

AMS 200 – Fall 2016

Introduction: Graduate program overview

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Department of Applied Mathematics and Statistics, University of California, Santa Cruz

September 26, 2016

Outline

- 1 Course schedule
- 2 UCSC, SOE, AMS
- 3 Graduate program in Statistics and Applied Mathematics

AMS 200 (tentative) schedule of classes

- September 26: Overview of graduate program and AMS (Athanasios Kottas)
- October 3: Presentation by librarian Christy Caldwell
- October 10: Computational resources
- October 17: LaTeX and writing (Dongwook Lee and Daniele Venturi)
- October 24: LaTeX and presentations (Juhee Lee and Rajarshi Guhaniyogi)
- October 31: TA and GSR training and information (Herbie Lee)
- November 7: Public speaking I (David Draper)
- November 14: Public speaking II (David Draper)
- November 21: Q&A with senior grad students
- November 28: Ethics (Qi Gong)

University of California Santa Cruz



AMS department

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- The other Departments of the School of Engineering:
 - Biomolecular Engineering
 - Computational Media
 - Computer Engineering
 - Computer Science
 - Electrical Engineering
 - Technology Management

AMS faculty (Applied Mathematics)

- **Nicholas Brummell** – fluid dynamics; magnetohydrodynamics; numerical simulations of geophysical and astrophysical dynamics; supercomputing
- **Pascale Garaud** – astrophysical and geophysical fluid dynamics; magnetohydrodynamics; analytical and numerical solutions of PDEs related to these phenomena
- **Qi Gong** – computational optimal control for nonlinear systems; trajectory optimization and motion planning; optimal search, state and output feedback control of nonlinear systems; aerospace control applications

AMS faculty (Applied Mathematics)

- **Dongwook Lee** – computational magnetohydrodynamics and gas dynamics; high-order shock capturing numerical methods; high-performance computing; numerical modeling of astrophysics and high-energy-density physics
- **Daniele Venturi** – uncertainty quantification (UQ); multi-fidelity stochastic modeling and data-driven stochastic multiscale mathematics; high-performance scientific computing; probability density function methods for forward/inverse UQ problems; functional differential equations
- **Hongyun Wang** – single molecule studies and biophysics; statistical physics; stochastic differential equations

AMS faculty (Statistics)

- **David Draper** – Bayesian nonparametric methods; model specification and model uncertainty; risk assessment; applications in the environmental, medical, and social sciences
- **Rajarshi Guhaniyogi** – compressive methods for high dimensional regression; manifold regression; nonparametric Bayes; online learning with massive streaming data; spatial Bayes modeling for massive geostatistical datasets; applications in epidemiology, forestry, genomics, and neuroscience
- **Athanasios Kottas** – Bayesian nonparametrics; mixture models; modeling and inference for point processes; nonparametric regression; survival analysis; applications in biometrics, ecology, and the environmental sciences
- **Herbert Lee** – Bayesian statistics; computer simulation experiments; spatial statistics; optimization; inverse problems; nonparametric regression, classification and clustering

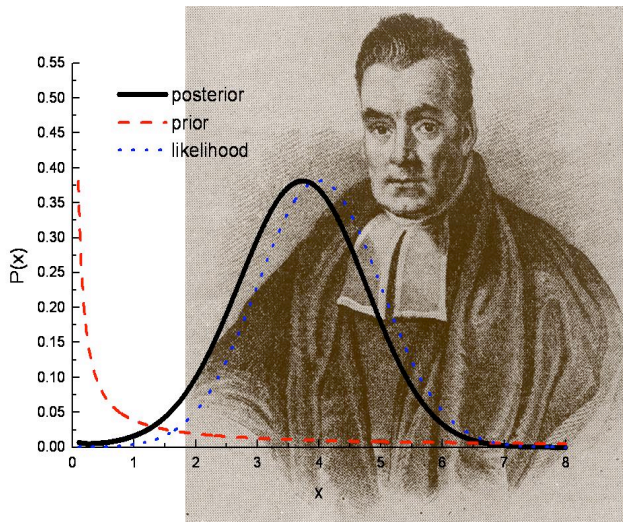
AMS faculty (Statistics)

- **Juhee Lee** – Bayesian statistics; Bayesian nonparametrics; modeling in biosciences and clinical trials
- **Raquel Prado** – Bayesian non-stationary time series modeling; multivariate time series; biomedical signal processing and statistical genetics
- **Abel Rodriguez** – Bayesian nonparametrics; Bayesian time series and spatial models; public health; financial econometrics; structural proteomics
- **Bruno Sansó** – Bayesian spatio-temporal modeling; environmental and geostatistical applications; modeling of extreme values; statistical assessment of climate variability

AMS faculty

- **Marc Mangel** (Distinguished Research Professor) – mathematical modeling of biological phenomena; statistical methods in fisheries management; mathematical and computational aspects of aging and disease; impact of technology on biological systems
- **Robin Morris** (Associate Adjunct Professor) – Bayesian analysis of scientific data, with applications in: Earth remote sensing; particle and astroparticle physics; signal processing and engineering
- **Yonatan Katznelson** (Lecturer)
- **Bruno Mendes** (Lecturer)

On the stats side, Bayes rules in AMS!



Timeline for the MS degree

- **Academic Year 1**

- 6 core courses + AMS 200 + AMS 280B
- possible independent study courses (AMS 297) to explore research topics for the capstone project

- **Academic Year 2**

- a minimum of 2 additional 5-unit elective courses
- **capstone project** to be read and approved by a committee consisting of the faculty advisor and one reader (at least one of the committee members must be from AMS)

Timeline for the PhD degree

● Academic Year 1

- 6 core courses + AMS 200 + AMS 280B
- independent study courses (AMS 297/299) to explore possible PhD dissertation topics
- first year qualifying examination

● Academic Year 2

- elective courses: in principle, 4 additional 5-unit courses required for the PhD degree; in practice, PhD students expected to take more electives
- select PhD dissertation topic and advisor

● Academic Year 3, Year 4, ...

- elective courses
- advancement to candidacy (by the end of spring AY 3 at the latest)
- PhD dissertation defense

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- Six core courses for each track, all in the first year of the program
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- **Statistics track:**
 - AMS 205B – Intermediate Classical Inference (winter quarter)
 - AMS 206B – Intermediate Bayesian Inference (winter quarter)
 - AMS 207 – Intermediate Bayesian Statistical Modeling (spring quarter)
 - AMS 256 – Linear Statistical Models (spring quarter)(AMS 206B to be replaced by AMS 206 for the MS degree)

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- **Applied Mathematics track:**
 - AMS 212A – Applied Mathematical Methods I (winter quarter)
 - AMS 213A – Numerical Linear Algebra (winter quarter)
 - AMS 213B – Numerical Methods for the Solution of Differential Equations (spring quarter)
 - AMS 214 – Applied Dynamical Systems (spring quarter)

First Year Exam

- FYE *around* the end of the spring quarter
 - in-class part: closed-notes, closed-book 4-hour exam based on 6 questions, one from each of the 6 core courses
 - take-home part: a problem that involves synthesis and application of methods and computing (submitted 48 hours after the in-class part)

- Detailed information for this year will be made available later

Further comments

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- It is strongly recommended to take AMS 280B **every** quarter!

Financial support

- Teaching and research assistantships are the main sources of financial support
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- UCSC fellowships: **Chancellor's Dissertation Year Fellowship** and **President's Dissertation Year Fellowship**
- Domestic students (non CA residents): make sure to work as early as possible on establishing CA residency!

For questions

- First year advisor
- Graduate director
- Graduate Advisor: Lisa Slater
- Your fellow grad students!