

CSC 84010 Computational Biology

Professor Saad Mneimneh

Thursdays, 2:00 -4:00 pm

Course Description

Math and computer science have changed the face of modern biological sciences and introduced the whole new field of Computational Biology (also related terms: computational molecular biology and bioinformatics). Computational biology derives knowledge from algorithmic treatment and computer analysis of biological data. The aim of the course is to give an introduction to the basic computational methods and algorithms used for the problems arising in biology. We will cover a variety of sequence alignment problems and look at different computational techniques such as dynamic programming, probabilistic systems e.g. hidden Markov models, advanced data structures e.g. suffix trees, and heuristics. We will also focus on the computational approaches to genetic and physical mapping, DNA sequencing and assembly, gene prediction, RNA and protein structure and folding, gene regulation networks, evolutionary trees, and microarray analysis.

Textbooks

There are many reference textbooks that you can find in the bookstore.

- **Biological Sequence Analysis**, R. Durbin, S. Eddy, A. Krogh, G. Mitchison. Cambridge University Press.
- **Introduction to Computational Molecular Biology**, Setubal, Meidanis. PWS Publishing Company.
- **Computational Molecular Biology: An Algorithmic Approach**, Pavel A. Pevzner. MIT Press.
- **Algorithms on Strings, Trees, and Sequences: Computer science and computational biology**, Dan Gusfield. Cambridge University Press.
- **Introduction to Computational Biology: Maps, sequences, and genomes**, Michael Waterman. Chapman and Hall/CRC.