Computational Modeling of Biological Systems

AMATH 422/522 Syllabus

Winter 2012

Instructor: Guillaume Lajoie
email: glajoie@uw.edu
office: Guggenheim Hall 407
office hours: TBA

Teaching assistant: Carol Husby
email: husebyc@uw.edu

Schedule and Location:
MW 4:30-5:50pm
Room B027 of ICL lab, Communications Building

Website and web resources:
University of Washington Catalyst tools will be used for the main web resource center. By logging on with your UW NetID, you will have access to the class website (also called Workspace on Catalyst), online material repository and student forum.

- You can login using a UW NetID at https://catalyst.uw.edu/
- Main website can be publicly accessed at https://catalyst.uw.edu/workspace/glajoie/26321/
- IMPORTANT: Instead of emailing course related questions the me or the TA, please visit the forum on catalyst and post there. I will be checking the forum regularly and encourage everybody to provide input and comments.

Course description and objectives:
In AMATH 422/522, you will learn about models that arise in the life sciences and how they are analyzed using modern mathematical and computational techniques. We will cover statistical models, discrete- and continuous-time dynamical models, and stochastic models. Applications will sample a wide range of scales, from biomolecules to population dynamics, with an emphasis on common mathematical concepts and computational techniques. Throughout, our themes will include interpretation of existing data and predictions for new experiments. MATLAB will be used for numerical computations, visualization, and data analysis – and mathematical tools taught in parallel with their computational implementation. No prior programming experience is assumed. This course is designed for students in a wide variety of departments and with backgrounds across the sciences. A working knowledge of calculus is assumed, together with a desire to learn more about the underlying science, mathematics, or both.

Textbooks:
Required: Dynamic Models in Biology, Stephen P. Ellner and John Guckenheimer (EG) (we will also use the associated Lab Manual available in .pdf format available on the class website or at http://www.cam.cornell.edu/~dmb/DMBs Supplements.html)
Recommended: MATLAB: A practical introduction to programming and problem solving, Stormy Attaway (A)
Optional: A course in Mathematical Biology, de Vries, Hillen, Lewis, Muller, Schonfisch;
Mathematical Models in Biology, Leah Edelstein-Keshet

Both (EG) and (A) are available at the UW bookstore and on reserve at the Odegaard Library. (A) is recommended for students with little or no MATLAB background.

Grading: Your course grade will be calculated via the following weights: homework 50%, case study presentation 10%, course project 40%. More information on the case study and course project can be found on the class website.