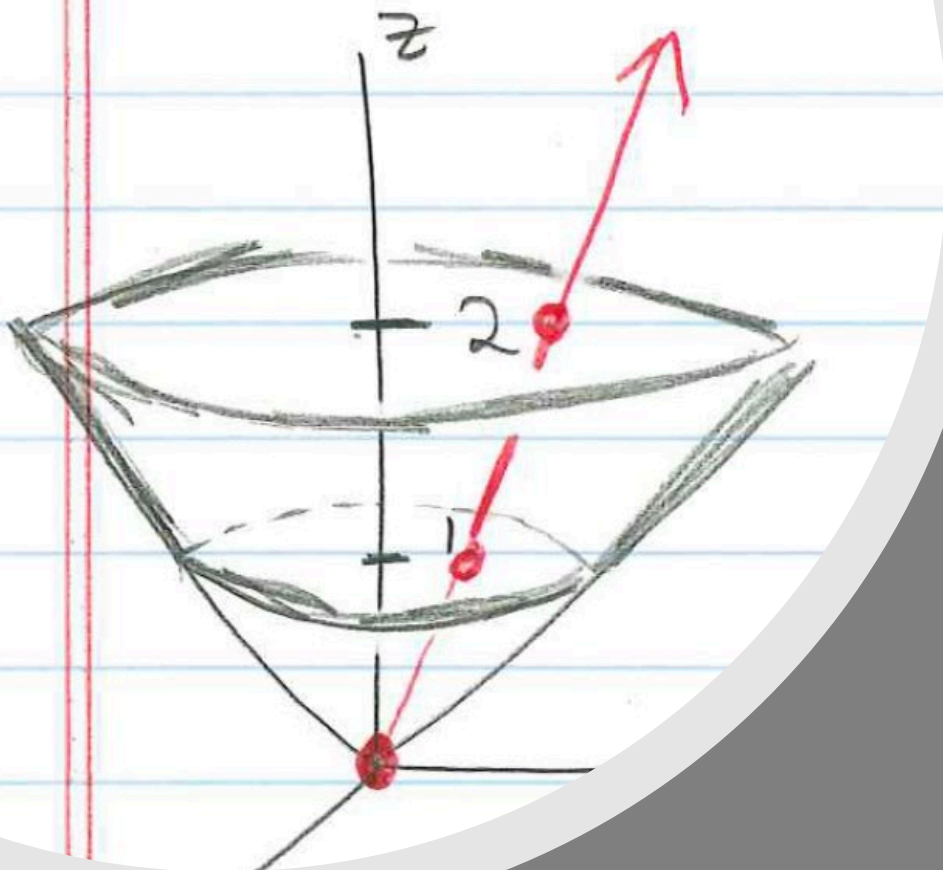
- 4 or 5 on AB exam
 - Credit for Calculus I and Calculus II
 - Take Calculus III in A term
 - Take Calculus IV in B term
- 4 or 5 on BC exam
 - Credit for Calculus I, II, and III
 - Take special Calculus IV in A term
 - Take special Differential Equations in B term
 - Take special Linear Algebra MA2072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



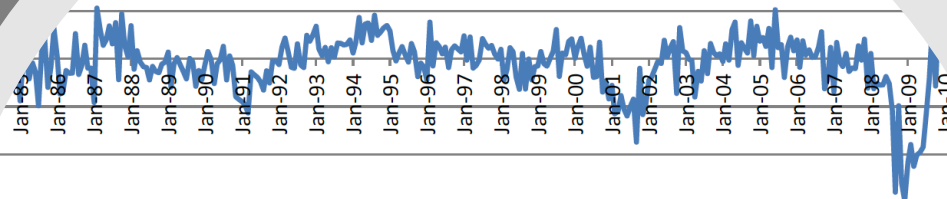
Retroactive Credit

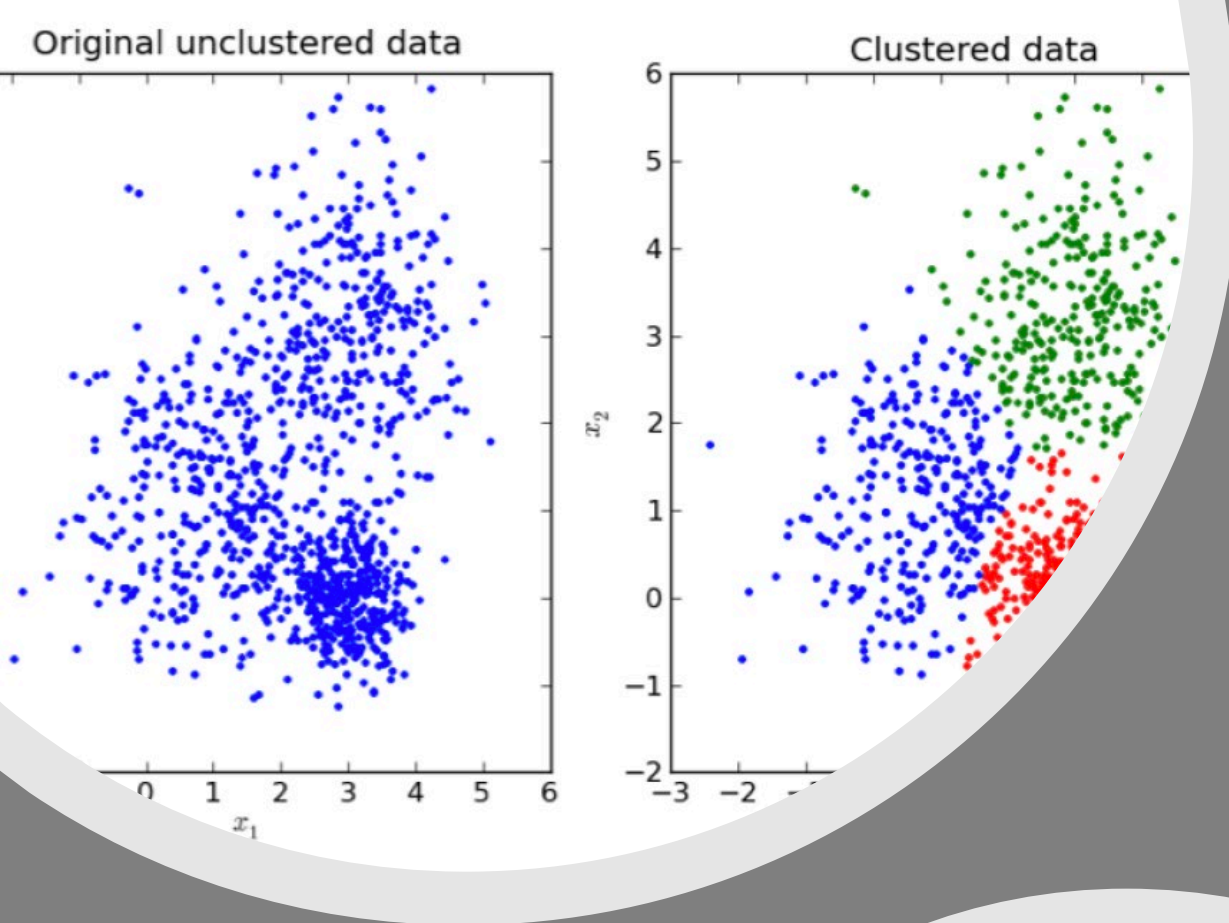
- Get free credit for Calculus I if*
 - Take and pass Calculus II in first year
 - Take and pass Calculus III in first year
- Get free credit for Calculus I and II if*
 - Take and pass Calculus III in first year
 - Take and pass Calculus IV in first year

