CGS 5166: Bioinformatics Tools [2 credits]
Spring 2005: Tu 11-12:15 in ECS 141
Instructor: Prof. Giri Narasimhan

Justification & Course Overview

This is an introductory graduate course in the use of Bioinformatics tools. It is meant for graduate students whose major is **not** Computer Science. No background in Computer Science will be expected. The idea is to introduce students to standard tools and techniques used in Bioinformatics. Targeted students include graduate students doing research in many areas of Biological Sciences such as Moleclular Biology, Immunology, Cell Biology, Biochemistry, and Pharmacology.

Prerequisite Knowledge

Introductory graduate course in Molecular Biology (PCB 6025 or equivalent), or permission of instructor.

Topics

- Fundamentals of Biology, Statistics, and the Internet
- Overview of Bioinformatics, Computational Biology and Biotechnology
- Databases & Software Packages: GenBank, SWISSPROT, BioPerl.
- Sequence Alignment & Multiple Sequence Alignment: BLAST, CLUSTAL.
- Phylogenetic Analysis: CLUSTALW, Phylip, PAUP, LAMARC.
- Sequencing and Mapping: Genotyper, Mapmaker.
- Pattern Discovery Techniques: TEIRESIAS, GYM.
- Machine Learning & Predictive Methods: Neural Networks, Hidden Markov Models (HMMPro), Self-Organizing Maps (GeneCluster), Support Vector Machines.
- Molecular Structural Alignment, Analysis & Visualization: DALI, RASMOL, CN3D
- Microarray Data Analysis: CLUSTER, SAM, GeneCluster, TreeView.
- Detection tools for Transcription Factor Binding Motifs: AlignACE, MEME, Weeder, Consensus, MotifRegressor.

Evaluation will include several homework assignments, exams, and a semester project.

Texts and/or References

- *Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins*, Eds. A. D. Baxevanis and B. F. Ouellette, Wiley Interscience, 3rd ed., **ISBN**: 0471478784, 2005.
- **[Reference]** *Bioinformatics – Sequence & Genome Analysis,* David Mount, CSHL Press, Paperback, 2nd ed., 2004, **ISBN:** 0879697121

Course web page: http://www.cs.fiu.edu/~giri/teach/5166S05.html