CAAM/STAT 31310, Autumn 2024, U Chicago

Foundations of Computational Dynamics: CAAM/STAT 31310

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- You are free to delve deeper into any subset of topics covered in class, or more broadly, into mathematical analyses and computational aspects of dynamical systems. You are actively encouraged to find topics that are at the intersection of your research with the course material.

- The project will be evaluated on its computational and theoretical components. You can maximize your score by showing substantial work (2-3 homeworks worth) in the algorithmic/computational aspects or the theoretical aspects or both.

- A self-contained final report of no more than 5 pages is required at the end of term. This carries 65% of the final project score.

- A 10-minute presentation, including questions, briefly summarizing project components is also required. This carries 25% of the final project score. Sign-up sheets for this are here.

- Your report can follow your proposal outline but elaborate on the problem motivation (what problem are you trying to solve or understand), your proposed solution approach, and your inferences (what you have learned).

- The final report will be evaluated based on your formulation/modeling of the problem in mathematical terms, your solution strategy and your discussion on your choice of solution strategy. You will not be evaluated on how novel your solution is; only how well you have understood your problem and solution method, and how clearly your justify (using numerical analysis and dynamical systems theory taught in class) your results.

- Computational questions you answer may include, but not be limited to, i) data assimilation and inverse problems, ii) dimension reduction and feature extraction, iii) learning dynamical systems, iv) uncertainty quantification in parameters/states of dynamical systems, and v) perturbation/stability analyses of dynamical systems.