

Biol.3xxx Introduction to Bioinformatics – Spring 2018

TENTATIVE SYLLABUS

Biol.3050? Introduction to Bioinformatics – Spring 2018

Instructors:

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Course Prerequisites:

Principles of Biology I (Biol.1110) and II (Biol.1120)

Course Materials:

Textbook: Introduction to Bioinformatics. Arthur M. Lesk (2014), 4th Ed. (ISBN 978-0-19-965156-6), Oxford University Press.

Course Description:

An introduction to the field of bioinformatics with some hands-on exploration of applications. Specific areas include scientific archives and information retrieval, genome organization, comparative genomics, transcriptomics, proteomics, structural bioinformatics, and systems biology. This course also imparts basic computational skills in data retrieval from the databases in molecular and structural biology.

Learning Objectives:

1. Gain an overview of the field of bioinformatics.
2. Understand the general kinds of databases in molecular biology.
3. Know some basic concepts and computational tools of information retrieval.
4. Be familiar with the type of questions that bioinformatics addresses.
5. Appreciate the role of bioinformatics in biotechnology and clinical applications.

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Grading Policies:

Students will be graded on the evaluation of a mid-term exam, the final exam, quizzes, homework assignments, and a combination of class participation, attendance, and overall attitude toward the course.

Grading Weights:

Mid-term Exam	20%
Final Exam	20%
Quizzes	25%
Assignments	25%
Participation	10%

Schedule of Topics:

Week 1	Course Intro, Overview
Week 2	Scientific publications and archives - intro to NCBI and PubMed
Week 3	Central Dogma, RNA and protein folds, 2-D and 3-D structures
Week 4	Structural bioinformatics and drug discovery - homology modeling and prediction - web tools on structural databanks
Week 5	Introduction to systems biology
Week 6	Metabolic pathways (Metabolomics)
Week 7	Gene expression and regulation networking - RNA and protein profilings, transcriptomics/proteomics - GEO profiles
SPRING BREAK	
Week 8	Genome organization and evolution
Week 9	Sequence alignments and phylogenetic trees
Week 10	Archives and information retrieval - more on NCBI and genome browsers
Week 11	Applications I: web tools (BLAST, Galaxy and Multiple Alignment/Phylogenies)
Week 12	Skills I: Basics in Unix (BASH), Perl, and R
Week 13	Skills II: Scripting examples
Week 14	Applications II: Combining scripting with bioinformatics tools