

GEOG 600: Modeling and Visualizing the Earth System Spring 2005

"All models are wrong but some are useful" George E.P. Box

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Textbooks:

None.

Students will be responsible for reading journal articles that will be provided throughout the semester.

Course Description:

Introduction to modeling and visualizing earth systems, including use of modeling to support management and policymaking. Course will promote the development of systems thinking skills and will emphasize modeling as a framework for environmental analysis and problem solving. Students will learn how different classes and scales of models are used to explore different types of environmental questions. Emphasis will be on the dynamic, interdependent and interactive relationships between human activities, atmospheric processes, ecosystem function and structure as well as the effects of these activities on biogeochemical cycles, energy flow, and biodiversity.

A course goal is to provide students exposure and hands-on experience in a problem-solving, project-oriented environment, which is needed to apply technologies to significant Earth System problems. Among technologies to be discussed are simple numeric models of various components of the Earth System using systems modeling software (Stella II®), sensors for satellites and aircraft, data acquisition and image processing tools, verification and validation techniques, and modeling uses of Geographic Information Systems.

Grading:

There will be no curve in this course. Each student's grades will be determined from the following:

Midterm	25%	<u>Grading Scale</u>
Final	25%	A 90-100%
Annotated Bibliography	10%	B 80-89%
Class presentation	15%	C 70-79%
Project model/paper	25%	D 60-69%
		F <60%

Total	<hr style="width: 100px; margin-left: auto; margin-right: 0;"/>	100 %
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Exams:

The midterm and final exam will test/reaffirm your knowledge of the integrated systems approach to modeling and visualizing the forcing, system response and impacts to the earth system. Each exam will involve the student creating a model given a dataset and a research question. The student will be

graded on the results of their answers to their model output, and the visualization of the model output.
MIDTERM: Due March 29th; FINAL EXAM: Due May 10th @ 4:30 PM

Make-up exams will only be given in cases of emergency (i.e. w/ a doctor=s excuse). NO EXCEPTIONS!!!

Homework:

This class will emphasize learning by promoting class discussions of topics introduced related to (earth) system science and modeling. These discussions will often be facilitated by the class reading various journal, newspaper, magazine articles and then talking over what they thought of the content of the article related to their views and understanding of the topic. Moreover, a hands-on approach will complement what is discussed in class through the use of computer models. Students will be responsible for constructing and running experiments related to specific examples of systems modeling. As these homeworks@ rely on class attendance and participation, your attendance in class is paramount.

Annotated Bibliography:

In order to fully introduce you to the various aspects of modeling and visualizing the earth system, you are to submit annotated bibliographies of 5 refereed journals articles. These bibliographies are to be turned in no later than April 5th. An example annotated showing proper format will be handed out later in the semester.

Project Model/Paper:

Students will design a research project of their choice that involves system modeling and visualization - with the hope they will use what they learn in class as the spring board for design of their model. The research paper/model should address a system issue - the inclusion and analysis of real data sets is encouraged. In order to avoid possible duplication of a research project, each group must get instructor approval before starting their paper/project. Students are to submit a 2 page research pre-proposal (including tentative list of references: see below) to me no later than February 22nd - remember, you must have my approval of your project before you begin.

Students will give a presentation to the class about their model design and resulting visualization of results. The presentations should be around 20 minutes in length and should provide a detailed description of their methodology and data used. The class will then provide feedback on the models design, results, and visualization techniques. These presentations will begin April 5th. Your exact presentation date will be assigned later in the semester.

Final papers (and the model) are DUE May 3rd. They are to be typed, single spaced, using 12 point font with 1 inch margins all around. The paper will discuss each phase of the proposed research and model design, including graphics to support the research objections and model discussion. A minimum of 10 references need to be used, with at least 5 being from refereed journals. You may use whatever citation format you like, but please specify which one you used in the bibliography. No late papers will be accepted!

Other Info:

The contents of this syllabus are subject to change in the event of extenuating circumstances and at the discretion of the instructor.

Out of respect for your fellow classmates (and me!), cell phones, pagers, etc. need to be turned off while in class. If it is an emergency and you are expecting a phone call, please set it to vibrate and take the call outside of the classroom.

Any student with a documented disability who would like to request accommodations should contact the University Disability Services Office as early in the semester as possible.

Course Topics to be Discussed Include:

- Introduction to Earth systems/ systems modeling
- Model types
- Land-surface modeling
- Climate/weather modeling
- Wildlife & ecological modeling
- Issues between conceptual models and numerical models
- Positive and negative feedback loops