Georgia State University — CSC 8540

Course Syllabus for CSC 8540: *Advanced Algorithms in Bioinformatics*

Fall 2024

Time

2:45pm–4:30pm on Tuesdays and Thursdays

Room

Langdale Hall, Room 229

Instructor

Name: Murray Patterson
Email: mpatterson30@gsu.edu
Office: 1 Park Place, Room 948E
Zoom: `https://gsu-edu.zoom.us/my/mpatterson30`

Office Hours

- Fridays from 1pm–3pm in my office or via Google Meet `https://meet.google.com/obq-wxfs-wdw` (I will also be online during this time)

- After class: I will remain in the classroom

- By appointment: please discuss with me or send me an email to arrange a time

Teaching Assistants (TAs)

Name: Sarwan Ali
Email: sali85@student.gsu.edu

Prerequisites

CSC 4520 with a grade of C or higher

Reference Materials *(not required)*

- Algorithms in Bioinformatics: A practical introduction. Wing-Kun Sung (Chapman & Hall/CRC, 2010)

- An Introduction to Bioinformatics Algorithms. N.C. Jones and P.A. Pevzner (MIT Press, 2004) **ISBN**: 0-262-10106-8

- Other online resources will be provided as the course proceeds

Course Content

Georgia State University iCollege — `https://icollege.gsu.edu`

Course Overview

Welcome to CSC 8540 at Georgia State University! This course will cover sequence similarity, DNA indexing, genome alignment, biological databases, multiple sequence alignment, the reconstruction and comparison of phylogenetic trees, genome rearrangment, motif finding, RNA structure prediction, peptide sequencing, and population genetics

Course Structure

- **Lecture** — Classes will be conducted in a traditional lecture format.

- **Homework** — Assignments will build on the lecture content.

- **Readings** — Course textbook pages, relevant articles and additional supporting content will be assigned for students to read.

- **Discussions** — Opportunities to share questions about key concepts, homework assignments, and more.

Grade Scale

Grade	Point Equivalent
A+	≥ 97
A	≥ 90
B+	≥ 87
B	≥ 80
C+	≥ 77
C	≥ 70
D	≥ 60
F	< 60

Grading (*subject to change*)

- Homework Assignments (50%)

- Course Project (50%)

Course Schedule (*subject to change*)

	Topic	Reading
Week 1	Syllabus and Introduction	
Week 2	Introduction to molecular biology	Ch. 1[†]
Week 3	Sequence similarity	Ch. 2
Week 4	DNA indexing: suffix trees	Ch. 3
Week 5	Genome alignment	Ch. 4
Week 6	Biological databases	Ch. 5
Week 7	Multiple sequence alignment	Ch. 6
Week 8	Phylogenetic trees: reconstruction	Ch. 7
Week 9	Phylogenetic trees: comparison	Ch. 8
Week 10	Genome rearrangment	Ch. 9
Week 11	Motif finding	Ch. 10
Week 12	RNA structure prediction	Ch. 11
Week 13	Peptide sequencing	Ch. 12
Week 14	Population genetics	Ch. 13
Finals	Project presentations	

[†] Algorithms in Bioinformatics: A practical introduction. Wing-Kun Sung (Chapman & Hall/CRC, 2010)

[‡] An Introduction to Bioinformatics Algorithms. N.C. Jones and P.A. Pevzner (MIT Press, 2004)

[§] Slides that will be provided as the course proceeds

Make-up Policy

Homework

Each homework assignment is due at the beginning of class on the due date.

Academic Honesty Policy

In academics, intellectual property is extremely important. This is one reason we hold students to the tenets of the Academic Honesty Policy — other topics related to student conduct are available at `https://codeofconduct.gsu.edu/`. But intellectual property goes beyond that when it comes to the materials created by your instructor and the publisher of your textbook. Your instructor has spent a great deal of time and energy developing materials for this course, and the publisher holds a copyright to all materials associated with the textbook. Please be aware that the GSU community takes this very seriously.

It is for this reason that GSU has a special policy regarding copyright, found at `https://cetl.gsu.edu/services/instructional-support/constructing-a-syllabus/`. This policy implies that the selling, sharing, publishing, presenting, or distributing of instructor-prepared course lecture notes, videos, audio recordings, or any other instructor-produced materials from any course for any commercial purpose is strictly prohibited unless explicit written permission is granted in advance by the course instructor (note that this includes homework assignments, labs, exams or their solutions). This includes posting any such materials on websites such as Chegg, Course Hero, OneClass, Stuvia, StuDocu and other similar sites, or using them as prompts in AI tools such as ChatGPT. Unauthorized sale or commercial distribution

of such material is a violation of the instructor's intellectual property and the privacy rights of students attending the class, and is prohibited.

Sharing of any materials from the textbook, such as questions from publisher provided quizzes, is likewise prohibited.

Course Evaluations

Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take the time to fill out the online course evaluation.

Extended Absences

For students, the Dean of Students' Office will continue to provide faculty with notifications when students file **Professor Notification of Absences (PNAs)**. This notification indicates that the Dean of Students office has reviewed the documentation related to a student's medical circumstances. For more information about this, and how to submit such a notification, see `https://deanofstudents.gsu.edu/student-assistance/#professor`.

Students with Disabilities

Students who wish to request accommodation for a disability may do so by registering with the Access and Accommodation Center. Students may only be accommodated upon issuance by the Access and Accommodation Center of a signed **Accommodation Plan** and are responsible for providing a copy of that plan to instructors of all classes in which accommodations are sought.

Basic Needs Statement

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable us to provide resources that we may possess. The Embark program at GSU provides resources for students facing homelessness and Panther's Pantry provides resources for students facing food insecurity.

Disclaimer

The course syllabus provides a general plan for the course — deviations may be necessary.