* No changes and no substitutes, no math NRs



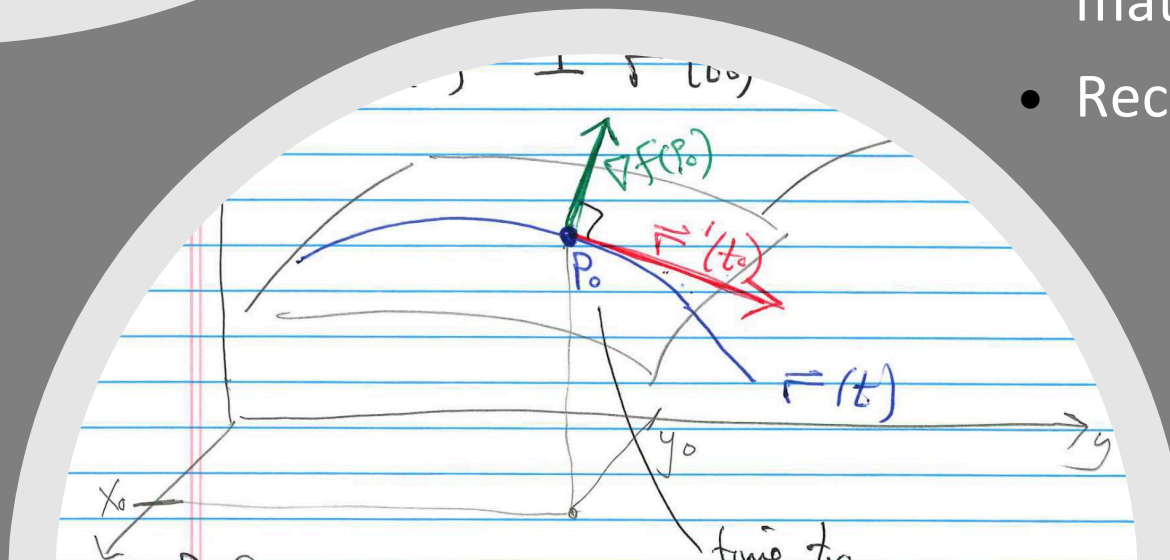
US Index Using Lag Values, 1983-2013





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
- Recommended for all

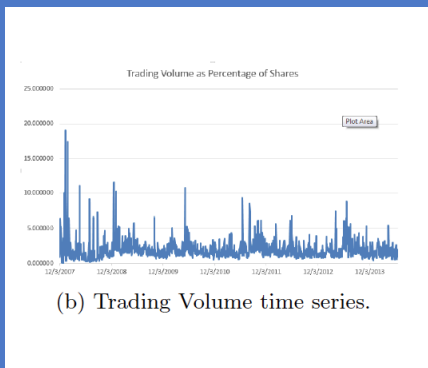


After the First Year

- Choose a Concentration... Transition Courses
 - Math Modeling with Differential Equations
 - Graph Theory, Combinatorics
 - Probability Theory
 - Linear Algebra II
 - Mathematical Statistics
- Upper-Level Courses for breadth and depth
- Major Qualifying Project as a capstone

Special Topics Courses and New Courses

- Analytic Number Theory (special topics)
- Spectra of Graphs (special topics)
- MA 464X - Introduction to Time Series Analysis (new course)



Actuarial Courses @ WPI

Theory of Interest (2 course sequence) (Exam FM)

- How much money do I need to put away today to pay you \$100 per month for **5 years**?

Actuarial Mathematics (2 course sequence) (Exams LTAM, MAS-1)

- How much money do I need to put away today to pay you \$100 per month for **as long as you live**?

Loss Models (2 course sequence) (Exams STAM, MAS-1, MAS-2)

- How much do I need to charge for car insurance to ensure I am 95% confident I can pay all the claims?

Introduction to Actuarial Ratemaking (Exams 5, 6, 8)

- What should I charge this year for car insurance given what we've seen over the last 5 years?

Actuarial Estimation of Unpaid Claims (Exams 5, 6, 7)

- Given we've already seen a \$1,000,000 of car insurance claims this year, what should I expect the final total to be?

Topics In Actuarial Mathematics: special topics course to narrow in on concepts outside or beyond these courses that are either related directly to exams or other industry issues.

