Cornell College

CSC 358: Advanced Topics: Bioinformatics
Block 8 – 2024

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Class Meetings: Class will generally meet from 9-11 and 1-3 in West 200. Office hours will be held from 11-11:30 M, W, F and from 3-3:30 M, Th or by appointment (tinyurl.com/BookLJepsen)

Prerequisites: CSC140, or Instructor Permission

Course Description: Bioinformatics is the application of computational approaches to biological problems. This fast-growing field is becoming essential to biomedical research. This course will provide students with an introduction to the algorithms, tools, and computational methods used to analyze biological data. In this class, we will introduce many of the areas of study within the field of bioinformatics including genomics, proteomics, structural bioinformatics and statistics. Students who take this course will leave with the ability to analyze data in python and R, search databases, perform sequence alignments, and use online tools to analyze biological data.

Course Materials: A computer with connection to the internet.

Recommended Reading: None of the following are required reading, but all are useful for the learning of bioinformatics.

Bioinformatics Algorithms by Philip Compeau & Pavel Pevzner - Online Edition https://www.bioinformaticsalgorithms.org
Bioinformatics with Python Cookbook by Tiago Antao 2015 – eBook available through Cole Library.
Applied Bioinformatics by Paul M. Selzer, Richard J. Marhöfer and Oliver Koch 2018 – (ISBN: 978-3540838937)

Course Goals:

- Gain an understanding of the vast field of Bioinformatics and the varied areas of research (*Knowledge*)
- Develop the tools for reading scientific literature (*Inquiry*)
- Practice professional writing and speaking (*Communication*)
- Be able to analyze biological data using python and R (*Reasoning*)
- Be able to gather relevant data from biological databases (*Inquiry*)

Grading Policies:

- 15% Quizzes (Lowest grade dropped)
- 15% Homework (Lowest grade dropped)
- 15% Attendance/Participation

- 25% Final Project (including paper and presentation)
- 30% Exams

Grading Scale:

Percent	Letter Grade	73-76.99	C
93-100	A	70-72.99	C-
90-92.99	A-	67-69.99	D+
87-89.99	B+	63-66.99	D
83-86.99	B	60-62.99	D-
80-82.99	B-	below 60	F
77-79.99	C+		

Quizzes (15%):
Quizzes will be scheduled in advance throughout the block and will take place at the end of morning sessions. The lowest quiz grade will be dropped. If you miss a quiz, it is your responsibility to schedule a makeup time either during office hours or at the end of the following class session. Please arrange a makeup time by the end of the business day on the day of the missed quiz.

Homework (15%):
Homework assignments will include readings, writing prompts, and problem sets, providing a diverse range of tasks to reinforce your learning. Homework will be assigned most evenings, with a typical due time at the beginning of the following morning class. Detailed instructions and due dates for each assignment will be available on Moodle.

If you encounter difficulties with any assignment, please don't hesitate to contact me via email. Additionally, I'll allocate time at the beginning of class to address any additional questions you may have. It's important to emphasize that late submissions will not be graded unless prior arrangements have been made.

Attendance and Participation (15%):
Your learning experience will greatly benefit from attending all class sessions; therefore, attendance is mandatory. However, I understand that there may be valid reasons for missing class. If you need to miss either a lab or lecture, please notify me before the start of class.

Most afternoons, we will engage in lab assignments to delve deeper into concepts covered in lectures. If you miss a lab, you must complete the assignment before the next class session begins. Otherwise, labs will be completed and submitted in groups. They are graded on a credit/no credit basis. If you have made a genuine effort to complete the lab and actively participated in your groups, you will receive credit.

The final component of your attendance and participation grade will be a reflective response. You will be asked to write a paragraph reflecting on your participation and engagement throughout the block. In your reflection, consider both classroom participation and out-of-class work. Reflect on activities that aided your learning and those that hindered it. Finally, if you could redo the class, what changes would you hope to make?

Final Project (25%):
A goal of this course is to get you *doing* bioinformatics. To achieve this, you will undertake a group final project. Specific details and deadlines will be posted on Moodle as the block progresses.

Your final project will comprise two main components: a written paper (50% of the category grade) and a final presentation (35% of the category grade). Presentations will be scheduled during the 4th week of the block, while papers must be submitted by 1:00 pm on the 4th Wednesday of the block.

The remaining 15% of the category grade will be allocated to smaller assignments throughout the duration of the project, including a project proposal, periodic check-ins, and both group and self-evaluations.

Exams (30%):
Exams are schedule for the 2nd and 4th Wednesday of the block. Each exam will contribute 15% to your final grade. Details about format will be discussed in class no later than the Monday before the exam.

Academic Integrity and Honesty:

Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to explicitly acknowledge ideas, claims, observations, or data of others, unless generally known. When a piece of work is submitted for credit, a student is asserting that the submission is her or his work unless there is a citation of a specific source. If there is no appropriate acknowledgment of sources, whether intended or not, this may constitute a violation of the College's requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Catalogue, under the heading “Academic Honesty."

Mental Health

As a college student, you may sometimes experience stress, anxiety, or other mental health challenges that affect your mood, energy level, concentration, and mental ability. Cornell recognizes that you may experience these challenges and provides resources to help you take charge of your mental health and overall well-being. If you, a classmate, or a friend experience mental health challenges at Cornell, please check out the Counseling Center’s website (www.cornellcollege.edu/counseling) for many resources on and off campus, and you can call the Counseling Center at 319-895-4292 for more information or to make an appointment. Visit the Student Gateway (https://www.cornellcollege.edu/students/index.html) and the Cornell Well-being Network (https://www.cornellcollege.edu/well-being-network/) websites for additional student re-sources.

Disabilities and Accommodations
Cornell College makes reasonable accommodations for persons with disabilities. Students should notify the Office of Academic Support and Advising and their course instructor of any disability related accommodations within the first three days of the term for which the accommodations are required, due to the fast pace of the block format. For more information on the documentation required to establish the need for accommodations and the process of requesting the accommodations, see http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml.