Syllabus 2024: BIOL 5536/GCB 5360/CIS5360

Schedule: MW 1:45-3:15

Instructor: Junhyong Kim (junhyong@sas.upenn.edu)

Synopsis:

This course covers the theoretical basis of Computational Biology (CB) for PhD-level students who are seeking dissertation work in CB, both theory and method development. Here, I define CB as a field whose goal is to study fundamental biology of organisms and their dysfunctions using computational analysis. This contrasts with other broader computational activities in biomedical sciences such as developing biomedical software systems, databases, and other infrastructures. The goal of the course is to understand principles of common algorithms as well as the statistical and mathematical basis of the methods used in CB. In particular, the course will also provide reviews and short tutorials of basic concepts in algorithms, probability, statistics, and math that is useful for CB.

Course Mechanics:

You will be organized into teams for the semester; a different permutation of team members will be set up throughout the semester. You will be assigned team projects consisting of creating lecture notes, lectures, and other assignments.

This course consists of two sets of lectures. The first is a set of lectures I will give called "Missing Semester" lectures—these consist of basic concepts from computer science, probability theory, statistics, vector spaces and matrices, and geometry. They will be short form of courses that would have been useful to take during the undergraduate stage. When I give these lectures, the assigned team's responsibility will be to create lecture notes for the whole class. That is, you will listen to my lectures and convert them into lecture notes.

The second set is lectures you will give based on assignments from a lecture note that I will handout. These will cover standard CB topics such as string search, sequence alignment, etc. For these the assigned team will create slides and lecture materials and deliver a 50 min lecture. This will be followed by Q&A and I will add more comments.

There will be additional set of lectures assigned to you based on current literature towards the end of the semester.

Grades and exams:

70% of the grade will be based on your weekly activities, including the quality of the notes, slides, and presentations as well as any other assignments I give during the semester.

There will be an in-class open book final exam that will account for 30% of the grade.

Course Schedule: TBA