Module (Course Syllabus) Catalogue

2023-2024

College/ Institute	**Erbil Technical Health and Medical College**	
Department	**Medical Laboratory Technology**	
Module Name	**Molecular Biology**	
Module Code	**MOB701**	
Degree	**Technical Diploma** ☐ **Bachelor** ■ **High Diploma** ☐ **Master** ☐ **PhD** ☐	
Semester	**7th**	
Qualification	**Bachelor**	
Scientific Title	**Lecturer**	
ECTS (Credits)	**6**	
Module type	**Prerequisite** ☐ **Core** ■ **Assist.** ☐	
Weekly hours	**4**	
Weekly hours (Theory)	**(2)hr Class**	**(70)Total hrs Workload**
Weekly hours (Practical)	**(2)hr Class**	**(70)Total hrs Workload**
Number of Weeks	**14**	
Lecturer (Theory)	**Dr. Nzar Ali Ameen Shwan**	
E-Mail & Mobile NO.	**nzar.shwan@epu.edu.iq**	
Lecturer (Practical)	**Mr Ahmed Nawzad**	
E-Mail & Mobile NO.		
Websites		

Course Book

Course Description	Molecular biology is the study of biological systems at the molecular level. Molecular biology deals with nucleic acids and proteins and how these molecules interact within the cell to promote proper growth, division, and development. The course is focusing heavily on DNA replication, transcription, and translation. As well as mutation types and repair mechanisms. The weekly laboratory session will complement the lecture, mainly by providing hands-on experience in observation, data collection, measurement, and problem-solving skills.
Course objectives	Upon successful completion of this course, students should be able to demonstrate the following competencies: • To describe the flow of genetic information from DNA to RNA to protein. a. Describe the composition and structure of DNA and the basic steps of DNA replication b. Describe the composition and structure of RNA and the basic steps of transcription c. Describe the composition and structure of protein and the basic steps of translation d. Describe the structure and function of a gene e. Describe examples of human genetic disorders caused by gene mutations and chromosomal rearrangements • Students will be able to explain how genes are regulated a. Explain the regulation of genes in prokaryotes b. Explain the regulation of genes in eukaryotes c. Describe cell-cycle regulation and the genetics of cancer d. Explain how genetics is used to study development e. Explain the relationship between environmental exposure and cancer genetics • Students should be able to explain how mutation occurs a. Explain different types of mutations on DNA level b. Explain different types of mutation on chromosome level c. Understand the relationship of mutation and genetic (inheritance) disease d. Explain different types of mutagens e. Understand the relationship between mutation and cancer development f. Explain what epigenetics is and the role in development of cancer g. External and internal factor that play a role in developing of cancer
Student's obligation	- **Student's obligation** Attendance in lecture is expected. You are responsible for everything covered, mentioned, discussed and displayed in class. If you miss a class, get a classmate's notes as my notes will not be available. You cannot excel in this course if you do not come to class. 1- **Attendance**: students are strongly encouraged to attend class on a regular basis, as participation is important to understanding of the material. This is student opportunity to ask questions. Students are responsible for obtaining any information during the class which provided. 2- **Lateness**: Lateness to class is disruptive 3- **Electronic** devices: All cell phones are to be turned off at the beginning of class and put away during the entire class.

	4-**Talking**: During class please refrain from side conversations. These can be disruptive to your fellow students and your professor
Required Learning Materials	- Printouts of weekly lectures taught at the college campus - Reviewing of internet
Forms of teaching	The material will be presented at a level suitable for undergraduates by lecturing, discussion, video, power points and seminar

Evaluation

Task		Weight (Marks)	Due Week	Relevant Learning Outcome
Paper Review				
Assignments	Homework	5%		Encourages students to search for more detailed knowledge relevant to the topics taught at campus.
	Class Activity	2%		
	Seminar	10%		Enhances the preparation and presenting skills of the students
	report	10%		To make students engage more with their favorite topics
	Project			
Quiz		8%		To encourage students, study every week.
Midterm Exam		25%		To evaluate students and their achievements at the middle of the term.
Final Exam		40%		Final evaluation and assessment.
Total		100%		

