BIO 511: Advanced Bioinformatics - Spring 2014

(February 12, 2014)

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Lecture: Wed 10:40-13:30 FENS L047

Evaluation:

Homework/recitation/quizzes	25 %
Exam 1 (take-home)	25 %
Exam 2 (take-home)	25 %
Final exam (in-class)	25 %

Textbooks:

1. James Tisdall, *Beginning Perl for Bioinformatics*, O'Reilly, 2001.

2. Donald Forsdyke, *Evolutionary Bioinformatics*, Springer, 2011.

3. Jonathan Pevsner, *Bioinformatics and Functional Genomics*, Wiley-Blackwell, 2009.

Detailed Course Content:

	lecture topic	*recitation activity*
Feb 12	General information about the course HW1: What's in a PDB file	*Visualizing the molecules of life (VMD)*
Feb 19	Chargaff's first and second parity rules HW2: Counting nucleotide pairs and triplets	*Testing Chargaff's second rule (Perl)*
Feb 26	DNA and RNA double helices HW3: Conformational transition of a protein	*Morphing double helices (Perl, VMD)*
Mar 5	Poisson distribution, language, and the coding problem HW4: Analysis of DNA and protein sequences of viruses	*Pair probabilities as hash (Perl)*
Mar 12	The genetic code and open reading frames HW5: Finding proteins in *E. coli*'s genome	*Finding open reading frames*
Mar 19	Markov chain models and DNA sequence HW6: Random DNA sequence with structure	*Mutating DNA sequences (Perl)*
Mar 26	RNY codon rule: Remnant of a comma-free code?	*Exploring the RNY codon rule*
	Exam 1 (take-home) Mar 27 - Apr 2	
Apr 2	Introduction to sequence alignment	Dynamic programming
Apr 9	Semiglobal and local alignment	*Aligning nucleotide sequences*
Apr 16	Semester Break	
Apr 23	National Holiday	
Apr 30	Amino acid substitution matrices	*Aligning protein sequences*
May 7	Building a tree from similarity scores	*Writing your UPGMA code*
May 14	Profiles and multiple sequence alignment	*Your first phylogenetic tree*
May 21	Multiple sequence alignment (cont.)	*Your first multiple sequence alignment*
	Exam 2 (take-home) May 22 - May 26	