هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Course Title:	Bioinformatics
Course Code:	**2054102-3**
Program:	**Bachelor of Biotechnology**
Department:	**Department of Biotechnology**
College:	**College of Science**
Institution:	**Taif University**

Table of Contents

A. Course Identification

1. Credit hours:
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: 10th levels / year 4
4. Pre-requisites for this course (if any)**: Genomics and Proteomics (2053102-3)**
5. Co-requisites for this course (if any)**: NONE**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	60	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	30
3	**Tutorial**	
4	**Others** (specify)	
	Total	60

s

B. Course Objectives and Learning Outcomes

1. Course Description

This course will introduce students to the basic and applications of bioinformatics. Topics include the different types of databases, data mining, data deposition, sequence alignment of nucleic acids and proteins, phylogenetic analysis, design of PCR primers and its parameters, online software packages used in analysis of nucleic acid (DNA) and protein sequences, and the applications of bioinformatics.

2. Course Main Objective

Develop bioinformatics tools with programming skills, apply computational based solutions for biological perspectives, perform alignment of sequences and construct the matrix for alignment based on dynamic programming and construct the phylogenetics of different sequences.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Recall the various molecular databases of biological information	K.2
1.2	State the various tools for DNA sequence alignment, primer design, and phylogenetic tree	K.2
1.3	Describe the analysis of molecular biological information in the various databases	K.4
2	**Skills :**	
2.1	Evaluate the sources of molecular biological information in various databases.	S.2
2.2	Interpret the molecular biological information.	S.2
3	**Values:**	
3.1	Accept the values of the various recent communication technologies	V.3

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Bioinformatics: Concepts and applications Biological Databases- Concept, types, specialization, limitations, DBMS	6
2	DNA and protein Databases	4
3	DNA Primers: Principals and parameters	2
4	Sequence Alignments- Algorithms, Scoring Matrices, Multiple Sequence	6
5	Sequence and Structure based predictions- Simulation of Molecular interactions	2
6	Basics of Phylogenetic analysis and tree construction methods	4
7	Structural Bioinformatics Protein structure basics, Ramachandran plot, Protein structure- function relationship, SCOP and CATH	4
8	Applications of bioinformatics	2
Total		30

No	List of Practical Topics	Contact Hours
1	Searching on genes in different organisms.	3
2	Data retrieval from various databases, Homology searching and their applications.	6
3	Working on DNA and protein Databases websites.	3
4	Designing of DNA Primers.	3
5	Analysis of Sequence Alignments and Multiple Sequence Alignment (MSA).	6
6	Designing of different Phylogenetic trees.	9
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recall the various molecular databases of biological information	Lecture	Written Exam
1.2	State the various tools for DNA sequence alignment, primer design, and phylogenetic tree	Lecture	Written Exam
1.3	Describe the analysis of molecular biological information in the various databases	Group Discussion	Report
2.0	**Skills**		
2.1	Evaluate the sources of molecular biological information in various databases.	Lecture, Brain storming	Written Exam
2.2	Interpret the molecular biological information.	Lecture, Problems solving	Performance Evaluation
3.0	**Values**		
3.1	Accept the values of the various recent communication technologies	Discussion	Report

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm exam	5	20%
2	Periodical Exam	8	10%
	Performance Evaluation	Continues	10 %
3	Reports (Weekly Lab.)	Continues	15%
4	Oral exam	9	5%
5	written test (Final exam)	11	40%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Six hours per week of office hours are available for each faculty members for consultations and academic advice.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1- Zvelebil, Marketa J. Understanding bioinformatics. Garland Science/Taylor & Francis Group, 2008. 2. Lesk, A. K., "Introduction to Bioinformatics" 4th Edition, Oxford University Press, 2013

	3. Mount, D.W., "Bioinformatics Sequence and Genome Analysis" 2nd Edition, Cold Spring Harbor Laboratory Press, 2004
Essential References Materials	
Electronic Materials	NCBI website, DDBI website.
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Laboratory connecting to a network
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show, Smart Board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	CDs

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course management and planning	Students	Indirect
Effectiveness of teaching and assessment	Students	Indirect
Quality of learning resources	Students	Indirect
Effectiveness of Evaluation and exams	Students, Peer Reviewer	Indirect, Direct

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Department Council
Reference No.	7
Date	16-6-1443