

Project Proposal

Due: TBA (in a couple of weeks).

Project goal: Use mathematical modeling techniques introduced in the class to address a scientific question about a real world system. You will write a journal article and create a poster describing your model and results.

Project Proposal: The first deliverable on the way to creating the journal article and poster is a 5-9 page project proposal. The project proposal will introduce the question you want to work on, describe some previous research on the question, explain your modeling approach, and describe the work you will need to do to implement and analyze the results of the model.

First steps: The key to a good project is to find a research question that you are excited about. You might start by thinking about topics that you are interested in and searching the literature to see what types of papers have been published on the topic, and what questions the papers are addressing. You might need to search for articles in the applied discipline (sociology, ecology, etc.) as well as in applied math journals.

When reading previous literature, you should pay particular attention to the believability of the authors' conclusions. Did they convince you? If not, why not? What would you have done different? Are their mathematical methods discussed in this course that might be better for addressing the question that the author is trying to address.

If you are already working on a research question, you can use the project as an opportunity to further that project. You will need to use the mathematical tools discussed in the class to take a different approach to the one you are already pursuing.

No matter how you choose your research question, your proposal will need to discuss previous research on the topic/question in three to four publications.

Please email me or see me in office hours to discuss ideas, and ask for help understanding models presented in previous research. Be ambitious, and come and see me if you are in doubt about whether the project you are proposing is feasible.

Working in groups: You are encouraged to work in groups, but can work alone if you prefer. The maximum allowable group size is *three*. If you do work in a group, You will need to include an extra section to your proposal detailing how the work will be divided among the group members and what norms the group is adopting to ensure that everyone's voice is heard and ideas given full consideration. For instance, this could include an agreement that work will not proceed on a given section or sub-task until all group members have agreed to the plan for that section or sub-task and proposed approach.

Projects will be evaluated based on:

- Significance: How interesting is the problem and would the solution have an impact?
- Appropriateness of the model for addressing the question. Criteria such as balance of simplicity with realism, as well as robustness to underlying assumptions or parameters will be considered.
- Technical quality of the simulation and analysis. Were the math and coding done correctly?
- Interpretation of the results, including a serious and thorough consideration of limitations of the model.
- Clarity, conciseness, and effectiveness of the writeup and poster.
- Novelty of the work.

Proposals will be evaluated based on: Significance, novelty, appropriateness of the model, the detail and appropriateness of the review of previous literature, and organization and clarity of the writing.

Parts of the Proposal: Your proposal should begin by introducing an interesting question. There should be a section detailing the background necessary to fully unpack the question, as well as discussing previous research in at least three publications.

You need to describe how you plan to improve on previous research. Be as concrete as possible about the details of the model that you are proposing, keeping in mind that further details will emerge as you begin to work on the simulation and analysis.

You will need a section describing the work you plan to do to simulate and/or analyze the model and results. You may need to skip ahead in the book to see what techniques will be available. Feel free to ask me if what you are doing is feasible. You will also need to discuss how you will interpret and measure the success of the model.