CIS798 / Biol697/890 Discovering Genomics and Bioinformatics

Syllabus – Spring 2007

CIS798 / Biol 697/890 Discovering Genomics and Bioinformatics (4) A problem solving approach to understanding genomics and bioinformatics. Practical use of databases and web-based tools used to study biological problems. Pr. Biol 450, or CIS522 and 575 and consent of instructor.

Website: http://www.cis.ksu.edu/~dcaragea/bioinf

Instructors:

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Line Schedule: Lectures: MWF 9:30 – 10:20 AM
Lab: W 1:10 – 3:20 PM

Textbook: *Discovering Genomics, Proteomics, and Bioinformatics, 2nd Edition*
AM Campbell & LJ Heyer, Pearson/Benjamin Cummings, CSHL Press, 2007
ISBN: 0-8053-8219-4 (paperback)

Textbook Website: *http://www.aw-bc.com/geneticsplace/* ***(purple cover)***

Tentative **Lecture Schedule**

#	Date	Day	Topic & Text Chapter	Reading /URLs *(before lecture)*
1	Jan 12	F	**What is Bioinformatics?**	None
-	**Jan 15**	**M**	**NO CLASS - University Holiday**	
2	Jan 17	W	***Case Study: What's Wrong with My Child*** ***Chp 1*** 1st Patients	***Chp 1*** pp iii-9
3	Jan 19	F	Next Steps in Understanding the Disease	pp 9-19
4	Jan 22	M	***Review: Basic Genetics***	
5	Jan 24	W	***Review: Basic Molecular Biology***	
6	Jan 26	F	***Review: Basic Biochemistry***	
7	Jan 29	M	Case Study Revisited: Status of DMD	pp 20-29
8	Jan 31	W	***Genome Sequence Acquisition*** ***Chp 2*** How Are Genomes Sequenced ***2.1***	***Chp 2*** pp 34-59
9	Feb 2	F	***Can We Predict Protein Function?***	
10	Feb 5	M	What Have We Learned for Unicellular Genomes? ***2.2***	pp 59-83
11	Feb 7	W		
12	Feb 9	F	What Have We Learned from Metazoan Genomes? ***2.3***	pp 83-109
13	Feb 12	M		

14	**Feb 14**	**W**	**Midterm Exam #1**		***Chps 1 - 2***
15	Feb 16	F	***Comparative Genomics in Evolution & Medicine***	***Chp 3***	***Chp 3***
			Comparative Genomics	***3.1***	
16	Feb 19	M	Evolution of Genomes	***3.2***	
17	Feb 21	W	Genomic Identifications	***3.3***	
18	Feb 23	F	Biomedical Genome Research	***3.4***	
19	Feb 26	M	***Genomic Variations***	***Chp 4***	***Chp 4***
			Environmental Case Study	***4.1***	
20	Feb 28	W	Human Genomic Variation	***4.2***	
21	Mar 2	F	Ultimate Genomic Phenotype - Death?	***4.3***	
22	Mar 5	M	Ethical Consequences of Genetic Variation	***4.4***	
23	Mar 7	W	***Why Can't I Just Take a Pill to Lose Weight?***	***Chp 5***	***Chp 5***
24	Mar 9	F	***Basic Research with Microarrays***	***Chp 6***	***Chp 6***
			Introduction to Microarrays	***6.1***	
25	Mar 12	M	Alternative Uses of DNA Microarrays	***6.2***	
26	Mar 14	W	***Applied Research with DNA Microarrays***	***Chp 7***	***Chp 7***
			Cancer & Genomic Microarrays	***7.1***	
27	Mar 16	F	Improving Health Care with DNA Microarrays	***7.2***	
-	**Mar 19-23**		**NO CLASS – Student Holiday**		
28	Mar 26	M	***What Have We Learned from Microarrays?***		
29	**Mar 28**	**W**	**Midterm Exam #2**		***Chps 3 - 7***
30	Mar 30	F	***Proteomics***	***Chp 8***	***Chp 8***
			Introduction - Protein Functions	***8.1***	
31	Apr 2	M	Protein 3D Structures	***8.2***	
32	Apr 4	W	***Can We Predict Protein Structure from Sequence?***		
33	Apr 6	F	Protein Interaction Networks	***8.3***	
34	Apr 9	M	Measuring Proteins	***8.4***	
35	Apr 11	W	***Can We Predict Protein Interactions/Functions?***		
36	Apr 13	F	***Why Can't We Cure More Diseases?***	***Chp 9***	***Chp 9***
37	Apr 16	M	***Genomic Circuits in Single Genes***	***Chp 10***	***Chp 10***
			Dissecting a Gene's Circuitry	***10.1***	
38	Apr 18	W	Integrating Single-Gene Circuits	***10.2***	
39	Apr 20	F	***Integrated Genomic Circuits***	***Chp 11***	***Chp 11***
			Natural Gene Circuits	***11.1***	
40	Apr 23	M	Synthetic Biology	***11.2***	
41	Apr 25	W	***Modeling Whole-Genome Circuits***	***Chp 12***	***Chp 12***
			Is Genomics a New Perspective?	***12.1***	
			Can We Model Entire Euks with Systems Approach?	***12.2***	
			Will Systems Biology Go Systemic?	***12.3***	
42	Apr 27	F	**Team Project Presentations**		
43	Apr 30	M	**Team Project Presentations**		
44	May 2	W	**Team Project Presentations**		
45	May 4	F	**Team Project Presentations**		
46	?		**FINAL EXAM**		

Tentative Lab Schedule

#	Date (Wed)	Topics	Reading & Exercises
1	Jan17	NCBI - Sequence Databases & Tools ISU Centers, Databases, Servers, Software	Lab 1
2	Jan 24	Structure Databases & Visualization (PDB, PyMol, JMol, Cn3D, STING)	Lab 2
3	Jan 31	Sequence Alignment & Analysis (BLAST, FASTA, Gene Prediction)	Lab 3
4	Feb 7	Protein Function Prediction (Sequence-based, Structure-based)	Lab 4
-	Feb 14	***Independent Projects***	-
5	Feb 21	Comparative Genomics	Lab 5
6	Feb 28	Phylogenetic Analysis (CLUSTAL, PHYLIP)	Lab 6
7	Mar 7	Genome Viewers, SNP Analysis	Lab 7
8	Mar 14	Microarray Analysis	Lab 8
-	Mar 21	***Student Holiday***	-
-	Mar 28	***Independent Projects***	-
9	Apr 4	Protein Structure Prediction	Lab 9
10	Apr 11	Proteome Analysis	Lab 10
11	Apr 18	Network & Pathway Analysis	Lab 11
12	Apr 25	Independent Projects Team Meetings	-
13	**May 2**	**Review**	-