

**Syllabus: CS 5984**  
**Algorithms in Bioinformatics**  
**Fall, 2000**

<http://courses.cs.vt.edu/~algnbio>

**Instructor: Lenwood Heath**

- **Office:** 638 McBryde Hall
- **Office Hours:** Monday and Wednesday, 1:15-3:00 PM
- **EMAIL:** [heath@cs.vt.edu](mailto:heath@cs.vt.edu)

**Class Meets: McBryde 232, MWF 12:20–1:10 PM**

**Exams**

Midterm Exam	Monday, October 16, 12:20–1:10 PM
Final Exam	Thursday, December 14, 10:05-12:05

**Index Number: 95897**

**Prerequisites:**

- Data Structures (CS 2604) required
- CS 4104, Data and Algorithm Analysis, highly desirable
- Some familiarity with molecular biology a definite advantage

**Textbooks:**

**Gus** *Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology*, Dan Gusfield, Cambridge University Press, 1997.

**S&M** *Introduction to Computational Molecular Biology*, Setubal and Meidanis, PWS Publishing Company, 1997.

**On Reserve:**

For current list, see class web site.

## Description

This course emphasizes algorithms to solve problems found in biology, especially molecular biology. A variety of current problems in computational molecular biology will be introduced, investigated, analyzed for computational complexity, and solved with efficient algorithms, when feasible. A number of such problems will be shown to be NP-complete or other evidence of their difficulty will be presented.

## Grading Policy

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

<b>Homework assignments—12 at about 50 points each</b>	600
<b>Midterm exam—October 16, 12:20-1:10 PM</b>	150
<b>Final exam—December 14, 10:05-12:05</b>	250

A typical homework assignment consists of 2 or 3 problems, some from one of the texts and some not. All homework must be prepared with L<sup>A</sup>T<sub>E</sub>X or other word processing system and submitted as a stapled printout to a box outside the instructor's office (McBryde 638). Homework is due at 5:00PM on the due date (see course calendar). **No late homework will be accepted.**

## Ethics

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

## Announcement

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

**Intended Topics**

<b>Gus CHAPTER</b>	<b>S&amp;M CHAPTER</b>	<b>TOPIC</b>
	1	Introduction to Molecular Biology.
	2	Computer Science and Bioinformatics
1		Exact Matching: First Algorithms
2.1–2.3		Exact Matching: Classical Algorithms
3		Exact Matching: A Deeper Look
5		Suffix Trees
6.1–6.2		Linear-Time Construction of Suffix Trees
7		Selected Applications of Suffix Trees
10		The Importance of Sequence Comparison in Molecular Biology
11	3.1–3.2	Core String Edits, Alignments, and Dynamic Programming
12	3.3	Refining Core String Edits and Alignments
14	3.4	Multiple String Comparison
15	3.5	Sequence Databases and BLASTing — FASTA, too
16	4 and 5	Selected Sections, as Time Allows
17	6	Evolutionary or Phylogenetic Trees, as Time Allows

END OF SYLLABUS