

ECE1508F 2005: Topics in Computational Molecular Biology

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1 Course objectives

This course is meant for graduate students who want to become familiar with some of the leading-edge problems in molecular biology, that are believed to require major innovations in algorithms and mathematical modeling to solve. The focus is on defining problems in molecular biology and associated terminology, putting these problems in broader context regarding science, medicine and bio-engineering, and identifying key areas where algorithm-oriented researchers (with ECE-like or CS-like backgrounds) can make contributions.

2 Style of course

The above objectives present quite a challenge. We will not work through concepts of molecular genetics in an organized fashion – doing so usually requires multiple years of study and can seem like an encyclopedic study. Instead, papers on leading-edge molecular biology problems and with a potential high-impact algorithmic aspect will serve to focus what we learn about. We'll learn whatever it is we need to know to obtain an ability to work on these problems. The style of the course will be similar to a journal club, except that I will insert background lectures to cover material that is deemed to be critical to understanding the papers we go through.

3 Readings

- Reference: **Human Molecular Genetics, Editions 2 or 3**. Free access at: <http://www.ncbi.nlm.nih.gov/books/bv.fcgi?call=bv.View..ShowTOC&rid=hmg.TOC&depth=1>
- Various assigned papers (announced in lectures or posted on course web page)

4 Course web page

The course website is <http://www.psi.toronto.edu/~frey/tcb>

5 Tutorials

There won't be any tutorials in this course.

6 Grading

- 40% Interaction: Students will present papers and ask questions about papers that other students present. This portion of the grade will reflect how much the student contributes to the overall learning experience of the class. I expect most students to receive full marks on this component.
- 60% Course project: In early October, I will meet with each student to identify an appropriate course project. The project must involve the use of an algorithm to analyze molecular biology data. While the project may be based in large part on the student's research, I have several well-defined projects that students can take on, if they wish.