BIOL-530/630
Bioinformatics Algorithms
Spring 2025

Day	Date	What are we doing in class today?	Assignments	Core Concept
Tuesday	Jan 14	Sequence scavenger hunt: asynchronous activity	Discussion 1 Activity 1	Intro Bibliography Software available Key definitions about search algorithms and biological databases
Thursday	Jan 16	Introductions, Syllabus review, Introduction to Bioinformatics Algorithms	Introduce yourself Software Bioinformatic Server Quiz 1	
Tuesday	Jan 21	Sequence alignment Pairwise/Multiple	Quiz 2	Nucleotide & amino acid alignments (global vs. local) Alignment parameters Consensus sequence Gap penalties
Thursday	Jan 23	Pairwise alignment DotPlots Alignment scores Global alignment	Discussion 2 Activity 2	
Tuesday	Jan 28	Sequence alignment and database search BLAST / FASTA	Quiz 3	Heuristic search High-scoring segment pair (hsp) Database sequences
Thursday	Jan 30	Basic Local Alignment Search Tool (BLAST)	Discussion 3 Activity 3	
Tuesday	Feb 4	Phylogenetics Substitution matrices Distance-based methods	Quiz 4	Scoring matrices Nucleic acid substitution models Phylogenetic tree
Thursday	Feb 6	Phylogenetic analysis	Discussion 4 Activity 4	
Tuesday	Feb 11	Phylogenetics Character-based methods	Quiz 4	Distance vs. character based phylogenetic tree Parsimony Bootstrapping
Thursday	Feb 13	Phylogenetic analysis	Discussion 5 Activity 5	
Tuesday	Feb 18	Genome comparisons	Quiz 5	Synteny

Thursday	Feb 20	Genome similarity	Discussion 6 Activity 6	Insertion/deletion Genome Synteny
Tuesday	Feb 25	Functions of genes: knowledge bases	Quiz 6	Gene ontology Biological annotations
Thursday	Feb 27	EXAM 1		
Tuesday	Mar 4	GO enrichment	Discussion 7 Activity 7	Enrichment analysis
Thursday	Mar 6	Pattern matching algorithms	Quiz 7 Discussion 8 Activity 8	Types of algorithms Motif Sequence search
Tuesday	Mar 11	Spring Break - No Class		
Thursday	Mar 13	Spring Break - No Class		
Tuesday	Mar 18	RNA secondary structure	Quiz 8	Secondary structures RNA functionality
Thursday	Mar 20	RNA folding	Discussion 9 Activity 9	RNA secondary structure prediction
Tuesday	Mar 25	Hidden Markov Models Gene Finding in prokaryotes	Quiz 9	Application of HMMs into biology
Thursday	Mar 27	Open reading finder	Discussion 10 Activity 10	Prokaryotic gene finder
Tuesday	Apr 1	Intro to High Throughput Sequencing (HTS) Technologies/platforms	Quiz 9	Advantage and implementation of HTS
Thursday	Apr 3	HTS overview	Discussion 11 Activity 11	Sequence analysis and interpretation
Tuesday	Apr 8	HTS Assembly	Quiz 10	de Bruijn graphs
Thursday	Apr 10	HTS Genome Assembly	Discussion 12 Activity 12	Genome assembly
Tuesday	Apr 15	HTS Alignment RNA-seq	Quiz 10	Transcriptome analysis
Thursday	Apr 17	EXAM 2		
Tuesday	Apr 22	Final Project Q & A		
Thursday	Apr 24	Final Project Draft		

Tuesday	Apr 29	Final Project Q & A		
Thursday	May 1	Final Project due		