

Math 437: Mathematical Biology Project Guidelines

The project will involve writing a journal style article and sharing your work to the rest of the class in a short (approximately 15 minutes plus questions) oral presentation with slides. Graduate students or others who have their own research projects may use this project as an opportunity to utilize modeling within their own work; however, most students will reproduce and extend the work of a published paper. You may work alone or with a partner. If you need help selecting an appropriate paper, please ask! Presentations will take place the final week of classes.

Choose a paper (or topic) and a partner (Due March 25)

As mentioned above, I am happy to help you find an appropriate research paper. Mathematical biology articles are published in many journals; some that may be of interest are the Journal of Theoretical Biology, PLoS Computational Biology, Bulletin of Mathematical Biology, Proceedings of the Royal Society B, as well as some articles in Science, Nature, and the Proceedings of the National Academy of Sciences. A colleague (Zach Kilpatrick) has compiled a list of papers by topic that would be appropriate for this project (<https://www.math.uh.edu/~zpkilpat/math4309project.html>). There are also a number of relevant papers modeling Covid-19 evolution and epidemiology. Your selected paper must be approved by me.

One page synopsis of the paper (Due April 1)

At this point, you'll have read and understood the key points of the journal article. You should write a one page synopsis of the journal article, including background as to why the model was developed, what types of mathematics were used in the analysis and how they were used, and key results and their implications. You should also have some ideas as to how you might extend the model or perform additional experiments on the model.

First draft of the paper (Due April 12)

By now you will have reproduced at least two figures from the paper and extended the model to produce at least two additional figures. Some analyses may be incomplete, though the general framework of your paper should be coming into form. Your paper should include an **abstract** that briefly describes the problem and key conclusions, an **introduction** that describes the biological background and motivation for model development and analysis, a **methods** section that describes the model and methods used in analysis, a **results** section that discusses the results from the analysis, and a **discussion** section that describes the biological implication of the results and puts them into the context of the field. It is appropriate here to discuss limitations and possible extensions of the work. You should reproduce at least two figures from the journal article and produce two original figures related to your extension or additional experiments on the model.

Final draft of the paper (Due May 3)

The final draft of the paper should be polished and professional, including appropriate citations.

Presentations (April 29, May 1, May 3)

You will be given the opportunity to share your work with the rest of the class in the form of an oral presentation. If you work as a pair, both students should present in approximately equal time

in the oral presentation. You should use slides to highlight your work (using for example the Latex Beamer document class, Keynote, Powerpoint).