SPATIAL MODELING

Course Outline

Course Description

Spatial models allow us to make the best use of geospatial data to represent real world phenomena that are dynamic and change over space and time. In this course the focus will be on *geosimulation* approaches and how they are used to model dynamic geographic phenomena. Students will learn concepts related to theory of *complex systems*, *geographic automata*, particularly *cellular automata* and *agent-based models, as well as machine learning and artificial intelligence,* and their integration with GIS for representing, simulating and forecasting dynamic geographic phenomena. The topics will cover but are not limited to integrated space-time models of land-use/land cover changes, urban sprawl, transportation movement, forest fire propagation, pollution, and/or invasive species spread. Issues of model testing and validation will also be examined. Students will learn how GIS, complexity and geographic automata can be used to simulate geographic phenomena and will be exposed to the scientific research process in the field of GIS-based spatial modeling.

The course is based on a combination of instructor and student-led presentations and discussions on concepts and issues related to spatial modeling and geosimualtion. A required list of readings of scientific journal papers covering selected course topics will be provided.

Computer lab time will be available to pursue model building ideas through a project. Students will choose a dynamic spatio-temporal problem and conceptualize a modeling strategy to resolve it. GIS software will be available in the SIS computer lab to implement a solution. The final project will be presented in class and written as a final report in the format of a scientific paper. The course will provide you with the *capstone experience*.

Grading:

The final grade for the course will be determined from: student participation (20%), mini test (15%), project proposal (15%), project oral presentation (15%), written project report (35%). There is no final exam. All marks in the course are absolute and hence not scaled or assigned based on a curve.

The lectures and labs will start in the week of January 7th, 2019.

Note: The content and the grading can be subject to minor changes depending on the number of students enrolled, class progress, and available resources.