

Syllabus: CS 3824
Introduction to Computational Biology and
Bioinformatics
Fall, 2018

1 General Course Information

CRN	82722
MEETING TIME	11:00 AM–12:15 PM; Tuesdays and Thursdays
CLASSROOM	McBryde 216
FINAL EXAM	Monday, December 10, 1:05 PM–3:05 PM

Instructor: Lenwood S. Heath

- **Office:** 2160J Torgersen Hall
- **Office Hours:** 1:00–3:00, Tuesdays and Thursdays
- **Email:** heath@vt.edu

Teaching Assistant: Dhoha Abid

- **Office Hours Held in:** See Web site
- **Office Hours:** See Web site
- **Email:** dabid@vt.edu

Web Site: <http://courses.cs.vt.edu/cs3824/heath/Fall2018/index.php>

Canvas: <https://canvas.vt.edu/>

Piazza: <https://piazza.com/vt/fall2018/cs3824>

Prerequisites: CS 3114, Data Structures and Algorithms; minimum grade C

Required Textbook: An Introduction to Bioinformatics Algorithms. Neil C. Jones and Pavel A. Pevzner. MIT Press, 2004. ISBN: 978-0-262-10106-6.

2 Course Description

This course introduces computational biology and bioinformatics (CBB) through hands-on learning experiences. The emphasis is on problem solving in CBB, especially through algorithms and heuristics. The breadth of topics covered includes a subset of the following: structural bioinformatics; modeling biological networks; computational sequence analysis; algorithms for reconstructing phylogenies; randomized algorithms; and probabilistic models.

3 Grading Policy

Grading for the course is on a 1000-point scale, with the points distributed as follows:

Homework assignments: 6 at 80 points each	480
Team presentation:	120
Midterm exam: October 11, 2018	150
Final exam: Monday, December 10, 1:05 PM–3:05 PM	250

A typical homework assignment consists of 2 to 4 problems, posted on the course Web site approximately one week before the due date. All homework must be prepared with \LaTeX^1 or other word processing system and submitted as a PDF to Canvas by 5:00 PM on the due date². Also, any required drawings must be drawn in a drawing program, not scanned and inserted. **No late homework will be accepted.**

Team presentations occur in the last few weeks of the semester. Teams of two or three students will research a topic, typically based on some journal papers or other resources, and make a 20-minute presentation on that topic. Details will be posted on the course Web site.

¹See \LaTeX resources on the course Web site.

²See Calendar on the course Web site.

4 Grading Scale

Grade	Points
A	930–1000
A-	900–929
B+	870–899
B	830–869
B-	800–829
C+	770–799
C	730–769
C-	700–729
D+	670–699
D	630–669
D-	600–629
F	0–599

5 Readings

For most classes, there is a reading assignment (see Section 8) to be completed by class time. Each assignment consists of sections in the textbook or other materials provided on the course Web site.

6 Ethics

The Honor Code applies. All work submitted must be the student's own work. Students may solicit help only from the instructor or the teaching assistant.

Lecture notes, assignments, quizzes, tests, exams, solutions, and other materials distributed to or generated in this class are intended for use only by students enrolled in this CRN (section) this semester. Without the teacher's written permission, no one may show, give, or otherwise make such class materials available to anyone not enrolled in this CRN this semester. Prohibited activities include, but are not limited to, uploading a test, uploading solutions to problems, and submitting such class materials for online posting. The prohibition on sharing solutions applies to all solutions, regardless of who wrote the solutions.

The Undergraduate Honor Code pledge that each member of the university community agrees to abide by states: **“As a Hokie, I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do.”**

Students enrolled in this course are responsible for abiding by the Honor Code. A student who has doubts about how the Honor Code applies to any assignment is responsible for obtaining specific guidance from the course instructor before submitting the assignment for evaluation. Ignorance of the rules does not exclude any member of the University community from the requirements and expectations of the Honor Code. For additional information about the Honor Code, please visit: www.honorsystem.vt.edu.

If you have questions or are unclear about what constitutes academic misconduct on an assignment, please speak with me. I take the Honor Code very seriously in this course. The normal sanction I will recommend for a violation of the Honor Code is an F* sanction as your final course grade. The F represents failure in the course. The “*” is intended to identify a student who has failed to uphold the values of academic integrity at Virginia Tech. A student who receives a sanction of F* as their final course grade shall have it documented on their transcript with the notation “FAILURE DUE TO ACADEMIC HONOR CODE VIOLATION.” You would be required to complete an education program administered by the Honor System in order to have the “*” and notation “FAILURE DUE TO ACADEMIC HONOR CODE VIOLATION” removed from your transcript. The F however would be permanently on your transcript.

7 Announcement

If any student needs special accommodations because of a disability, please contact the instructor during the first week of classes.

8 Course Schedule

DATES	READING ASSIGNMENT	TOPICS
AUGUST		
8/20–8/24	Chapters 1, 2, 3	Introduction and molecular biology
8/27–8/31	Chapter 4	Restriction mapping; motif finding
SEPTEMBER		
9/3–9/7	Chapter 5	Sorting by rearrangements
9/10–9/14	Chapter 6	Sequence comparison and alignment
9/17–9/21	Chapter 6	Optimal global and local alignment; BLAST
9/24–9/28	Chapter 9	Exact pattern matching; suffix trees
OCTOBER		
10/1–10/5	Chapter 11	Hidden Markov models
10/8–10/12	Chapter 11	Hidden Markov models
10/11	Midterm	In class: Topics through Chapter 9
10/15–10/19	Chapter 12	Randomized algorithms; Gibbs sampling
10/22–10/26	Chapter 8	Graph algorithms; sequence assembly
NOVEMBER		
10/29–11/2	Online	Short read mapping; RNA-Seq
11/5–11/9	Chapter 10	Phylogenetic trees
11/12–11/16	Chapter 10	Phylogenetic trees; in-class presentations
11/19–11/23	THANKSGIVING BREAK	
11/26–11/30		In-class presentations
DECEMBER		
12/4	Last Day of Class	In-class presentations; course wrap-up
12/10	Final	1:05 PM–3:05 PM: Comprehensive exam

END OF SYLLABUS