CMPT 441 - D100 Computational Biology

Instructor(s): Leonid Chindelevitch

SFU Burnaby

Calendar Objective/Description:
This course introduces students to the computing science principles underlying computational biology. The emphasis is on the design, analysis and implementation of computational techniques. Possible topics include algorithms for sequence alignment, database searching, gene finding, phylogeny and structure analysis.

Instructor’s Objectives:
The goal of this course is to provide a solid foundation in the algorithmic techniques, such as dynamic programming, graph theory and probabilistic modelling, that computational biologists use on a daily basis, as well as to create exposure to the practice of computational biology through the analysis of a biological dataset. The course targets both graduate and advanced undergraduate students in computing science, molecular biology, biochemistry, biophysics, mathematics and biostatistics with minimal or no background in computational biology. However, a basic knowledge of algorithm design and analysis is required.

Prerequisites:
CMPT 307. Students with credit for CMPT 341 may not take this course for further credit.

Topics:
- Sequence alignment: global, local and multiple alignment
- Probabilistic models: hidden Markov models, stochastic context-free grammars
- Secondary structure prediction: RNA and proteins
- Phylogenetics: inferring and analyzing evolutionary trees

Grading:
10% participation, 20% midterm, 30% assignments (best 3 out of 4), 40% team project. The team project will involve the analysis of a biological dataset provided by a life sciences faculty member. It will be evaluated via an oral presentation and a written report.

Recommended Books:

Academic Honesty Statement:
Academic honesty plays a key role in our efforts to maintain a high standard of academic excellence and integrity. Students are advised that ALL acts of intellectual dishonesty will be handled in accordance with the SFU Academic Honesty and Student Conduct Policies ( http://www.sfu.ca/policies/gazette/student.html ).