

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