BIOL-UA 124 Fundamentals of Bioinformatics

Instructors:
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Course Description:
The course has a lecture and a recitation component. During the recitation the students will use popular software packages to analyze publicly available data from genome projects and high-throughput experiments. The course is divided into three sections:Genomics – students will learn about different DNA-sequencing technologies and the challenges behind analyzing the sequences. Students will learn the concepts behind aligning sequences and predicting where genes reside in sequences.Structural Bioinformatics – students will learn the concepts behind predicting RNA and protein structures.Functional Genomics – students will learn about gene expression analysis and how it can be used to identify changes in genome structure and gene activity.

Pre-requisite:
Molecular and Cell Biology I (BIOL-UA 21).

Textbook and Required Materials:
(UB) Understanding Bioinformatics, Marketa J Zvelebil, Jeremy O. Baum. Garland Science.

Grading:

Assignments	20%
Midterm 1	20%
Midterm 2	20%
Final	30%
Attendance/Participation	10%

Topics:
Introduction to Sequence Technologies Sequence Assembly and Alignment
Pairwise Sequence alignment (BLAST) & PSI BLAST
Multiple Sequence Alignment and Protein Motif and Domain predictions
Phylogenetics and Tree Building Gene Structure Prediction
Domains and Secondary Structure predictions
Tertiary Protein Structure prediction RNA and miRNA structure Prediction
Gene Expression Analysis Clustering
Proteome sequence and expression Analysis
Protein Interactions
Systems Biology & Gene networks