BIOCOMPUTING
CSCE 4810.001 / CSCE 5810.001
BIOL 4810.001 / BIOL 5810.001
MATH 4810.001 / MATH 5700.001

Course Information & Syllabus (Fall 2018)

Instructor : XUAN GUO
Lectures: Mondays & Wednesdays 5:30 pm – 6:50 pm, NTDP B140
Office Hours: Wednesdays 2:00 – 3:30 pm or by appointment
Office: NTDP F290
Phone: 940-565-2817
E-mail: xuan.guo@unt.edu

TA: Shuo Sun
Office: F232, **Hours:** Wednesday 2:00-4:00 pm **E-mail:** shuosun2@my.unt.edu

Class Web Page: Blackboard
Recommended Textbooks:

- An Introduction to Bioinformatics Algorithms, Neil C. Jones and Pavel A. Pevzner. MIT Press, 2004. URL: http://www.bioalgorithms.info
- Python for Bioinformatics, Sebastian Bassi, Chapman & Hall

Course Objective: We will study the principles and algorithms used to create computational analytical models for problems in the Life Sciences in general and Biology in particular. Genome sequencing projects, including the completed human genome project, continually generate large datasets of gene and protein sequences. Efficient and optimal analysis of this ever-growing dataset yield important knowledge and information that have direct consequences on the biological aspects. A broad range of topics will be studied to establish a basic understanding and appreciation of the issues and problems of computational biology. The course includes an applied component, which will provide an introduction to programming for biological data and use of a range of web-based Biocomputing utilities.

Biocomputing is inherently ***interdisciplinary*** and so are the assignments and projects given in this course. **YES,** the instructor is fully aware of the fact that students in this class may have little or no background in Biology or Computing Science. This is what makes this course challenging and fun. While students are expected to work on homework assignments independently, interdisciplinary teams consisting of one Biology student and one Computing Science student shall collaborate on all projects.

ABET outcomes for CSCE/BIOL/MATH 4810 are:
1. Learn the principles of Molecular Biology and Genetics
2. Understand the concepts of DNA structure and encoding
3. Understand the Central Dogma of Biology (DNA->RNA->Protein)
4. Learn basic Python programming
5. Understand computational complexity of Bioinformatics problems
6. Learn fundamental computational tasks/algorithms of Bioinformatics
7. Learn about NCBI and available Bioinformatics tools
8. Understand the importance of Bioethics

Grading:

Undergraduate version		Graduate version	
Assignments	60%	Assignments	40%
Presentation 1	20%	Presentation 1	15%
Presentation 2	20%	Presentation 2	15%
		Project	30%

The following is a list of topics we will attempt to cover during this course:

Week #	Description	Assignments
1-2	Molecular biology – A gentle introduction	
1-2	Introduction to the world of algorithms	HW#1 Basic Molecular Biology
3-4	A (very) quick overview of Python	HW#2 Python Programming
5	Sequence alignment	
6	Sequence assembly	Group Presentation 1
7	Gene predication	HW#3 Sequence Analyses
8	Finding regulatory motifs	Group Presentation 2
9	Phylogenetic tree	HW#4
10	Genome variations	
11	Bioethics/Gene expression	HW#5
12	RNA structure	
13	Protein structure	
14	Thanksgiving Break	
15	Project presentations	
16	Project reports	

Submission: All submissions, including assignments and projects, shall be turned in electronically using the Blackboard. Assignments received electronically within 24h of the time they are due will be eligible for 50% credit. Because answer keys will be posted, no homework will be accepted after the extended deadline.

Attendance: Attendance will not be taken in class but is expected. However, all students are responsible for everything done or said in class.

Plagiarism: Plagiarism of any kind will automatically result in a grade of F for the course.

Americans with Disabilities Act: We cooperate with the Office of Disability Accommodation to make reasonable accommodations for qualified students (cf. Americans with Disabilities Act and Section 504, Rehabilitation Act) with disabilities. If you have not registered with ODA, we encourage you to do so. If you have a disability for which you require accommodation, please discuss your needs with the instructor or submit a written Accommodation Request on or before the fourth class day.