AMS 200 – Fall 2016

Introduction: Graduate program overview

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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

The Department of Applied Mathematics and Statistics (AMS) is part of the Baskin School of Engineering
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
Core courses

- Six core courses for each track, all in the first year of the program
- Two common core courses: AMS 203 (Introduction of Probability Theory), and AMS 211 (Foundations of Applied Mathematics), both in the fall quarter
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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

- Students completing the MS program can request to transfer to the PhD program (must pass the FYE at the PhD level)
- Students in the PhD program may receive the MS degree upon completion of the MS degree requirements, including the capstone project
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- Department seminars: Mondays at 4pm in E2-180

- AMS 280B (attending the department seminars) must be taken for at least one quarter per year
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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.
- PhD students are required to serve as TAs for at least two quarters during their grad studies (certain exceptions apply).

Fellowships from external agencies, an important example being the NSF Graduate Research Fellowship Program (http://www.nsfgrfp.org/).

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!
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For questions

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