

THE UNIVERSITY OF WESTERN ONTARIO

DEPARTMENT OF COMPUTER SCIENCE
LONDON CANADA

Topics in Bioinformatics

(Computer Science 9832a, September 2018)

Course Description

Bioinformatics studies biological problems using biological, computational, and mathematical methods. Computational biology studies computational techniques that can solve biological problems efficiently. This course covers some selected topics from Bioinformatics research.

Topics

The topics are drawn from the following lists:

- Pairwise sequence alignment with affine gap penalty.
- Multiple sequence alignment with affine gap penalty.
- Phylogeny
- Neighbour-joining algorithm for phylogenetic tree construction.
- Tree comparison algorithms.
- RNA structure alignment algorithms.
- Sequence assembly
- Hidden Markov models
- RNA secondary structure prediction by minimum energy folding.
- Protein peptide de novo sequencing.
- Normalized similarity and distance

Recommended Textbook

M. S. Waterman, *Introduction to computational biology*, Chapman & Hall, 1995.

Suggested Textbook

R. Durbin, S.R. Eddy, A. Krogh, and G. Mitchison, *Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids*, Cambridge University Press, 1998.

P.A. Pevzner, *Computational Molecular Biology: An Algorithmic Approach*, MIT Press, 2000

Course work

There will be two assignments for the course. For each assignment, there will be more advanced questions for graduate students only.

Each student will participate in a project. The projects will be individual or group depending on the enrolment.

For undergraduate students the projects will be related to the topics covered by lectures. For each project, there will be four components: literature survey, programming, presentation, and report. The presentations will be in class. The report will be due by the end of the semester.

For graduate participants the projects will be related to research topics chosen individually and approved by the instructor. For each project, there will be three components: literature survey, presentation, and essay. The presentations will be one hour in class. By the end of the semester, there will be an essay due for each project of about fifteen pages. This should be either a survey paper on a research topic or a summary of current research.

There will be no examination for the course.

MMASc students enrolled in this class may have an alternate grading scheme which will form an addendum to the official course outline.

Prerequisite: Computer Science 3331, 3340.

Instructor

Dr. KaiZhong Zhang, 372 Middlesex College, Tel: 519 661-3826

Class Meetings

3:30-5:30pm Thursday, MC 320.