CSCI 451-551: Computational Biology
Fall 2023 Syllabus

Instructor: Dr. Brendan Mumey
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Office hours: Tue: 11am - 1:30pm, other times by appointment
NAH 253B

Lectures: Tue/Thu: 9:25 am - 10:40 am, Roberts Hall 210

Overview: This course covers classic and recent problems from computational biology and bioinformatics. It primarily deals with algorithms topics for genomic sequence data, e.g. indexing and searching the human genome. Other potential topics include protein structure prediction, regulatory networks and algorithms from systems biology.

The course is co-convened as an undergraduate and graduate course; specific requirements for each of the courses are described below.

Resources

Ecat (Brightspace): Used for class announcements and lab/hw submission, grades:

https://ecat.montana.edu

Google drive: Course documents such as the lecture schedule and homework will be stored in this google drive folder:

https://drive.google.com/drive/folders/1M3u9svs3HYfoTSQ_7Qdjim30qnlRPw5v?usp=sharing

Textbook

Wing-Kin Sung, *Algorithms in Bioinformatics: A Practical Introduction*, CRC Press
Textbook website: www.comp.nus.edu.sg/~ksung/algo_in_bioinfo/

MSU Bookstore Inclusive Access: You will get a digital copy of the book and will have it the first day of classes. The program grants access to the required course materials digitally by the first day of class at a discounted rate that the school and the bookstore have negotiated. *If for any reason the student decides to purchase the materials elsewhere, they can opt-out of the program by the add/drop deadline and their account will be refunded.*

Access via D2L: Content -> RedShelf Course Materials

Homework

Approximately every two weeks you will have a homework assignment. You are encouraged to work in groups (max 3 people). We will discuss the homework in a class and I may call on students to present their solutions. *Homework should be typed or neatly handwritten.* I recommend latex. (There is a free web version of latex at overleaf.com)

A note on Generative AI: do not turn in ChatGPT, etc.-created writing as your own. You may experiment with it but please cite and explain how you used it, if you decide to. Here is a bit more from the teaching perspective: https://www.montana.edu/facultyexcellence/teaching-advising/genai/index.html

451 Requirements

Students enrolled in 451 have the following requirements:

Paper summary/critique
Choose and read one bioinformatics-related research paper and write a 1+ page summary and critique (you may work with a partner). Email me the article beforehand for approval.
Some places to look for papers include: BCB, RECOMB, ISMB, BIBM, WABI (conferences), Nature Biotechnology, Bioinformatics (journals)

Alternative to the above: participate in one of the 551 research projects below.

Submit via Brightspace (due Dec 11 @ 11:59pm)

Grading Scheme	
Homework	55%
Exam 1	15%
Exam 2	15%
Paper critique	15%

551 Requirements

Students enrolled in 551 have the following requirements:

Topic presentation
Give a class presentation on an approved topic. The topic can be something we haven't covered from the textbook (or references) or a topic from one or more recent bioinformatics related conference or journal paper (talk to me for ideas). Students may work in teams of two on the presentation (individual presentations should be half a lecture period; joint presentations should cover a full lecture period).

Mini-research project

Based on one or two recent research papers related to computational biology, you will develop a mini-research project and present your results in a written report (3+ pages) and give a short presentation. May work in teams or individually. There are several different types of projects that could work:

a. Compare and contrast two or more papers on the same general topic.
b. Implement several algorithms for a bioinformatics problem and collect experimental results.
c. Work on some aspect of an unsolved or partially unsolved current research problem.

Submit via Brightspace (due Dec 14 @ 8:00am)

Grading Scheme

Homework	40%
Exam 1	15%
Exam 2	15%
Topic presentation	10%
Mini-research project	20%