BME280/CSE277/CSE377: BIOINFORMATICS
Spring 2006

Lectures: TTh 12:30-1:45pm, Engineering II, Room 322

Instructor: Ion Mandoiu
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Textbooks:

- Neil C. Jones and Pavel A. Pevzner, *An Introduction to Bioinformatics Algorithms*, MIT Press, 2004. Textbook website: http://bioalgorithms.info/. (Required)
- Dan Gusfield, *Algorithms on Strings, Trees, and Sequences*, Cambridge University Press, 1997. (Optional)

Prerequisites: BIOL 107, CSE 254, either STAT 220 or STAT 224, or equivalent background in biology, programming, discrete math, and statistics.

Course outline: This course is an introduction to the fundamental mathematical models and algorithmic techniques used in bioinformatics. Empasis will be placed on modeling computational problems arising in biology as graph-theoretic, statistical, or mathematical optimization problems, and on designing, analizing, and implementing efficient combinatorial algorithms for the latter. Covered algorithmic techniques will include exhaustive search, integer programming, greedy algorithms, dynamic programming, divide-and-conquer, graph algorithms, combinatorial pattern matching, clustering, hidden Markov models, and randomized algorithms. Biological applications covered will include restriction mapping, DNA sequencing, motif finding, pairwise sequence alignment, gene prediction, evolutionary trees, genome rearrangements.

Grading and course policies: Grading will be based on homework assignments (30%), programming assignments (30%), and a final project (40%). Homeworks will be assigned approximately bi-weekly, and will be mostly theoretic in nature. *Homework assignments are due at the beginning of the lecture on the due date.* There will be 3-4 individual programming assignments requiring you to implement full solutions to specified bioinformatics problems in the programming language of your choice. The final project will give you the opportunity to study a bioinformatics problem in more depth. Suitable final project topics include surveys of bioinformatics topics not covered in the lectures, the design and implementation of novel algorithms, and empirical computational studies. A list of potential topics will be provided towards the middle of the semester, although you are encouraged to devise your own. You will be required to submit a written final report and give a short presentation of your project at the end of the semester. When appropriate, projects can be done in teams of two students.

WebCT: We have a WebCT Vista site for the class. Check it regularly for class materials, grades, problem clarifications, changes in class schedule, and other class announcements.

Academic honesty: You are expected to adhere to the highest standards of academic honesty. Unless otherwise specified, collaboration on assignments is not allowed. Use of published materials is allowed, but the sources should be explicitly stated in your solutions. Violations will be reviewed and sanctioned according to the University Policy on Academic Integrity.

Students with disabilities: If you have a documented disability for which you are or may be requesting an accommodation, you are encouraged to contact the instructor and the Center for Students with Disabilities or the University Program for College Students with Learning Disabilities as soon as possible to better ensure that such accommodations are implemented in a timely fashion.