

Computer Science/Biology 106: Life as an Algorithm

Instructor: Duane A. Bailey (bailey@cs.williams.edu)
 Office: 306 Thompson Physics Laboratory (x2417)
 Office Hours: any time outside of class
 Readings: To be supplied via the Web
 Web site: <http://www.cs.williams.edu/LAAA/>
 Lecture: Tuesday and Thursday, 8:30–9:45 A.M., Chemistry 206
 Lab Time: Thursday, 1:10-2:25 P.M. or 2:35-3:50 P.M., TCL 217a.
 Lab Code: 710395

Course Overview

Can computers reproduce? Can DNA compute? Can evolution give us hints on solving big problems? Is life's blueprint inefficient? This course looks at the way computers are shaped by biological thinking, and the way that biologists make use of computational theories. Topics range from artificial life to identification of genes to the susceptibility of machines to viruses. Lectures investigate new and novel ways of thinking about computers and biology. Labs experiment with parameters of problems of common interest to computer scientists and biologists. Students will learn to use common programming tools to aid in the manipulation and analysis of basic biological data.

Evaluation will be based on performance on problem sets and laboratory assignments (50%), and examinations (50%). No prerequisites. No programming or biology skills are assumed. This course is not open to students who have completed Computer Science 136 or above.

A Schedule of Classes

Lecture	Date	Topic	Lecture	Date	Topic
1	September 7	Introduction	14	October 26	MIDTERM
LAB	September 7	Accounts	15	October 31	Logic
2	September 12	Computation	16	November 2	Signaling & Switching
3	September 14	Turing Computation	LAB	November 2	Digital Logic
4	September 19	String Biology	17	November 7	The Neuron
5	September 21	Synthetic Biology	18	November 9	Vision
—	September 22	Drew Endy Talk (MIT)	LAB	November 9	Image Filters
6	September 26	Sequencing & Assembly	19	November 14	Morphogenesis
7	September 28	Shotgun Sequencing	20	November 16	L-Systems
LAB	September 28	Dynamic Programming	LAB	November 16	Growth & Fractal Dimension
8	October 3	Evolution & Genetic Algorithms	21	November 21	Protein Folding
9	October 5	Shannon Theory	—	Thanksgiving	Protein Consumption
LAB	October 5	Applied GA's	22	November 28	DNA Computation
10	October 12	Kolmogorov's Theory	23	November 30	DNA Computation II
LAB	October 12	Compression & Redundancy	LAB	November 30	DNA Computation
11	October 17	Cellular Automata	24	December 5	Viruses
12	October 19	Cellular Automata II	25	December 7	Computer Viruses
LAB	October 19	Life & Ants	LAB	December 7	Review Session
13	October 24	Review Session	Final	December	Scheduled Final

Honor Code Guidelines for Computer Science Courses

The Honor Code as it applies to non-programming assignments is outlined in the Student Handbook.

For programming assignments in Computer Science courses, the honor code is interpreted in very specific ways. When a program is assigned, your instructor will identify it as a practice, test, laboratory, or team program. The Honor Code applies differently to each:

Practice Programs. These are provided to help you gain an understanding of a topic, and are not graded.

Guideline: Help on these programs is unrestricted.

Test Programs. Any assignment designated as a test program is to be treated exactly as a take-home, open-book test. You are allowed to read your textbook, class notes, and any other source approved by your instructor. You may not consult anyone other than your instructor. The instructor encourages the asking of questions, but reserves the right not to answer, just as you would expect during an exam.

Guideline: Any work that is not your own is considered a violation of the honor code.

Laboratory Programs. Laboratory programs are expected to be the work of the individual student, designed and coded by him or her alone. Help locating errors is allowed, but a student may only receive help in correcting errors of syntax; help in correcting errors of logic is strictly forbidden.

Guideline: Assistance in the design or coding of program logic will be considered a violation of the honor code.

Team Programs. Team programs are laboratory or test programs to be worked on in teams of two or more students. You are allowed to discuss team programs with your partners, but work with others is otherwise restricted by the appropriate rules above.

Guideline: Any work that is not the work of your team is considered a violation of the honor code.

If you do not understand how the honor code applies to a particular assignment, consult your instructor.

Students should be aware of the Computer Ethics outlined in the Student Handbook. Violations (including uninvited access to private information and malicious tampering or theft of computer equipment or software) are subject to disciplinary action.

Guideline: To protect your work dispose of printouts and diskettes carefully, and avoid leaving your programs on hard disks in labs and other public storage areas.

The Department of Computer Science takes the Honor Code seriously.

Violations are easy to identify and will be dealt with promptly.

Department of Computer Science