هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Genomics and Proteomics**
Course Code:	**2053102-3**
Program:	**Bachelor in Biotechnology**
Department:	**Biotechnology Department**
College:	**College of Science**
Institution:	**Taif University**
Version:	**V4**
Last Revision Date:	**3/1445 – 9/2023**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:					
3 (2 Lec, 1 Lab)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered:					
5th Level /3rd Year					
4. Course general Description:					
The course is designed to introduce students into structural and functional genomics and the tools of genomics and proteomics. It covers the following topics: genome definition and function, genome structure, genome variations and diversifications, structural organization of prokaryotic and eukaryotic genomes, organelle genomes, various genome sequencing approaches, genome analysis of genome model organisms such as *C. elegans*, *Drospphila melanogaster*, and *Arabidopsis thaliana*, transcriptome analysis and its applications, proteins structure and function, analytical proteome analysis tools (1-D, 2-D gel electrophoresis), mass spectrometry and analysis (ESI, MALDI and Hybrid), LC/MS-MS; applications of mass spectrometry (PMF and PTMs), protein structure determinations.					
5. Pre-requirements for this course (if any):					
2052203-3, Molecular Biology					
6. Pre-requirements for this course (if any):					
Not applicable					
7. Course Main Objective(s):					
The objective of this course is to cover the structure and function of genome in eukaryotes, prokaryotes, and organelles, genome variations, model genomes, methods of genome and proteome analysis, as well as proteomic analysis and applications.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning		
3	Hybrid		

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	15
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the different approaches used to study the genome and proteome	K3	Lecture	Written Exams
1.2	Describe the tools for the analysis of genomes, genes, and gene expression	K5	Lecture	Written Exams
2.0	**Skills**			
2.1	Practice various approaches to analyze DNA and RNA in order to detect genomic variations and changes in gene expression	S3	Project	Practical Exam, Report

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Interpret genomic and proteomic data	S3	Problem solving	Report
3.0	**Values, autonomy, and responsibility**			
3.1	Express independence and responsibility	V4	Discussion	Performance Evaluation

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction to Genomics and Proteomics:** • the basic concepts of genomics and proteomics, • the history of the field, the importance of genomics and proteomics, • tools and techniques used in these fields.	**4**
2.	**Genome Structure and Function**: • the structure and function of genomes in eukaryotes, prokaryotes, and organelles. • the organization of genes, the regulation of gene expression, and the role of non-coding DNA.	**6**
3.	**Genome Variations:** • different types of genome variations, including single nucleotide polymorphisms (SNPs), copy number variations (CNVs), and structural variations (SVs). • the impact of these variations on gene expression and disease.	**4**
4.	**Model Genomes:** • the different model genomes used in genomics and proteomics research, including the human genome, the mouse genome, and the fruit fly genome. • the advantages and disadvantages of using model genomes.	**4**
5	**Methods of Genome and Proteome Analysis**: • the different methods used to analyze genomes and proteomes, including DNA sequencing, microarrays, and mass spectrometry. • The advantages and disadvantages of each method.	6
6.	**Proteomic Analysis and Applications**: • the different applications of proteomics, including protein identification, protein quantification, and protein-protein interactions. • the challenges and limitations of proteomics.	**6**
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam	Week 7	20%
2.	Periodical exam	Week 10	10%
3.	Report	Week 12	10%
4.	Practical Exam, Performance Evaluation	Week 15	20%
5.	Final Exam	Week 16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition. Campbell AM & Heyer LJ, Benjamin Cummings 2007; CSH Press, NY. ISBN-10: 81317155902. 2. Bioinformatics and Functional Genomics – Jonathan Pevsner - 2nd edition, Wiley-Blackwell, 2009. ISBN-10: 0471210048
Supportive References	1 Introduction to Genomics. A.M Lesk, Oxford University press, 2007. ISBN-10: 0199557489 2. Introduction to Proteomics: Tools for the New Biology. Daniel C. Liebler, Humana Press Inc., 2002. ISBN-10: 0896039919
Electronic Materials	**NBCI website (https://www.ncbi.nlm.nih.gov)**
Other Learning Materials	**1. Software for genetic analysis simulations.**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	One classroom for 3 hours a week and one laboratory for 3 hours a week with internet facility.
Technology equipment (projector, smart board, software)	**Data show, genomic analysis software, internet connection**.
Other equipment (depending on the nature of the specialty)	**Thermal cycler, Gel documentation system**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Students assessment	Peer Review, Students	Direct (Independent Reviewer), Indirect (survey)
Quality of learning resources	Faculty members	Direct (Random Correction)
The extent to which CLOs have been achieved	Students	Direct (Independent Reviewer), Indirect (survey)
The extent to which CLOs have been achieved	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	**6**
DATE	**5/11/2023**

قسم التقنية الحيوية بكلية العلوم
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