

AMATH 534
Project and paper presentations – guidelines

The point of the paper presentations is to expose you and your classmates to the coolest and most influential applications and implications of the mathematical formalisms we will be developing in class. In other words, you get to do (most of) the “good part!”

The point of your project is to gain experience in asking a new question about neural coding and/or dynamics, starting from the research literature.

Here are some guidelines:

GUIDELINES FOR COURSE PROJECT:

- Chose a paper (our course wiki lists many suggestions), with a team of one or two fellow students (group size: 2 or 3). A paper on pure data analysis will be a difficult choice, please read on.
- Write code that implements one of the central models in the paper (or the central model, if there is only one). Reproduce one of the associated figures in the paper, or at the very least some of the model results behind one of these figures. Or, if this pencil and paper work, rederive one of the key results.
- Identify an interesting new question that can be asked about the model and topic of the paper.
- Extend or modify the code, or mathematics, to take a crack at answering this question.
- Write a paper on this (see below).

GUIDELINES FOR PAPER PRESENTATION (In class presentation 1):

- Prepare about 5 slides (powerpoint, or other software), including: (1) intro to topic, (2) mathematical or computational model used in paper, (3) conclusions / insight from this model. If there are many different conclusions, summarize or pick one or a few key conclusions.
- Alternatively, you are welcome to use a handout and the whiteboard.
- Prepare and **practice** a presentation of the main ideas. **YOUR PRESENTATION MUST FIT IN SIX MINUTES. TWO ADDITIONAL MINUTES WILL BE ALLOCATED FOR QUESTIONS.** Please time yourself as you practice – it is difficult to give a summary of anything in a few minutes! But this is exactly what happens in spotlight sessions of many research conferences.

Evaluation of these presentations will be based on the aspects listed above. Did you clearly introduce the topic and define, in an understandable way to a typical class member, the computational model used in paper (it’s OK to simplify, the goal is to be understandable and clear)? Did you clearly describe at least one conclusion? Finally, were your slides and plots legible, and did your presentation fit into six minutes? These criteria will be used to assign the points for your presentation.

GUIDELINES FOR PROJECT PRESENTATION (In class presentation 2):

- Prepare about 5 slides (powerpoint, or other software), including: (1) reminder of paper topic, (2) reminder of mathematical or computational model used in paper, (3) main figure or result you are trying to replicate, (4) your results so far in trying to do this replication, (5) novel question you are asking, (6) your results so far in trying to answer this novel question. Note that your project does not have to be done or results finalized: this is a progress report.

- Alternatively, you are welcome to use a handout and the whiteboard.
- Prepare and **practice** a presentation of the main ideas. **YOUR PRESENTATION MUST FIT IN EIGHT MINUTES. TWO ADDITIONAL MINUTES WILL BE ALLOCATED FOR QUESTIONS.** Please time yourself as you practice – it is difficult to give a summary of anything in a few minutes! But this is exactly what happens in spotlight sessions of many research conferences.

Evaluation of these presentations will be based on the aspects listed above. Did you clearly remind of us of the topic and model? Did you clearly describe your replication efforts, and where they are succeeding or failing? Did you state a well-formed, plausible novel question? Finally, were your slides and plots legible, the amount of detail on your slides appropriate to what an audience member in our class (fellow students) could at least mostly follow, and did your presentation fit into the allotted time? These criteria will be used to assign the points for your presentation.

GUIDELINES FOR PREPARATION OF YOUR PROJECT PAPER:

NOTE: The paper is due as posted on the website.

- Prepare a paper describing your findings. **This paper should have the following sections.**
 - Introduction. Discuss the neuroscience problem that is solved in the paper.
 - Detailed description of model equations, including definitions in of all variables, written in prose as text.
 - Numerical reproduction of one of the results in paper – figures, captions, text discussion, OR mathematical re-derivation of the like “in your own words,” as makes sense (obviously main steps will be identical, but include your own explanations of steps as you see fit).
 - Novel results – figures, captions, and/or math, plus text discussion.
 - Conclusion – text
 - Appendix – code (if used).
- In the introduction and / or discussion, cite at least one OTHER article (beyond the one you are focussing on) that are on a related theme, and comment on how the article you based your work on and / or your results fit in.
- Figures should appear throughout as part of the main text, as you go along, and should be high-quality – large enough, with large enough text, clear line types, all symbols and axes defined, and well-written captions. The appendix should include all any code used to reproduce figure(s) in the paper and to extend them to answer your research question.
- As a guideline, your paper should include around 5-10 pages of “pure” text to accomplish the above, PLUS figs and appendices.