Geography 970: Seminar in GIScience

Environmental Modeling with GIS

University of Wisconsin-Madison

Instructor:
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Meeting Hours:
Wednesdays: 12:30-3:30

Instructor Office Hours:
Tuesdays: 1:15 p.m - 2:15 p.m.
Thursdays: 1:15 p.m - 2:15 p.m.

Course Description:
This course offers students an opportunity to approach environmental modeling using GIS techniques. The course focuses on the quantification of physical environmental processes using GIS techniques. The course consists of three components: review of key physical environmental processes (hydrological and ecological processes, such as runoff generation, evapotranspiration, etc.); the implementation (quantification) of these processes in a computer environment; and the GIS techniques for parameterizing the physical landscape for simulating these processes over large spatial extent. The quantification and simulation of physical processes using GIS will be illustrated in two stages. During the first stage, the quantification and implementation of some simple hydro-ecological processes in GIS will be examined to illustrate the steps and issues involved in modeling physical processes using GIS. In the second stage, some common environmental models, such as BASINS (USEPA, for watershed and water quality analysis), RHESSys (University of Montana, for hydro-ecological modeling), and WetSpa Extension (Free University, Belgium, for hydrological modeling) will be examined to provide an appreciation of how these models accommodate complex physical processes and to illustrate the limitations of these models.

The objectives of this course are to provide students with an understanding of the processes and issues associated with environmental modeling using GIS techniques; and to provide students an appreciation of the power and limitations of exiting GIS-based environmental models. It is hoped that with this background students will be able to make an informed use of existing GIS-based environmental modeling.

Format:
Seminar format (consisting of leading discussion and presentation by the instructors and student projects)
Evaluation:

- Participation: 40%
- Attendance: 10%
- Discussion: 10%
- Presentation: 20%
- Student Project: 60%

Prerequisites:
Geog 377 and Geog 325 or their respective equivalents.

Text and Readings:

Environmental Modeling and GIS Oriented:


Other GIS Texts:


**Intended Topics:**

Introduction to the course
The Change Field of Geography: from Qualitative to Quantitative

Physical Processes
- Hydrological cycle and photosynthesis (conceptual process)
- Hydrological cycle and photosynthesis (Quantification)
- Hydrological cycle and photosynthesis (Parameterization Using GIS)

Case Studies:
- WetSpa Extension
- RHESSys
- BASINS