

FINAL PROJECT

Your final project for *Spatial Modeling* will involve an exploration of some spatial phenomenon using spatial simulation modeling. You will use a model to better understand how this phenomenon leads to complex emergent spatial patterns over time. You will then provide a write up of your project using a scientific manuscript approach utilizing text, images and videos to explain the process-to-pattern relationship. **The goal of this project is not to develop a model aimed at perfectly representing some real-world process; instead, your aim should be to utilize complex systems theory and simulation modeling as an approach to provide a thoughtful description of how a process lead to emergent spatial patterns.**

There are three choices of how to go about this project:

1. Choose a specific phenomenon that you are interested in and develop a model in NetLogo from scratch in order to simulate one or more processes that might be responsible for creating observable spatial patterns.
2. Use existing models from the NetLogo library to evaluate different types of processes that might be responsible for creating observable spatial patterns. You should identify and evaluate at least three different processes to evaluate.
3. Evaluate how the spatial and/or temporal dimensions of spatial simulation models impact model results. You can either (1) select one model and evaluate many spatial and/or temporal components, or (2) select many models and evaluate one or two spatial and/or temporal components.

Select which type of project that you want to do based on your interest, but also take into consideration your programming capabilities. The instructional staff will be able to assist you with using NetLogo, but we are not in the position to write code for student projects.

DELIVERABLES

PART I

You must submit the final project proposal in lab for approval on the project. This will help you understand what your expectations are and help us in knowing how to help you in your project.

DUE: WEDNESDAY, MAY 6TH

PART II

You are required to provide a 2000 (undergraduates) or 3000 (graduates) word manuscript that will be delivered through your website. The manuscript should be formatted as follows:

1. Introduction:

- a) Provide a background to your topic using the scientific literature.
- b) Identify the justification for your study using what you have learned in the course. This justification should explicitly identify why a complex systems and simulation modeling approach is necessary to achieve your objective.
- c) State the objective of your research project.
- d) Briefly outline how you will achieve this objective.

2. Methods:

- a) Use the ODD protocol to describe your methods.
- b) Describe how you will conduct a sensitivity analysis.
- c) Describe how you will evaluate your model.

3. Results:

- a) Present the results from your model simulations using text, figures and videos. Use the *narrative approach* (Millington et al. 2012) to describe how the specific processes that you are simulating manifest in the spatial patterns emerging from the model.
- b) Discuss findings from the sensitivity analysis.
- c) Discuss findings from model evaluation.

4. Discussion:

- a) Using what you have learned about complex systems in the course in concert with your results, explain the phenomenon that you are looking at as a complex system. That is, you should be able to describe concepts such as feedbacks, path dependence, non-linearity, autonomous decision-making, and emergence

through your results. This is where you will demonstrate that you have an exceptional understanding of the theoretical concepts learned in lecture and through the assignments.

5. Conclusion

- a) Provide a brief summary of your project by restating your objective and how your study was able to achieve it.

DUE DATE: FRIDAY, JUNE 5TH AT 11:59PM