

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

**Course Information & Syllabus (Fall 2016)**

**Instructors:** Armin R. Mikler and Rajeev K. Azad

**Lectures:** Wednesdays 5:30pm – 8:20pm, NTDP D223

**Office Hours:** (Mikler) T 9:30 – 11:00 am or by appointment

(Azad) W & F 8:30 – 10:00 am at GAB 434 or by appointment

**Office:** A316 LSC and GAB 434 (Azad), NTDP F294 (Mikler)

**Phone:** 940-369-5078, 940-565-4694 (Azad); 940-565-4279 (Mikler)

**E-mail:** Rajeev.Azad@unt.edu, mikler@cs.unt.edu

**TA:** Faris Hawamdeh

**Office:** TBD

**Hours:** TBD

**Class Web Page:** UNT Blackboard

**Textbook:** An Introduction to Bioinformatics Algorithms, Neil C. Jones and Pavel A. Pevzner. MIT Press, 2004. URL: <http://www.bioalgorithms.info>

**(Highly) Recommended Text:** Beginning Perl for Bioinformatics, James Tisdall, O'Reilly

**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 Computer Science. This is what makes this course challenging and fun. While students are expected to work on homework assignments independently, interdisciplinary teams consisting of at least one Biology student and one Computer 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. Understand the importance of Bioethics
5. Learn basic Perl programming
6. Understand computational complexity of Bioinformatics problems
7. Learn fundamental computational tasks/algorithms of Bioinformatics
8. Learn about NCBI and available Bioinformatics tools

**Grading:**

Assignments	20%
Project(s)	25%
Midterm (1)	15%
Final (1)	15%
Poster Presentation (1)	25%

Note that this is a 3-hour evening class and several classes will cover both, an introduction to programming and basic concepts in bioinformatics. The following is a list of topics we will attempt to cover during this course:

Week #	Description	Assignments
1-4	Molecular Biology – A gentle introduction	
2	Introduction to the world of algorithms	HW#1 Basic Molecular Biology
3-6	A (very) quick overview of PERL	
7	DNA Restriction Maps	HW#2 Perl Programming
8-9	Finding Regulatory Motifs	Group Project Assignment
9	Bioethics	HW#3 Restriction Maps
10	Genome Rearrangements	Exam #1
11-12	Dynamic Programming – Calculating Edit Distance	
13	Sequence Alignment	HW#4 Sequence Alignment
14	Thanksgiving Break	
15	PROJECT & POSTER PRESENTATIONS	
16	EXAM #2 (FINAL)	

**Submission:** All submissions, including assignments, projects and exams, shall be turned in electronically using the project command. Late submissions cannot be accepted.

**Graduate vs. Undergraduate Work:** Since this is a combined course, *graduate* students will be assigned some additional assignments and projects as appropriate.

**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.