Modeling at Oberlin

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OCCaM

Oberlin Center for Computation and Modeling

Goals
- Increase proficiency and application of modeling in the curriculum at Oberlin.
- Build and support a modeling community at the college.

Activities
- National conference in 2005
- Campus speakers
- Promotes curriculum development
- Spearheads the creation of a Concentration in Modeling
OCCaM (cont’d)

- Departments represented:
  - Biology, Chem/Biochem, CS, Geology, Math, Physics/Astronomy, Neuroscience …
  - … also Economics, Environmental Studies

- Grants
  - Booth-Ferris Foundation
  - NSF S-Stem

Modeling Courses

- Math:
  - Optimization
  - Dynamical Systems
  - Seminar in Mathematical Modeling

- Physics/Astronomy
  - Intro to Climate Modeling

- Economics
  - Computer Spreadsheets for Economists
  - Games and Strategy in Economics
  - Agent-based Computational Economics

- Neuroscience
  - Neurons to Networks to Cognition

- Environmental Studies
  - Systems Modeling

- Biology
  - Evolution
  - Population Genetics
  - Behavioral Ecology

- Geology
  - Modern Mapping Technologies

- Computer Science
  - Scientific Computation
  - Computational and Agent-Based Modeling
Computational & Agent-Based Modeling

- Enrolled 15 (mostly) juniors-seniors
  - Natural or social science majors
  - Decent math background
  - Little or no computer programming

- Designed to give exposure to a variety of modeling milieus (and tools).
  - Dynamical systems (Stella)
  - Approximation (MatLab)
  - Agent-based models (NetLogo)

Final Project

- Groups of 1-4 worked for a half-semester on mostly agent-based modeling projects from their major areas.

- Three TA’s recruited from U. of Michigan Center for the Study of Complex Systems
  - Physics (Nanotechnology)
  - Biology (Public Health / Epidemiology)
  - Social Science
Project Titles

(visit http://www.cs.oberlin.edu/~rms/models)

- Cancer Growth and Treatment
- Voting and the Spread of Information
- Modeling Water-based Soil Erosion
- Commercial Timing
- Optimal Timing of TV commercials
- HIV Transmission in a Small Open Population
- A Subway Challenge
- Migration of Homo erectus
- Modeling the Solar System

Conclusion

- Right mix of students, and with appropriate backgrounds.

- Good student math skills made Stella and NetLogo intuitive.

- TA involvement made for higher quality projects.

- Next time
  - No MatLab (too ambitious)
  - Start projects earlier