Specific learning outcome:

On successful completion of this course, the student will be able to:

a. Understand the structure and function of DNA, RNA and protein
b. Explain the way in which genes code for proteins
c. Understand how gene expression is regulated
d. Understand the genetic basis of cancer
e. Understand the relationship of mutation and genetic (inheritance) disease
f. Explain different types of mutagens
g. Understand the relationship between mutation and cancer development
h. Explain what epigenetics is and the role in development of cancer

	i. g. External and internal factor that play a role in developing of cancer
Course References:	Books: 1. Robert J. Brooker (2012). Genetics: analysis & principles (4th edition). 2. Tamarin R.H. (2001). Principles of Genetics (7th edition). 3. Anthony J.F. Griffiths, Susan R. Wessler, Sean B. Carroll and John Doebley, (2015). Introduction to genetic analysis. 4. James D. Watson / Tania A. Baker / Stephen P. Bell / Alexander Gann / Michael Levine / Richard Losick (2013). "Molecular Biology of the Gene (7th edition).

Course topics (Theory)	**Week**	**Learning Outcome**
An introduction to Molecular Biology: Identification of DNA as the genetic material Nucleic acid structure and function: The building block of nucleic acid	First	Introducing the Molecular Biology module. Describing the major evidence that led to the discovery of DNA double helix model. Understanding the structure of nucleotides building block of nucleic acids (DNA and RNA)
DNA Replication	Second	Understand how DNA is replicated. Describing the principle of DNA replication in prokaryotes and eukaryotes.
Gene Structure	Third	Understand the structure of a typical gene in bacterial cell and eukaryotes. Understand the function and role of each segment of the gene.
Gene Expression: Transcription: from DNA to RNA	Fourth	Describing the Central Dogma of Molecular biology. Understand the transcription process and the enzymes involved in this step of gene expression
Gene Expression: Translation: mRNA to protein	Fifth	Understand how the information on RNA

		transcript is translated to amino acids.
Gene mutation and DNA repair: Consequences of Mutation	Sixth	Describe the basic principle of mutation and repair mechanisms. Describing different types of gene mutations and their consequences
Midterm Exam	Seventh	
Occurrence and Causes of Mutation	ninth	Classification of mutations and their occurrence in the population
Recombinant DNA technology	Tenth	Describe the principle of gene cloning
Gene Cloning Using Vectors	Eleventh	Understand the use of different cloning vectors in gene cloning
Polymerase chain reaction	Twelfth	Understand the Principle of PCR, Steps of PCR, variants of PCR.
DNA Sequencing	Thirteenth	Understanding the principle of different DNA sequencing technologies
Bioinformatics Applications and Genomic databases	Fourteenth	An introductory of Bioinformatic analysis

Questions Example Design (theoretical and practical exam):

All of the activities provided in the workload section are considered when awarding you a grade for this course. In order to pass this course, you will need to earn a 60% or higher on the final exam. Your score on the exam will be calculated as soon as you complete it. If you do not pass the exam on your first try, you may take it again in the second trial.

- Type of the exam (composition and multiple choice)
- Exam's duration (for example one hour)
- The number of the questions: at least four questions. The marks distributed evenly throughout.

The answer should contain preface, main contents and conclusion.

Example

Examinations (Type of the questions):

- **Open questions:** What are the three main classes of RNA and their functions?
- **Fill in the blanks:** In a mutational event, when adenine is replaced by guanine, it is a case of .....

1. **Multiple choice questions:** Which of the following could be the components of a single nucleotide found in DNA?
    a. Deoxyribose, adenine, and thymine.
    b. Ribose, phosphate, and cytosine.
    c. Deoxyribose, phosphate, and thymine.
    d. Ribose, phosphate, and uracil.
    e. Deoxyribose, phosphate, and guanine.
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- **Short answer: Give short answers to the following questions.**
    - What are the mechanisms for gene mutations?

- **Matching:** Match the words in column A to the best available answer in column B.
- **Definition:**

Extra notes:

External Evaluator