

## Bioinformatics and Computational Biology

Biology 5643 Fall 2007 Tu &Th 2:00-3:15pm

**Instructor:** Dr. Yufeng Wang

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**Office Hours:** by appointment

### Course Description:

Bioinformatics and computational genomics use modern statistical and computational methods to understand biological processes. This course will emphasize the analysis of sequences, protein structures, and gene expression networks on a large scale. Topics to be covered include traditional concepts, such as sequence alignments and phylogenetic analysis, as well as emerging topics such as microarray data analysis and proteomics.

### Outline of topics:

- Basics of molecular biology
- Information and Resources: PubMed, Bioinformatics Databases, molecular biology databases
- Sequence alignments: algorithms, and applications
- Phylogenetic analysis
- Structural Genomics
- Gene expression profiles: Biology, measurement, and modeling (clustering, classification, time-series)
- Proteomics
- Gene Regulatory Networks and Systems Biology

### Textbooks:

Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, by Andreas D. Baxevanis and B. F. Francis Ouellette. Third Edition. ISBN: 0-471-47878-4.

Bioinformatics: Sequences and Genome Analysis, by David W. Mount. Cold Spring Harbor Laboratory. Second Edition. ISBN 0-87969-712-1

Other required reading will be posted online.

### Prerequisites:

BIO 2313 or STA 1993, or an equivalent.

Students should have:

1. A basic knowledge of biochemistry/molecular biology/genetics.
2. A knowledge of basic quantitative concepts.

### **Grading:**

Students will be evaluated on the basis of a final paper/project, an oral presentation, assignments, and class participation.

Attendance: 10%

Assignments: 40%

Term project: 50%

- Topic or abstract due (email submission) November 9 @5 p.m. (5%)
- Oral presentation: (15%)
- Full paper due (email submission) December 5 @5 p.m. (30%)

### **Academic Dishonesty:**

The integrity of a university degree depends on the integrity of the work done for that degree by each student. The University expects a student to maintain a high standard of individual honor in his/her scholastic work.

Specifically, "**plagiarism**" will be interpreted in its broadest sense: ideas from others must be referenced; words from others must be in quotation marks and referenced. Paraphrasing without referencing will be considered plagiarism. Extensive paraphrasing from a single source is unacceptable, referenced or not.

**Attendance is mandatory.** You are responsible for any substantive or procedural information given in class. In the event you are absent from a class, do not look to the instructor to repeat for you personally what has already been presented to the larger class. When you are in attendance, please refrain from talking or engaging in any other behavior that may be distracting to fellow students. Audio headsets and empowered mobile phones are not permitted in class. Computer activity must be directly related to activity in this classroom. If you can not conform to these restrictions, you must leave the classroom. Continued enrollment in this class represents your agreement to these conditions.