

COURSE SYLLABUS

Fall 2004

COURSE: CPSC 591
Section 001 – Monday, Wednesday 4:00pm – 5:15pm

TITLE: Bioinformatics

CREDIT: 3 Credit Hours

FACULTY: Dr. Andy Novobilski <http://www.utc.edu/faculty/Andy-Novobilski>
313-D EMCS Bldg Andy-Novobilski@utc.edu
(423) 425-4202

Office Hours: Monday, Wednesday 2:00pm – 4:00pm;
Other times by appointment.

Dr. Peggy Kovach, Dept. of Biology
121 Holt Hall, Margaret-Kovach@utc.edu

PREREQUISITES: CPSC 580 and experience with mathematical programming, or permission of the instructor.

COURSE DESCRIPTION: Bioinformatics is the application of advanced information discovery and retrieval algorithms to the domain of genetics. Areas of interest include sequencing of DNA, alignment of DNA sequences, and analysis of protein interactions using both tabular information display and 2/3-D visualization of scientific data.

COURSE OBJECTIVES: This course has two main objectives. First, to introduce computational scientists to the terminology and science of the problem domains associated with genomics. Second, to inspire computational scientists to look deeper into the field of bioinformatics for ways in which they might advance the body of knowledge currently in place. To meet these goals, the course will: 1) provide a domain based overview of the biological processes of interest; 2) introduce the computational models and algorithms used to analysis the domain behaviors; 3) survey the current tools and technologies available for bioinformatics researchers to use; and 4) introduce Perl, and associated Perl libraries related to the custom creation of bioinformatics applications.

ATTENDANCE AND PARTICIPATION: You are expected to attend and participate in all in-class lectures, complete all assigned homework and paper critiques, plus develop a final project of your choice. All cell phones, pagers and other similar devices need to be silenced during class. Finally, participation means doing your own work. Therefore, academic dishonesty (as described by the UTC Honor Code) will not be tolerated and will result in an F for the course and the possible notification of the UTC Honor Court.

UPDATES: The information in this syllabus is subject to change and it is the responsibility of the student to be aware of changes new material, missed content, etc. Updates can be found on Blackboard under the course page.

MAKE-UP POLICY: All assignments are to be turned in at the start of class on the assigned due date. With one exception, late work will not be accepted. During the term, you may, for a penalty of 25%, turn in one assignment one week late. There will be no make-ups given for in-class exams. The comprehensive final will count in its place.

EVALUATION: You are responsible for completing a series of homework assignments, a series of paper critiques, two (2) in-class exams, a comprehensive final, and a final project/presentation. Final projects will include selection of a paper outlining an application of computational science to bioinformatics, demonstration of the technique, a written report and final presentation of the work to the class.

The course grade will be determined as:

| Activity | Percentage |
|-----------------|-------------------|
| Homework (4) | 32 % |
| Critiques (2) | 10 % |
| Exams (2) | 28 % |
| Final Exam | 20 % |
| Final Project | 10 % |

Letter grades will be assigned with 100-90 being an A, 89-80 being a B, 79-70 being a C, 69-60 being a D, and anything 59 or lower being an F.

TEXTBOOKS: David Mount, Bioinformatics: Sequence and Genome Analysis, 2nd Ed. Cold Spring Harbor Laboratory Press, ISBN # 0-87969-712-1

ADA STATEMENT: Attention: If you are a student with a disability and think that you might need special assistance or a special accommodation in this class or any other class call the Office for Students with Disabilities/College Access Program at 425-4006. Examples of disabilities might include blindness/low vision, communication disorders, deafness/hearing impairments, emotional/psychological disabilities, learning disabilities, and other health impairments. This list is not exhaustive.

Schedule

| Date (Week of) | Topics | Assignments |
|----------------------|--|---|
| Monday, August 23 | Intro to Genomics Collecting and Storing Sequences in the Library | Mount 1-2 |
| Monday, August 30 | Introduction to Perl in Bioinformatics | Mount 12 |
| Monday, September 6 | Alignment of Sequence Pairs | Mount 3 No Class 9/6, Labor Day |
| Monday, September 13 | Intro to Probability and Statistical Analysis | Mount 4 HW 1 – Chp 2, Prbs 1-6 Monday 9/13 |
| Monday, Spetember 20 | Multiple Sequence Alignment, Topics in Search | Mount 5 Critique of Paper 1 "Genomes in Medicine" |
| Monday, September 27 | Proteomics | Exam 1 – Monday 9/27 Mount 1-5, Perl, Genomics |
| Monday, October 4 | Sequence Database Searching for Similar Sequences | Mount 6 HW 2 – Perl Based Sequence Alignment |
| Monday, October 11 | Phylogenetic Prediction | Mount 7 Critique of Paper 2 |
| Monday, October 18 | Prediction of Secondary Structure | Mount 8 HW 3 – Chp 5, Prbs 1,5,6 and Chp 6, Prbs 2, 3 |
| Monday, October 25 | Gene Prediction and Regulation, Topics in Machine Learning | Mount 9 Fall Break, Monday 10/25 |
| Monday, November 1 | Protein Classification and Structure Prediction, Topics in Visualization | Mount 10 |
| Monday, November 8 | Genome Analysis | Mount 11 Final Presentation Topic |

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| Monday, November 15 | Analysis of Microarrays | Mount 13 Exam 2 – Monday 11/15 Mount 6-10 |
| Monday, November 22 | | HW 4 – Chp 10, Prbs 1-4 Thanksgiving, 11/24 |
| Monday, November 29 | | Class Presentations |
| Monday, December 6 | Last Day of Class | Class Presentations |
| Monday, December 13 | Final Exam: 5:30pm | |