Computational Methods in Biology (MAP 5486)

Syllabus, Fall 2022

M,W,F   12:00–12:50   231 Love Bldg.

Professor: Prof. Richard Bertram
Office Hours: M,W,F 10:00–11:00, or by appointment
Office: 114 Love Bldg.
E-mail: rbertram@fsu.edu

Corequisite: MAP5165 (Methods in Applied Math 1) or permission of instructor.

Some good books for this topic are (not required, but helpful):

- An Introduction to Systems Biology, by Uri Alon, Chapman & Hall, 2007

- Computational Cell Biology, by Christopher Fall, Eric Marland, John Wagner, and John Tyson (eds.), Springer-Verlag, 2002

- Nonlinear Dynamics and Chaos, by Steve Strogatz, Westview Press, 2001.

Course Topics: The course is structured around four main topics: Models and dynamics of gene transcription networks, proteins and protein-protein interactions, cellular activity, and biological networks.

Course Objective: To convey how modeling and computer simulations can provide useful information about the functions of biological systems at the sub-cellular and cellular levels.

Computer Software: The XPPAUT software is free and is set up specifically to solve and analyze ordinary differential equations. It can be used for much of what we will be doing in class. It can be downloaded onto your computer from Bard Ermentrout's web page.

Expectations: You are expected to attend class, give a presentation (see below), complete assignments and take the final exam.

Assignments: Periodic homework assignments will be made which must be turned in on time to avoid a 20% grade reduction for late work (late assignments accepted, with penalty, within 2 days of the due date). These count for most of the final grade, so you should work the problems carefully and turn in the best work possible.

Student Presentations: Each student will present a research paper during the last part of the semester. I will come up with possible papers to present, but others can be chosen as long as they build on topics covered in class. These will be graded, and I will provide guidlines for paper presentations in a separate document.

Final Exam: There will be a final exam on Tuesday, December 6 from 10 AM until noon.

Grading: The assignments count 60% of the final grade. The paper presentation counts 20%. The final exam counts 20%. The final letter grade is determined according to the following scale:

$$90.1\text{–}100\% = \mathbf{A}, \qquad 88\text{–}90\% = \mathbf{A}^-$$
$$84.1\text{–}87.9\% = \mathbf{B}^+, \quad 80.1\text{-}84\% = \mathbf{B}, \quad 78\text{-}80\% = \mathbf{B}^-$$
$$74.1\text{–}77.9\% = \mathbf{C}^+, \quad 68.1\text{-}74\% = \mathbf{C}, \qquad 66.1\text{-}68\% = \mathbf{C}^-$$
$$58\text{-}66\% = \mathbf{D}, \qquad 0\text{–}57.9\% = \mathbf{F}$$

Honor Code: A copy of the University Academic Honor Code can be found in the current Student Handbook. You are bound by this in all of your academic work. It is based on the premise that each student has the responsibility 1) to uphold the highest standards of academic integrity in the student's own work, 2) to refuse to tolerate violations of academic integrity in the University community, and 3) to foster a high sense of integrity and social responsibility on the part of the University community. You may discuss homework assignments with other students in the class, but the work you turn in must be your own. Plagiarizing the work of others is academically dishonest and will result in a grade of 0.

American Disabilities Act: Students with disabilities needing academic accommodations should: 1) register with and provide documentation to the Student Disability Resource Center (SDRC); 2) bring a letter to the instructor from SDRC indicating you need academic accommodations. This should be done within the first week of class.