

Practical Applications of Sequence Analysis (MIC 753)

Spring 2001

The upper-level graduate school course, "Practical Applications of Sequence Analysis" (MIC 753) will be taught by Dr. Elliot Lefkowitz during the Spring Semester, 2001.

Dates: Tuesday, April 3 through Tuesday, June 5, 2001
(no class on Thursday, May 17 and Tuesday, May 29)

Times: Tuesdays: 3:00 - 4:30
Thursdays: 1:00 - 2:30

Location: Bevill Biomedical Research Building Lecture Room - BBRB 170

Prerequisites: CMB 1,2 and 3 or a basic understanding of modern molecular biology and genetics.

Description: The course consists of a series of lectures, demonstrations, and discussions that are directed at providing an overall understanding of how to analyze genetic sequence information by computer. This includes basic analyses such as restriction mapping and detection of coding sequences, to more advanced analyses such as sequence similarity searching, sequence comparisons and multi-sequence alignment; evolutionary analysis of gene families; prediction of functional motifs from primary sequence information; and current tools for the mapping, assembly, and analysis of genomic sequence information.

The course emphasizes the use of the Genetics Computer Group (GCG) series of sequence analysis programs, as well as many of the World-Wide Web-based tools currently available for use.

Grading: Students registered for credit will be required to complete a series of computer-based exercises to demonstrate proficiency in the application and use of the various computer programs presented during class. These exercises will take the form of the two projects described below.

Project 1. Preparation of Web-based Bioinformatic Solutions - Due Monday, May 21

Each student will design a web site that describes online, web-based solutions that are available to help solve a particular bioinformatic problem.

1. You should have your topic approved by Elliot prior to beginning this project. The list below provides examples of bioinformatic problems that may be appropriate, or choose your own.
2. Your web site should include links to the appropriate web pages along with descriptions of what is available and a how-to guide to provide on-line help in using the bioinformatic tools.
3. You should also provide a review of the described sites that focuses on their ability to solve the problem at hand, and ease-of-use.

4. You can utilize whatever web-creation software you wish. Recommendations of easy-to-use web design programs are Microsoft FrontPage for the PC and Adobe PageMill for the Macintosh.
5. Up to TWO students may work on this project together and submit a common set of files for their web site.

Possible topics for Project 1:

- Protein motif identification
- Protein structure prediction
- Protein Families
- RNA Secondary structure prediction
- Human genome analysis
- Mouse genome analysis
- Microbial genome analysis
- Database access and searching
- Evolutionary analysis
- Sequence assembly
- Microarray analysis

Project 2. Analysis of a gene family - Due Monday, June 11

Each student will be required to identify a sequence family that they will analyze in different ways throughout the course. Each student must be working on a unique set of genes. Elliot will approve each choice on a first-come, first-serve basis. So it is to your advantage to accomplish the following assignment as soon as possible.

1. Pick an interesting gene family that contains at least six members either in multiple species, or in multiple alleles.
2. Email a description of the gene family to Elliot (ElliotL@uab.edu) and why you think it will be worthwhile to study.
3. Elliot will let you know if your choice is satisfactory. If not, you will have to choose another set of genes.
4. Throughout the course, you should apply the various analytical programs demonstrated in class to your gene family. It will be your decision to choose which programs to use in your analysis. Your analysis should be compressive and relevant to the chosen gene family.
5. Prepare a short journal-type paper describing your work.

For more information contact Elliot Lefkowitz:

Phone: 934-1946

Email: ElliotL@uab.edu

Office: BBRB 277A

Web site: <http://genome.microbio.uab.edu/MIC753/>