CMPT 441 - D100 Computational Biology

Instructor(s): Kay C Wiese

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:
This is an introductory course on fundamental algorithmic techniques used to solve computational problems encountered in molecular biology. The course will investigate both traditional deterministic algorithms such as dynamic programming as well as machine learning and AI methods in Computational Biology. We will focus on practical algorithmic solutions as well as theoretical challenges. The course will have a project based on student's choice.

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

Topics:
- Molecular biology basics
- Public Databases and Tools
- Sequence Analysis (local and global alignments)
- Multiple Sequence Alignments
- Dynamic Programming
- Markov Chains and Hidden Markov Models (HMMs)
- Sequence Similarity Search
- RNA secondary Structure Prediction
- Thermodynamic Models
- Machine Learning: Evolutionary Computation, Neural Networks

Grading:
Students must attain an overall passing grade on the weighted average of exams in the course in order to obtain a clear pass (C- or better). Details will be discussed in the first week of classes. There will be assignments and a project and also a midterm exam. Details will be discussed in class in the first week of classes.

Required Books:

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).