Jordan University of Science and Technology

Faculty of Science & Arts

Biotechnology & Genetic Engineering Department

BT401 Computational Biology

First Semester 2023-2024

Course Catalog
2 Credit Hours. This course provides a general introduction to computational tools for biology. The course covers basic concepts in computational biology topics emphasizing in describing basic theoretical concepts of wet-lab experimentation. This course covers different approaches to solve biological problems and several tools to work with DNA and RNA sequence analysis, Sequence databases, Gene expression analysis, Genome assembly, Binding site prediction, Differential equation-based biological models, genome rearrangement. Besides, this lab covers principle methods and tools used for Sequence alignment, Motif finding, and programming skills to implement solutions for the studied problems.

Text Book	
Title	An Introduction To Bioinformatics Algorithms 2004
Author(s)	Neil C. Jones And Pavel A. Pevzner
Edition	1st Edition
Short Name	Ref 1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref2	Bioinformatics Programming Using Python	Mitchell L Model Released December 2009	1st Edition	
Ref3	Bioinformatics and Functional Genomics	Wiley-Blackwell, 2015	3rd Edition	

Instructor	
Name	**Mrs. Wafa' Alqarqaz**
Office Location	-

Office Hours	Sun : 08:30 - 09:30 Sun : 11:30 - 12:30 Mon : 09:30 - 10:00 Tue : 08:30 - 09:30 Tue : 11:30 - 12:30 Wed : 09:30 - 10:00 Thu : 08:30 - 09:30
Email	waalqarqaz@just.edu.jo

Class Schedule & Room

Section 1:
Lecture Time: Mon : 11:30 - 12:30
Room: LAB

Section 2:
Lecture Time: Wed : 11:30 - 12:30
Room: LAB

Prerequisites

Line Number	Course Name	Prerequisite Type
963020	BT302 Bioinformatics	Prerequisite / Study

Tentative List of Topics Covered

Weeks	Topic	References
Week 1	Introduction to algorithms and complexities.	
Weeks 2, 3	Biological background.	
Weeks 4, 5	Executive search algorithm to solve restriction mapping problem.	
Weeks 6, 7	Executive search algorithm to solve motif finding problem	
Week 7	Branch and bound algorithm for motif finding problem.	
Week 8	Branch and bound algorithm for median string problem.	
Week 9	Greedy motif finding problem.	
Weeks 9, 10	Greedy algorithm for genome rearrangement problem.	
Week 10	Introduction to dynamic programming algorithms	
Week 11	Longest common sub sequence algorithm	
Weeks 12, 13	Dynamic algorithms for pairwise sequence alignment.	
Week 13	Scoring Alignment of Protein sequence	
Week 14	Multiple Sequence alignment.	
Week 15	BLAST	

Mapping of Course Outcomes to Program Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Course Learn Outcome Be able to understand Biological Primers, algorithms and complexities.	15%	
Be able to use different problem solving approaches (exhaustive search, Greedy and Dynamic programming) to solve biological problems (restriction mapping, motif finding, Genome Rearrangements and sequence alignments) and compare between different approaches.	50%	
Be able to use programming skills to implement algorithms of different approaches using Python language.	20%	
Be able to use web based tool for solving biological problems	15%	

Relationship to Program Student Outcomes (Out of 100%)					
A	B	C	D	E	F

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