Actuarial Science



**Casualty Actuarial
Society**

- Exam Completion:
 - Students graduate with 2 industry exams (on average) and other educational credit recognized by the SOA and the CAS (or VEE).
 - 25% of students complete 3 industry exams and VEE.
 - Record is 4 industry exams and the VEE.
- **Profs. Abraham and Posterro are Industry Professionals with the following credentials**
 - SOCIETY OF ACTUARIES (SOA: Life, Health, Disability)
 - CASUALTY ACTUARIAL SOCIETY (CAS: Home, Auto, Worker's Comp)
 - JOINT BOARD FOR THE ENROLLMENT OF ACTUARIES (IRS: Pensions)
 - CHARTERED FINANCIAL ANALYST INSTITUTE (CFAI: Investments)
 - GLOBAL ASSOCIATION OF RISK PROFESSIONALS (GARP: Investments)



Math Majors: you are invited to MQP “Pizza & Projects”

When? Thursday, February 24th

Time: 2:00 pm – 4:00 pm

Where? Unity Hall 520

Questions?

Email Prof. Randy Paffenroth (rcpaffenroth@wpi.edu) or
Prof. Fangfang Wang (fwang4@wpi.edu)



Learn more about and
discuss MQPs in
Mathematical Sciences and
Actuarial Mathematics!



Major Qualifying Projects

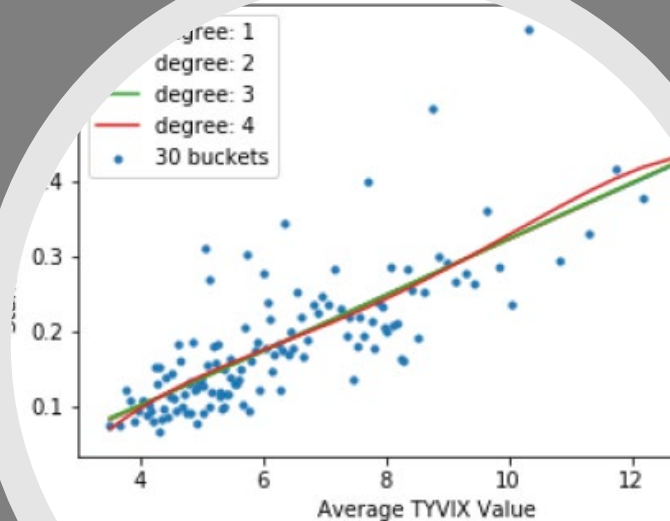
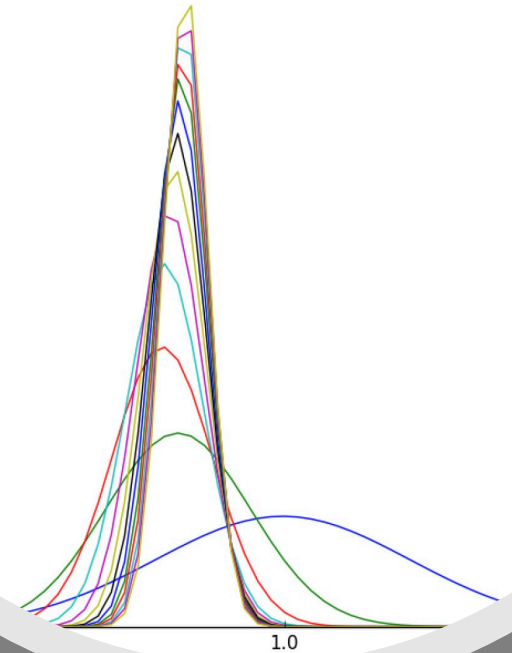
MQPs

- Work closely with faculty advisor(s) on a research project
- 3 course equivalent
- Wide variety of research topics and opportunities for MQP's with industry sponsors
- Some MQPs result in publication
- <https://www.wpi.edu/academics/departments/mathematical-sciences/major-project>

$$_t \mathbf{c}_t + \mathbf{\Gamma}_t \mathbf{w}_t + \boldsymbol{\varepsilon}_t$$

$$_{t+1} = \mathbf{p}^T \begin{bmatrix} x_t \\ x_{t-1} \\ \vdots \\ x_{t-p} \end{bmatrix} + \eta_t$$

$$\mathbf{H}_t), \quad \eta_t \sim (0, \sigma^2)$$





Center for Industrial Mathematics and Statistics



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



<http://www.wpi.edu/+CIMS>

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
- Industrial Mathematics



Mathematical Sciences @ WPI

- Please check out our department webpages for more info and make sure to check out videos by our current students!!
- Questions???

