

## ***Genomics and Applied Bioinformatics Biol 4150/8803B, Fall 2008***

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***Textbook:*** Zvelebil and Baum, *Understanding Bioinformatics*, Garland Science, 2008

***Alternate Testbook:*** Pevsner, *Bioinformatics and Functional Genomics*, Wiley-Liss, 2003.

***Additional readings:*** Several journal articles will be posted as PDF files on the course T-square site.

***Recommended equipment:*** If you do not have your own laptop, you will need a USB drive to save your work from the computer lab sessions. I recommend 256 Mb minimum. If you have not already done so, I also recommend that your laptop or desktop PC be configured as a dual-boot linux/Windows configuration. There are many “flavors” or “distros” of linux to choose from; most are available free.

***Learning objectives:*** You should be able to:

1. Locate and access a variety of public databases and software tools for bioinformatics.
2. Use/apply the common tools appropriately, with knowledge of their limits and pitfalls.
3. Evaluate the statistical significance of results of bioinformatics searches and analyses, where appropriate.
4. Evaluate the biological significance of, or formulate new questions based on the results of, bioinformatics searches and analyses.

For 8803: Write scripts or small programs to accomplish routine bioinformatics tasks.

***Grading:***

<b>10%</b>	Weekly on-line quizzes on T-square based on the reading - these quizzes must be completed by 1 pm Monday
<b>30%</b>	Three midterm exams
<b>40%</b>	Computer lab/Homework projects
<b>10%</b>	Group paper presentations
<b>10%</b>	In-class assignments

***Make-ups:*** You are allowed to miss one on-line quiz with no penalty, no questions asked. For missed exams, you must provide a documented legitimate excuse to schedule a make-up.

***Policy on collaboration and the Honor Code:*** Discussion with peers is encouraged, both during lecture group discussion periods and during computer lab exercises. However, all work turned in must be of your own original efforts. Using the work of your peers or from any other sources, on-line or in print, without attribution is plagiarism. Plagiarism will result in zero credit for the assignment, and possible further penalties as an Honor Code violation.

***Tentative Schedule of Topics - first iteration:*** The table below is a first iteration of the schedule of topics. As the course progresses, this schedule will be adjusted to fit the pace of learning.

<b><i>Week</i></b>	<b><i>Topic</i></b>	<b><i>Reading</i></b>	<b><i>Computer Lab/Homework</i></b>
1:	Intro, public databases	Ch 3, NAR database issue articles on T-square	Lab 1
2:	Pairwise sequence alignment – local and global alignments	Ch 4.1-4.5	Lab 2
3:	BLAST	Ch 4.6-4.7; 5.1-5.4	Lab 3
4:	Advanced BLAST	Altschul et al 1997 (T-square)	Exam 1
5:	High-throughput approaches to gene expression	Ch 15.1, on-line tutorial	Lab 4
6:	Microarray data analysis – normalization, statistical analysis	Ch 16.1 BRB Array Tools Manual and Tutorial	Lab 5
7:	Microarray data analysis – clustering, pathways	PCA Tutorial	Lab 5 continued
8:	Other types of microarrays – tiling arrays, ChIP/chip	Buck et al. 2005	Exam 2
9:	Multiple sequence alignment	Ch 6.4-6.5	Lab 6
10:	Molecular phylogeny	Ch 7	Lab 6 continued
11:	Protein structures - classification and prediction	Ch 11	Lab 7
12:	Protein structures – homology modeling	Ch 13	Exam 3
13:	Genome sequencing and annotation	Ch 9	Project
14:	Bacterial genomes and Paper Presentations	TBA article	Project
15:	Fungal genomes & Paper Presentations	TBA article	Project
16:	Vertebrate genomes & Paper Presentations	TBA article	Project