

## Course Syllabus

1	<b>Course title</b>	Molecular Biology	
2	<b>Course number</b>	0334382	
3	<b>Credit hours</b>	3	
	<b>Contact hours (theory, practical)</b>	(2,1)	
4	<b>Prerequisites/corequisites</b>	Biology 0304101	
5	<b>Program title</b>	B.Sc. in Biological Sciences	
6	<b>Program code</b>	04	
7	<b>Awarding institution</b>	The University of Jordan	
8	<b>School</b>	School of Science	
9	<b>Department</b>	Biological Sciences	
10	<b>Course level</b>	Third year	
11	<b>Year of study and semester(s)</b>	2023/2024, First Semester	
12	<b>Other department(s) involved in teaching the course</b>	Non	
13	<b>Main teaching language</b>	English	
14	<b>Delivery method</b>	<input checked="" type="checkbox"/> Face to face learning <input type="checkbox"/> Blended <input type="checkbox"/> Fully online	
15	<b>Online platforms(s)</b>	<input checked="" type="checkbox"/> Moodle <input type="checkbox"/> Microsoft Teams <input type="checkbox"/> Skype <input type="checkbox"/> Zoom <input type="checkbox"/> Others.....	
16	<b>Issuing/Revision Date</b>	Oct.4.2023	



### 17 Course Coordinator:

Name: Dr. Khaldoun Al-Hadid

Contact hours: Sun: 9:30- 10:30, Mon: 10:15- 11:15

Office number: 208

Phone number: 22203

Email: kalhadid@ju.edu.jo

### 18 Other instructors:

Name: Mohammed Abu Hazeem (Instructor of the lab)

Office number:

Phone number:

Email: abuhazeem8888@yahoo.com

Contact hours:

Name:

Office number:

Phone number:

Email:

Contact hours:

### 19 Course Description:

As stated in the approved study plan.

Prerequisite:0304101

The lectures in this course covers the following topics; historical back ground; chemistry of nucleic acid; Watson-Crick model of DNA; physical and chemical properties of nucleic acids; an introduction to gene function (selection, transcription and translation): transcription in prokaryotic cells: regulation of transcription in prokaryotic cells, transcription in eukaryotic cells, regulation of transcription in eukaryotic cells, general and specific transcription factors, post transcriptional events: translation and the genetic code; post translational events; DNA replication in prokaryotic and eukaryotic cells; Mutation and DNA repair. the laboratory covers the following topics: Isolation of nucleic acids; quantitative and qualitative measurements of nucleic acids; the use of restriction enzymes; Amplification of nucleic acids; characterization and



manipulation of the recombinant plasmid pGLO containing GFP gene; bacterial transformation and gene expression and protein produced isolation; DNA-cloning and southern blot.

**20 Course aims and outcomes:**

### A- Aims:

This course aims to introduce the students to the basic concepts of molecular biology including DNA structure, DNA replication, transcription, translation, and gene regulation. In the laboratory, the students learn hands-on techniques of basic techniques in molecular biology.

### B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to:

1. Describe the DNA, RNA and chromosomes structures.
2. Describe DNA replication process.
3. Describe the gene transcription process.
4. Describe the gene translation process.
5. Describe the regulation of gene expression.
6. Understand the theory of some molecular biology techniques.

SLOs CLOs	SLO (1) An ability to identify, formulate, and solve broadly defined technical or Scientific problems by applying knowledge of mathematics and science and /or technical topics to areas relevant to	SLO (2) An ability to formulate or design a system, process, procedure or program to meet desired needs.	SLO (3) An ability to develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgment to draw conclusions.	SLO (4) An ability to communicate effectively with a range of audiences.	SLO (5) An ability to understand ethical and professional responsibilities and the impact of technical and /or scientific solutions in global, economic, environmental, and societal contexts.	SLO (6) An ability to function effectively on teams that establish goals, plan tasks, meet deadlines and analyze risk and uncertainty

	discipline.						
1. Describe the DNA, RNA and chromosomes structures.	X						
2. Describe DNA replication process.	X						
3. Describe the gene transcription process.	X						
4. Describe gene translation process.	X						
5. Describe the regulation of gene expression.	X						
Understand the theory of some molecular biology techniques.	X						

