

Department of Atmospheric Sciences

COURSE ANNOUNCEMENT – SEMESTER I – 2004–2005

ATMS 421: Earth Systems Modeling
(Same as GEOG 421 and GEOL 481)

Call number: 37116

Instructors: Prof. Bruce Hannon, Geography Dept., 220 Davenport Hall, 333-0348
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Room and Time: 22 ACES Lib, Info & Alum Cntr, 5:00–8:00 p.m., W

Credit: 4 hours

Prerequisites: Advanced undergraduate standing and consent of instructor

Course Content:

The “Earth and Environmental Systems” comprise interactions among the solid earth, the oceans, the atmosphere, the land surface, the biosphere, and humans. These interactions determine our climate, our food supply, the quality of our environment, and our standard of living. Much study of such systems is carried out using computer models. Models are used to interpret data, test ideas about mechanisms, and make predictions. Students are often shown the results of models, but rarely do they have much idea of what a model really is, how models are built, and how they work.

In this course we will build and use models of climatic, hydrologic, geochemical, and human systems. We will explore the basic concepts of systems modeling, use models to test hypotheses, and find out about the assumptions and approximations that must be made in modeling. Models will be constructed using the STELLA® modeling software on Macintosh computers. STELLA offers an intuitive approach to modeling, so that prior experience with computer modeling is *not* a prerequisite for this course.

We will focus on a small number of modeling projects, to be determined, in part, by student interest. Examples are global and regional hydrology, global climate, the carbon cycle, and the sustainability, or otherwise, of expanding human population and activity. In each case we will build and/or use models of increasing sophistication, and, at the same time, learn about the background science. Students will work in groups and submit group lab reports.

Upper-level undergraduates in agriculture, engineering, or the natural and social sciences, as well as graduate students in any discipline are invited to enroll. An interest in learning to build and use models is the only prerequisite

Texts: *Beyond the Limits: Confronting Global Collapse, Envisioning a Sustainable Future*, by Donella H. Meadows, Dennis L. Meadows, and Jorgen Randers, Chelsea Green Publ. Co. (Required)

Modeling the Environment: An Introduction to System Dynamics Modeling of Environmental Systems, by Andrew Ford, 1999, Island Press. (Recommended)