

**FAYETTEVILLE STATE UNIVERSITY  
COLLEGE OF ARTS AND SCIENCES  
DEPARTMENT OF NATURAL SCIENCES**

**I. LOCATOR INFORMATION:**

Course Number/Name: BTCH 410/Introduction to Bioinformatics

Semester: Fall 2011

Time: MWF 1:00 – 1:50

Bldg./Room: Lyons Science Annex 127

Instructor: Dr. Robert Grier

Office Location: Lyons Science Annex 222

Telephone: 672-1368 (Office)                      672-1691 (Department)

E-mail: rgrier@uncfsu.edu

Office Hours: Mon.   Tues.   Wed.   Thurs.  
9-11      9-11      9-11      9-11

Note: Available at other times by appointment.

**II. COURSE DESCRIPTION:**

This is an introductory course to *Bioinformatics*. Bioinformatics uses computational methods to analyze and help interpret the information content of the large volume of biological data generated by genome sequencing, as well as cell wide measurements of gene expression (DNA microarrays), protein profiles (proteomics), metabolites and metabolic fluxes. The ultimate goal of this process is to elucidate cell function and physiology from a comprehensive set of measurements as opposed to using single markers of cellular function. The computational methods used in this course include analysis of sequences, (alignment, homology discovery, gene annotation), gene clustering, pattern recognition/discovery in large-scale expression data. Applications of bioinformatics to drug design, and biotechnology will be also discussed.

The prerequisites for taking this course are BIOL 200 (Cellular Biology) and CHEM 220 (Principles of Organic Chemistry) or CHEM 221 ( Organic Chemistry I). IF YOU HAVE NOT TAKEN THESE COURSES, YOU NEED TO SEE THE INSTRUCTOR IMMEDIATELY AFTER THE FIRST CLASS.

### III. **TEXTBOOK:**

The textbook to be used in this course is:

Krane, Dan E. and Raymer, Micheal L. (2003). Fundamental Concepts of Bioinformatics  
San Francisco: Benjamin Cummings

### IV. **SPECIFIC COURSE OBJECTIVES:**

At the completion of this course, students should be able to demonstrate a knowledge and understanding of:

1. The central dogma of molecular biology.
2. Information content of DNA to include: Promotor sequences, introns and exons, open reading frames
3. Data searches and pairwise alignment of DNA sequences
4. Patterns of substitution within genes
5. Estimating substitution numbers
6. Variations in evolutionary rates between genes
7. The importance of phylogenetic trees in protein and gene analysis
8. Schemes for gene finding in prokaryotes/eukaryotes
9. Popular algorithms: Smith-Waterman, Blast, Psi-blast, Fasta
10. Monitoring gene expression levels using Gene chips and DNA microarrays
11. Clustering methods: Identification of coordinated gene expression
12. The research literature and Internet resources related to bioinformatics.

### V. **EVALUATION CRITERIA:**

Final grades will be derived from a composite number of points earned during the course for the following activities:

#### A. **GRADE DISTRIBUTION**

Four exams @ 100 pts. each	=	400 pts
Problem Sets: 4 @ 25 pts each	=	100
Quizzes	=	100
Final Exam	=	<u>200</u>
		800 pts

The instructor reserves the right to modify the grading criteria as deemed necessary. Students will be notified of any such changes.

#### B. **GRADING SCALE:**

The point system below is based on the grading scale outlined in the FSU undergraduate catalog.

<u>PERCENTAGE</u>	=	<u>GRADE</u>
100 - 90%	=	A
89 - 80%	=	B
79 - 70%	=	C
69 - 60%	=	D
59% or less	=	F

C. **Missed examinations**

In the event that an examination is missed it is the responsibility of the student to contact me no later than the class following the missed examination. All make up examinations will be oral, no exceptions. I reserve the right to deny a make up examination if I think the excuse is not valid.