## 21. Topic Outline and Schedule:

Week	Lecture	Topic	Intended Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1	Introduction		Face to Face	-	-		

	1.2	Introduction		Face to Face	-	-		
	1.3	<b>Lab 1: Introduction, Safety Instructions</b>		Face to Face	-	-	Quiz	
2	2.1	Introduction to Molecular Biology_ Chapter 1	1	Face to Face	-	-	Exam	Principles of Molecular Biology1-22
	2.2	Introduction to Molecular Biology_ Chapter 1	1	Face to Face	-	-	Exam	
	2.3	<b>Lab 2: Micropipetting, Agarose gel electrophoresis</b>	6	Face to Face	-	-	Quiz	
3	3.1	Introduction to Molecular Biology_ Chapter 1	1	Face to Face	-	-	Exam	
	3.2	Introduction to Molecular Biology_ Chapter 1 (self-reading: Section 5.4_ protein from Campbell)	1	Face to Face	-	-	Exam	
	3.3	<b>Lab 3: <i>E. coli</i> genomic DNA extraction</b>	6	Face to Face	-	-	Quiz	
4	4.1	Nucleic Acid Structure-Chapter 3	1	Face to Face	-	-	Exam	Principles of Molecular Biology81-108
	4.2	Nucleic Acid Structure-Chapter 3	1	Face to Face	-	-	Exam	

	4.3	<b>Lab 4: Quantitative and Qualitative Measurement of DNA</b>	6	Face to Face	-	-	Quiz	
5	5.1	Nucleic Acid Structure-Chapter 3	1	Face to Face	-	-	Exam	
	5.2	Nucleic Acid Structure-Chapter 3	1	Face to Face	-	-	Exam	
	5.3	<b>Lab 5: PCR Amplification of <i>E. coli</i> rDNA</b>	6	Face to Face	-	-	Quiz	
6	6.1	Chromosomes_ Chapter 5	1	Face to Face	-	-	Exam	Principles of Molecular Biology_151-180
	6.2	Chromosomes_ Chapter 5	1	Face to Face	-	-	Exam	
	6.3	<b>Lab 6: Southern Blot</b>	6	Face to Face	-	-	Quiz	
7	7.1	DNA Replication_ Chapter 8	2	Face to Face	-	-	Exam	Principles of Molecular Biology_ 265-311
	7.2	DNA Replication_ Chapter 8	2	Face to Face	-	-	Exam	
	7.3	<b>Lab 7: Plasmid Isolation</b>	6	Face to Face	-	-	Quiz	
8	8.1	Revision		Face to Face	-	-		
	8.2	Midterm Exam		Face to Face	-	-		

	8.3	<b>Lab 8: Restriction Enzymes</b>	6	Face to Face	-	-	Quiz	
9	9.1	Bacterial Transcription and Its regulation_ Chapter 12_12.1, 12.2, 12.3, 12.4, 12.5	3	Face to Face	-	-	Exam	Principles of Molecular Biology_ 408- 436
	9.2	Bacterial Transcription and Its regulation_ Chapter 12_12.1, 12.2, 12.3, 12.4, 12.5	3	Face to Face	-	-	Exam	
	9.3	<b>Lab 9: Restriction mapping of Plasmid DNA</b>	6	Face to Face	-	-	Quiz	
10	10.1	Expression of Genes_ chapter 17	4	Face to Face	-	-	Exam	Biology_ Campbell_ 385-410
	10.2	Expression of Genes_ chapter 17	4	Face to Face	-	-	Exam	
	10.3	<b>Lab 10: Bioinformatics</b>	6	Face to Face	-	-	Quiz	
11	11.1	Expression of Genes_ chapter 17	4	Face to Face	-	-	Exam	
	11.2	Expression of Genes_ chapter 17	4	Face to Face	-	-	Exam	
	11.3	<b>Lab 11: DNA Cloning</b>	6	Face to Face	-	-	Quiz	
12	12.1	Expression of Genes_ chapter 17	3 & 4				Exam	



