

CS9877 - Research Topics in Genomics and Proteomics

Course description

Genomics and proteomics are two rapidly growing areas of molecular biology that are already causing a revolution in medicine. While genomics is concerned with the sequencing and analysis of an organism's genome, proteomics studies the organism's proteome (the entire set of proteins), including protein abundances, variations, modifications, and their interactions with other proteins or DNA. The two fields aim to understand cellular processes and their relation with diseases. The course will provide first an introduction to basic concepts of computational molecular biology, including sequence alignment, dynamic programming, BLAST, spaced seeds, suffix trees, suffix arrays, Markov chains, hidden Markov models, profile HMMs for sequence families, multiple sequence alignment methods, etc. Then, current and emerging research topics in genomics and proteomics will be discussed including DNA sequencing, error correction, genome assembly, assembly evaluation, genome resequencing, variation discovery, metagenomics, primer design, DNA splice junction prediction, DNA-protein binding prediction, protein-protein interaction prediction, protein-protein interaction network alignment, protein structure prediction, protein contact map prediction, gene expression inference, cancer diagnosis, alignment-free homology detection, etc.

Prerequisites

CS9877: None.

CS4463: Computer Science 3331A/B and 3340A/B; Biochemistry 2280A is recommended

Instructor

Dr. [Lucian Ilie](#), MC368, e-mail: ilie@csd.uwo.ca

Useful books (not required)

- W.J. Ewens, G.R. Grant, *Statistical Methods in Bioinformatics*, 2nd edition, Springer, New York, 2005.
 - R. Durbin, S. Eddy, A. Krogh, G. Mitchison, *Biological Sequence Analysis*, Cambridge Univ. Press, 1998 (11th printing, 2006).
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Evaluation (tentative):

- Participation: **20%**
 - Presentations (given by each student in class): **80%**
 - **Presentation schedule: TBA**
 - There will be no assignments or exams
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Class time

- Wednesdays, 11:30 - 1:30pm, MC316
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Office hours

- Wednesdays, 2:30 - 3:30pm, MC368
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Academic Accommodation for Medical Illness

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to your Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately. For further information please see:

<http://www.uwo.ca/univsec/handbook/appeals/medical.pdf>

A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Record's Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found here:

https://studentservices.uwo.ca/secure/medical_document.pdf

Students who are in emotional/mental distress should refer to Mental Health@Western

<http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.

Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact [Services for Students with Disabilities \(SSD\)](#) at 661-2111 x 82147 for any specific question regarding an accommodation.

Ethical Conduct

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

<http://www.uwo.ca/univsec/handbook/appeals/scholoff.pdf>

Plagiarism: Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence.

If assignments are to be individual assignments: All assignments are individual assignments. You may discuss approaches to problems among yourselves; however, the actual details of the work (assignment coding, answers to concept questions, etc.) must be an individual effort.

The standard departmental penalty for assignments that are judged to be the result of academic dishonesty is, for the student's first offence, a mark of zero for the assignment, with an additional penalty equal to the weight of the assignment also being applied. You are responsible for reading and respecting the Computer Science Department's policy on Scholastic Offences and Rules of Ethical Conduct.

The University of Western Ontario uses software for plagiarism checking. Students may be required to submit their written work and programs in electronic form for plagiarism checking.
