How stretched is my plan(t)?

Christophe Golé
Smith College

MOSAIC, IMA 2010

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Smith College

1. Applied math at Smith
2. Course development: Modeling for the Sciences
3. Biomathematical Sciences Concentration

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- emphasizes concepts over techniques, geometry over algebra, graphs over formulas, brute force over elegance, numerical solutions over closed-form solutions.

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- **Yet:** At Smith, we're revamping our Calculus course for student with good HS calc preparation - will still include modeling, differential equations, as well as use of real data.

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- Solution?: **Modeling in the Sciences**, open to all science majors (inc. economics).

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- Gateway course to the new Biomathematical science concentration

Course description

MTH/CS 205 Modeling in the Sciences. This course integrates the use of mathematics and computers for modeling various phenomena drawn from the natural and social sciences. Scientific topics, organized as case studies, will span a wide range of systems at all scales, with special emphasis on the life sciences. Mathematical tools include elementary data analysis, discrete and continuous dynamical systems and Markov chains. The course will use scientific software such as Mathematica or MATLAB, and will provide elementary training in programming. Prerequisites: Calculus II, Computer science I recommended.

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- Students ranging from high school to postbac, with or without computer experience.

Development process

6 weeks group work including:

- Students reading chapters of textbook, and presenting them

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- Students proposing new activities and exercises

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- They like graphics: use Mathematica manipulations, linear transformations, photographic data

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- How much of Mathematica? How much MATLAB?
- How much structured curriculum, how much open projects?
- What book, if any? (Issue: book with technology become quickly obsolete. Books without miss an important part.) (we looked at Tung, Mooney, Moler, Ellner)

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- Capstone: a higher level course in BIO, MTH or CS, (e.g. computational biology, dynamical systems) or an honor's thesis