

Computer Science 549 – Computational Biology

Fall 2013

Instructor: Steven Skiena

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Office Hours: 2:15PM-3:45PM Tuesday-Thursday, and by appointment.

Course Time: 4-5:20PM Tuesday-Thursday **Place:** W4330 Melville Library

Textbook: Jones/Pevzner, *An Introduction to Bioinformatics Algorithms*, MIT Press, 2004

Other books which I recommend as supplements are:

- Gusfield, *Algorithms on Strings, Trees, and Sequences*, Cambridge Univ. Press, 1997.
- Durbin, Eddy, Krogh, Mitchison, *Biological Sequence Analysis*, Cambridge U. Press, 1998.
- **Grading:** Grades will be assigned based on the following formula, with cut-offs determined by my opinion of students on the boundary.

Homeworks – $3 \times 5\% = 15\%$

Semester Project – Proposal 5%

Semester Project – Progress Report 10%

Semester Project – Final Report 25%

Midterm Exam – 20%

Final Exam – 25%

- **Material:** This is an course in computational biology, focusing current problems in genomics. Our emphasis will be algorithmic, on discovering appropriate combinatorial algorithm problems and the techniques to solve these problems. Primary topics will include DNA sequence assembly, DNA/protein sequence comparison, hybridization array analysis, RNA and protein folding, and phylogenetic trees.
- **Homework Assignments:** I anticipate that there will be three group homeworks over the course of the semester. Part will be algorithmic in nature and part biological. Some might involve light programming and/or web search. The homeworks and degree of grading will depend upon my level of TA support. Related questions are likely to appear on the midterm

and final exams. If I ultimately decide to have fewer homeworks, the other components of the grading will be scaled up accordingly.

- **Graduate Student Project:** This is your opportunity to study some aspect of computational biology in depth. Suitable projects will be course presentations, original research or implementations. A list of possible topics will be distributed about a month into the semester, although you are encouraged to devise your own.

A project proposal with progress report will be due about a month later. A second progress report will be due at Thanksgiving. *Both* will be graded, to provide motivation not to leave the project to the last week of the semester.

I intend to schedule brief discussions with each group to make sure I understand the progress and final reports.

- **Midterm and Final Exams:** There will be midterm and final exams to encourage students to review the material during and at the end of the course. These account for half the course grade between them. Last year's midterm will be made available as a study aid.

Rules of the Game:

1. The basic structure of the lectures will mirror the CSE 549 course I taught in Fall 2012. My full lecture notes (with video from Fall 2010!) are available on the web.
2. This course reflects a bias toward the algorithmic aspects of computational biology. CS students should not take this course if you have not had the equivalent of CSE 373/548, *unless* you can prove to me you have a strong biology background.
3. CSE 549 is now considered an "applications" course for the Ph.D. Qualifying requirements. This should increase its attractiveness for new Ph.D. students.
4. *I will not sign proficiency for CSE 373/548 based on the results of this class, so do not ask me.*
5. I strongly encourage interest from students with a life sciences background. My vision is to pair up computational and life scientists for projects as much as possible, so as to help each other get a more balanced view.
6. The WWW page for the course is <http://www.cs.sunysb.edu/~skiena/549/>. All course handouts and notes are available there, along with the latest announcements. Please check it out.
7. Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>
8. If you have a physical, psychological, medical or learning disability that may impact on your ability to carry out assigned course work, I would urge that you contact the staff in the Disabled Student Services office (DSS), ECC Building, 632-6748/TDD. DSS will review your concerns and determine, with you, what accommodations are necessary and appropriate. All information and documentation of disability is confidential.