Course Syllabus

BIOS 427/827 Bioinformatics Laboratory

Spring 2005

Instructors:

Name	Guoqing Lu	Etsuko Moriyama	Hideaki Moriyama
Office	Beadle E115	Beadle N107	Hamilton 29B
Phone	2-4982	2-4979	2-5367
Email	glu3@unl.edu	emoriyama2@unl.edu	hmoriyama2@unl.edu
Office hours	Contact before you visit instructors		

Meetings:

Time: Fridays, 12:00 - 2:20 PM
Place: Keim Hall 210

Credits: 3 credits

Prerequisites: BIOS 301 and BIOC 431/831, or equivalent, or permission

Text books (recommended):

1) Introduction to Bioinformatics: A Theoretical and Practical Approach, 2003. Stephen A. Krawetz and David D. Womble. Humana Press Inc., Totowa, NJ.
2) Introduction to Protein Structure. Second Edition. 1999. Carl Branden and John Tooze. Garland Pub., New York, NY.

Course description:

This computer laboratory course will provide students basic knowledge and practical skills needed for general bioinformatics, genomics, and proteomics analyses. The topics covered include: biological databases, molecular biology tools (*e.g.,* primer design, contig assembly), gene prediction/mining, database searches, pairwise and multiple alignments, phylogenetic inference, microarray data analyses, protein molecular graphics, and protein structure modeling. Both commonly used and specialized software (*e.g.,* GCG, Vector NTI, Entrez, BLAST, ClustalX, Phylip, PyMOL, SwissPDBviewer) will be illustrated and exercised in the class. No programming skill is required.

Practiced goal of the course:

After the completion of this practical course, students should be able to choose and use various bioinformatics and genomics tools properly by themselves. Various software including many freely available on the web and commonly used in bioinformatics and genomics

laboratories will be introduced. Students will be able to apply the techniques and skills they learned immediately in their own research.

Throughout the course, we emphasize particularly:

1) to let students understand basic bioinformatics methods employed in a variety of programs, and
2) to let students exercise and get familiarized with commonly used bioinformatics tools that will facilitate their own bioinformatics/genomics research.

Course requirements:

Besides attending each class, students are required to complete 6 take-home assignments and to design and implement a small research project. The assignments are designed for students to obtain practical experience with popular bioinformatics tools and for the lecturers to test whether students do understand the bioinformatics algorithms learned in the class. The small research project will be defined by the students in order to solve practical problems they may encounter in their current or future research. The students are required to present the project in class and to submit a final report.

Grading:

Homework Assignments: 60% (6 assignments, 10% each)
Research Project: 40% (oral presentation)

Course Schedule:

Week	Date	What to lecture	Who
1	Jan. 14	Introduction	Lu
2	Jan. 21	Biological Databases (*e.g.,* Entrez)	Lu
3	Jan. 28	Database searches (BLAST and FASTA)	Lu
4	Feb. 4	Molecular construction and primer design (*e.g.*, VectorNTI, Primer3)	Lu
5	Feb. 11	Fragment assembly and gene finding (*e.g.*, Staden, GCG, VectorNTI,)	Lu
6	Feb. 18	Functional annotation of protein sequences (*e.g,.* Pfam)	Lu
7	Feb. 25	Microarray data analysis (*e.g.*, Affymetrix Data Mining Tool)	Lu
8	March 4	Multiple alignment by clustalw	E. Moriyama
9	March 11	Phylogenetic reconstruction by clustalw and phylip	E. Moriyama
10	March 18	Spring Vacation	
11	March 25	Secondary structure of proteins	H. Moriyama

12	April 1	Protein Data Bank	H. Moriyama
13	April 8	Molecular modeling	H. Moriyama
14	April 15	Molecular docking	H. Moriyama
15	April 22	Presentation of projects	Students
16	April 29		