AMATH 575
Project presentation and paper – guidelines

The point of the course project is to allow small student groups to explore the area of dynamical systems and applications that most interests them, to practice collaboration, to delve into the current literature, practice reproducing published results, and even better, to experience posing and answering a novel question that extends the literature.

The course project should therefore be a challenging and an enjoyable undertaking. Projects are done in groups of (ideally) 3-6 students.

There are two main steps:

- Synthesize / reproduce a result from literature
- Ask and answer an "next step" question

And you'll share this work with us through:

- Mid-course presentation
- Final project presentation
- Project paper

GUIDELINES FOR MID-COURSE PRESENTATION:

- Identify a paper from the research literature that explores an aspect of dynamical systems and its applications that fascinates you. The textbook(s) are a great source of these, as is the literature in your own area of interest! Some specfic suggestions are on the course canvas website, too!
- For the mid-course presentation, each group will give a very brief in-class presentation of the main idea in the article or chapter. These presentations will then be developed into course projects.
- Specifically:
  - Prepare 4-6 slides (powerpoint, google slides, latex, or other software), including: (1) intro to topic, (2) mathematical or computational model OR technique, (3) conclusions / insight from this model or technique. If there are many different conclusions, summarize or pick one or a few key conclusions. (4) Sketch of your plans for asking your own "next step" question based on the model or technique.
  - Prepare and **practice** a presentation of the main ideas. Each group member should give at least one slide in the presentation. **YOUR PRESENTATION MUST FIT IN SIX MINUTES.** 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 each of the four aspects listed above, WITH A FOCUS ON CLEAR COMMUNICATION AT THE APPROPRIATE LEVEL.

- Did you clearly introduce the topic and define, in a simplified way that is plausibly understandable way for a typical class member, the computational model or technique used in paper (YOU WILL HAVE TO REALLY SIMPLIFY)?
- Did you clearly describe at least one conclusion of the original paper, in appropriately simplified form?
- Did you clearly describe YOUR plans for a next step, in appropriately simplified form?
- Finally, were your slides and plots legible, and did was your presentation timed to fit in the allotted time?

GUIDELINES FOR FINAL PROJECT PRESENTATION

- Prepare about 6 slides, including: (1) intro to topic and review of the work done by original authors, (2) the novel question you asked, (3) your results so far, and (4) your interpretations and / or interesting directions for ongoing further work. It's OK if some of this is in progress still, but there should be a "story" in place.
- Prepare and **practice** a presentation of the main ideas. Each group member should give at least one slide of the presentation. **YOUR PRESENTATION MUST FIT IN SIX MINUTES.**

Evaluation of course project presentations will be similar to that for the case study presentations described above, based on:

- Did you quickly and clearly remind us of the topic and core concept in the original paper?
- Did you state the new question you are asking, in an understandable (and likely simplified) way?
- Did you illustrate at least one resuls so far, in a clear way that class could reasonably be expected to mostly understand? Did you simplify and explain to achieve this?
- Finally, were your slides and plots legible, and did was your presentation timed to fit in the allotted time?

GUIDELINES FOR COURSE PAPER:

- Either
  - (a) Write or adapt code or analysis 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 (b) If there is no central model, rederive and explain in your OWN words, including at least one newly drawn figure, the central technique in the paper.
- **The next step:** Identify an interesting new question that can be asked about the model and topic of the paper, and extend or modify the code or analysis to answer this question.
- Prepare a paper describing your findings. **This paper should have the following sections.**
  - (1) Introduction. Discuss the mathematical or scientific question that is addressed in the paper.
  - (2) Reproduction of results in paper – figures, captions, text discussion.

- (3) Novel results – figures, captions, text discussion.
- (4) Conclusion – text
- (5) Appendix – code or any additional calculations
- In the introduction and / or discussion, cite at least two OTHER articles (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.
- Please attach the article you based your project on to the back of your paper.
- 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 code used to reproduce figures in the paper and to extend them to answer your research question.
- As a guideline, your paper should include about 10 pages of double-spaced text to accomplish the above; larger groups in particular might write more extensive articles.