Teaching Statement
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Summary

Courses:

- Taught over 22 courses (5 graduate courses and 17 undergraduate courses).
- *Graduate Courses Included:* Finite Difference Methods for PDEs, Finite Element Methods, Applied Stochastic Analysis.
- Many of these courses were attended in significant numbers by students from the sciences, engineering, and statistics. We discuss our approach to these interdisciplinary courses below.

Curriculum Development:

- Created two undergraduate courses on Mathematical Biology.
- Created an undergraduate course on Mathematical Finance.
- Created a graduate course on Applied Stochastic Analysis.
- Created a graduate course on Mathematical Finance.
- Developed course notes on topics in Mathematical Finance and Nonlinear Optimization which are posted on-line at: [http://www.math.ucsb.edu/~atzberg/](http://www.math.ucsb.edu/~atzberg/)
- Developed course websites with supplemental notes, review papers, and numerical codes.

Mentorship and Advising:

- Advised one postdoctoral researcher.
- Advised 7 graduate students (3 from dept. of mathematics and 4 from other departments).
- Advised 3 undergraduate researchers (majors in mathematics, physics, and chemistry).
- Served as advisor for undergraduate majors in mathematical finance for the past 4 years.
- Served on the Graduate Committee for the past 4 years.

Outreach:

- Gave public lectures at local high schools to expose students to mathematical research.
- Participated in the MRL RISE and UC SURF programs for undergraduate research.
Teaching Statement

I have taught a variety of courses both on strictly mathematical topics and on interdisciplinary topics. My teaching style emphasizes the importance of understanding mathematical concepts both with rigorous precision and with a healthy amount of intuition. I also place an emphasis on the connections between mathematics and other fields. This is achieved by presenting both rigorous proofs of most theorems used in a course along with intuitive explanations which summarize the main ideas. This is supplemented by presenting worked-out example problems which emphasize the importance and utility of the presented material. For the more interdisciplinary courses I have taught, I design my own homework problems and final projects to teach students how to connect the class materials to specific problems arising in practice. These homework assignments are often designed to emphasize both the precise formulation of problems as well as how to use the mathematical approaches to obtain solutions.

The numerical analysis courses I teach at UCSB are often attended in significant numbers by undergraduate and graduate students from outside the department of mathematics. These departments include: Physics, Statistics, Chemical Engineering, and Mechanical Engineering. A central goal of these courses is to equip graduate students with solid mathematical foundations both in the formulation and in the use of numerical methods for approximating the solutions of partial differential equations.

These courses present a number of unique challenges requiring significant versatility when lecturing on material and when answering student questions. On the one hand, one needs to cover the material with sufficient rigor so that the approaches and concepts are mathematically precise. On the other hand, one needs to present the material on a level which is intuitive enough that the less mathematically inclined students still follow and benefit from the lectures. To help achieve these dual aims, I often prepare specific problems from physics, engineering, or finance to help illustrate in a specific context the mathematical concepts. I also use a written exam to emphasize analytic concepts and a final project to emphasize how to use the presented concepts in practice. Supplemental materials are also posted on the class websites, which includes: tutorials, review articles, and lecture notes prepared on select topics.

It should be mentioned that these interdisciplinary courses tend to have a subset of students from outside of mathematics who complain the courses are too technical and struggle to learn the material. While my ESCI scores for these courses are good, they are a bit lower than my ESCI scores for the more pure mathematics courses I have taught (compare 104AB with 124AB, 122A). Overall, it can be seen from the evaluations and student comments that my approach has been very successful in offering the right balance for most students.
Advising and Mentorship

Postdoctoral Researchers

- Chetan Pahlajani, Department of Mathematics

Graduate Students

- David Valdman, Department of Mathematics
- Pat Plunkett, Department of Mathematics
- Jon Karl Sigurdsson, Department of Mathematics
- Per Danzl (co-advisor), Department of Mechanical Engineering
- David Boy (co-advisor), Department of Mechanical Engineering
- Patrick Sheppard (co-advisor), Department of Mechanical Engineering
- Chia-Chun Fu (co-advisor), Department of Chemical Engineering

Undergraduate Students

- Joe Rudzinski, Major in Chemistry and Mathematics
- Justin Shlake, Major in Mathematics
- Daniel Kerr, Major in Physics
Teaching Experience

Graduate Courses:


Undergraduate Courses:

1. Introduction to Mathematical Biology, INT184PA, UCSB, Spring 2010.
16. Introduction to Discrete Structures, RPI, Fall 2003.