TENTATIVE SYLLABUS

Instructors:
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Course Prerequisites:
Principles of Biology I (Biol.1110) and II (Biol.1120)

Course Materials:

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.
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:

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<tr>
<th>Component</th>
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<tbody>
<tr>
<td>Mid-term Exam</td>
<td>20%</td>
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<td>Final Exam</td>
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<td>Quizzes</td>
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<td>Assignments</td>
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<tr>
<td>Participation</td>
<td>10%</td>
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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