CSE 308-408
Bioinformatics: Issues and Algorithms

Spring 2007 • TuTh 2:35 pm – 3:50 pm • Packard Lab 258

Instructor **Professor Daniel Lopresti**
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Office Hours 4:00 – 6:00 Th (or by appointment)

Biology Advisor **Professor Jutta Marzillier**
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Textbooks *An Introduction to Bioinformatics Algorithms*, Neil C. Jones and Pavel A. Pevzner
MIT Press, ISBN 0-262-10106-8. (IBA)

Bioinformatics Biocomputing and Perl, Michael Moorhouse and Paul Barry
John Wiley & Sons, ISBN 047085331X. (BB&P)

Blackboard Lecture slides, assignments, etc. will be available @ http://ci.lehigh.edu

Grading
- Homework assignments =   250 points
- Programming assignments =   250 points
- Final project or paper =   500 points
- Scribe duty (CSE 408 only) =   100 points

Notes
- Homework / programming assignments will generally be posted to Blackboard by 9:00 am and due by 5:00 pm on the specified day. Carefully follow all instructions when naming your programs and submitting your work.
- Assignments turned in up to one week late will received ½ credit. After that point, no credit will be given. Extensions must be approved by Professor Lopresti.
- If you already consider yourself proficient in Unix and Perl programming, you may choose to skip the lectures marked with an asterisk (*). Please skim the indicated reading, however, and review the lecture notes online in Blackboard.

Date	Topics	Readings	Activities
Tu 1/16	Course introduction		
Th 1/18	Intro to molecular biology	IBA 3, BB&P 1	
	genetics and genomes, analyzing DNA		
Tu 1/23	Intro to algorithms	IBA 2, BB&P 2	
	correctness, recursion, iteration, time complexity		
Th 1/25	Intro to Unix; Perl programming 1 *	BB&P 3-4	
	getting started, control flow, variables, arrays, hashes		
Tu 1/30	Perl programming 2 *	BB&P 5-6	HW #1 out
	subroutines, scoping rules, file I/O		
Th 2/1	Sequencing (Prof. Marzillier)	Reading TBA	
Tu 2/6	Perl programming 3	BB&P 7-8	
	pattern matching, regular expressions, sorting		
Th 2/8	Restriction mapping	IBA 4.1-4.3	HW #1 due
	biology, full and partial digests, brute-force and practical algorithms		
Tu 2/13	Motifs, search trees	IBA 4.4-4.9	HW #2 out
	regulatory motifs, profiles, search trees, motif-finding		
Th 2/15	Genome rearrangements	IBA 5	
	biology, sorting by reversals, greedy and approximation algorithms		

Date	Topics	Readings	Activities
Tu 2/20	Sequence comparison & alignment 1 *biology, comparison models, dynamic programming, global alignment*	IBA 6.1-6.7	
Th 2/22	Sequence comparison & alignment 2 *local alignment, gap penalties, multiple alignment*	IBA 6.8-6.10	HW #2 due
Tu 2/27	Sequence comparison & alignment 3 *saving time and space, divide-and-conquer*	IBA 7	HW #3 out
Th 3/1	Sequencing & assembly 1 *biology, graph theory, shortest superstrings, sequencing by hybridization*	IBA 8.1-8.9	
Tu 3/6	Spring break		
Th 3/8	Spring break		
Tu 3/13	Sequencing & assembly 2 *protein sequencing, spectral analysis*	IBA 8.10-8.15	
Th 3/15	Genetic pattern matching 1 *repeat-finding, suffix trees*	IBA 9.1-9.5	HW #3 due
Tu 3/20	Genetic pattern matching 2 *heuristics: FASTA and BLAST*	IBA 9.6-9.8	HW #4 out
Th 3/22	Tools, datasets, and applications *EMBL/GenBank, SWISS-PROT/PIR, ClustalW, BLAST*	BB&P 17-18	
Tu 3/27	DNA microarrays (Prof. Marzillier)	Reading TBA	
Th 3/29	Clustering for expression analysis *biology, hierarchical clustering, k-means*	IBA 10.1-10.4	HW #4 due
F 3/30			Project proposals due
Tu 4/3	Evolutionary trees 1 *biology, distance-based tree reconstruction, additive trees*	IBA 10.5-10.7	HW #5 out
Th 4/5	Evolutionary trees 2 *character-based tree reconstruction, parsimony (small and large)*	IBA 10.8-10.11	
Tu 4/10	Proteomics (Prof. Marziller)	Reading TBA	
Th 4/12	No class: inauguration of President Gast		HW #5 due
Tu 4/17	RNA and protein structure prediction *RNA secondary structure prediction, protein threading*	Reading TBA	
Th 4/19	Bioethics	Reading TBA	
Tu 4/24	History of the Genetic Code	Reading TBA	
Th 4/26	Student final project presentations		
F 4/27			Final projects due

University Policy on Disabilities If you have a disability for which you are or may be requesting accommodations, please contact both your professor and the Office of Academic Services, Room 212, University Center or call (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

Academic Integrity The work you submit in CSE 308-408 must be entirely your own. While we encourage you to discuss basic concepts and strategies with friends and classmates, the copying or sharing of solutions to homework or programming assignments, or of final papers or projects, is never acceptable. Such cases will be referred to the University Committee on Discipline and, if found guilty, you may be given the failing grade WF in the course.

You should keep in mind that computer programs exhibit an individual's "style" just as much as other forms of authorship. Changing variable names, editing comments, or making other trivial updates in an attempt to hide plagiarism is rarely effective.

If you have questions about this policy at any point throughout the semester, ask. It is far better to be safe than sorry when your academic career may be on the line.