	12.2	Expression of Genes_ chapter 17	4				Exam	
	12.3	<b>Lab 12: Gene Knockout and Expression</b>	6	Face to Face	-	-	Quiz	
13	13.1	Control of Gene Expression_Chapter_18_18.1, 18.2, 18.3	5	Face to Face	-	-	Exam	Biology_Campbell_413-429
	13.2	Control of Gene Expression_Chapter_18_18.1, 18.2, 18.3	5	Face to Face	-	-	Exam	
	13.3	<b>Lab 13: Purification of the Green Fluorescent Protein (GFP)</b>	6	Face to Face	-	-	Quiz	
14	14.1	Control of Gene Expression_Chapter_18_18.1, 18.2, 18.3	5	Face to Face	-	-	Exam	
	14.2	Control of Gene Expression_Chapter_18_18.1, 18.2, 18.3	5	Face to Face	-	-	Exam	
	14.3	<b>Lab 14: Purification of the Green Fluorescent Protein (GFP), part 2</b>	6	Face to Face	-	-	Quiz	
15	15.1	Control of Gene Expression_Chapter_18_18.1, 18.2, 18.3	5	Face to Face	-	-	Exam	



	15.2	Control of Gene Expression_Chapter_18_18.1, 18.2, 18.3	5	Face to Face	-	-	Exam	
	15.3	Lab 15: Final Exam						

## 22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	CLOs	Period (Week)	Platform
Midterm Exam	30	Chapters: 1,3 & 5	1 & 2	Tuesday, April.30.2023	In Campus
Lab Quizzes	20	The lab of the week	6	Every lab	In campus
Final Exam	50	All the materials	1, 2, 3, 4, 5, 6	To be announced	In Campus

## 23 Course Requirements

(e.g: students should have a computer, internet connection, webcam, account on a specific software/platform...etc): Non

## 24 Course Policies:

A- Attendance policies: Absence from lectures should not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course.

B- Absences from exams and submitting assignments on time: You should contact **your instructor** as soon as possible if you miss an exam. All such cases will be dealt with according to the rules outlined in your student handbook.

C- Health and safety procedures: Students should follow the general lab safety rules during conducting the experiments in the lab.



D- Honesty policy regarding cheating, plagiarism, misbehavior: All violations pertaining to cheating, plagiarism, misbehavior will be dealt with in accordance with the rules outlined in your student handbook.

E- Grading policy: All the exams will be conducted in the campus and will be graded according to the evaluation method table mentioned above.

F- Available university services that support achievement in the course:

- University of Jordan's E-Learning online educational portal → <http://www.elearning.ju.edu.jo>
- Optional mobile application to access E-Learning platform (Moodle)

## 25 References:

A- Required book(s), assigned reading and audio-visuals:

Principles of Molecular Biology by Burton E, Tropp\_ 1<sup>st</sup> Ed.\_ 2014, Biology\_Campbell\_ 11<sup>th</sup> Ed.\_2016

B- Recommended books, materials, and media:

Video clips will be posted on e learning website.

## 26 Additional information:

Name of Course Coordinator: ---Dr. Khaldoun Al-Hadid-----Signature: ----- Date: --Oct.4.2023
.2023-----
Head of Curriculum Committee/Department: -----Signature: -----
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و ضمان الجودة  
ACCREDITATION & QUALITY ASSURANCE CENTER

Head of Department: --Dr. Amer Imraish ----- Signature: -----  
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Head of Curriculum Committee/Faculty: ----- Signature: -----  
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