Course E-Syllabus

1	**Course title**	Molecular Biology
2	**Course number**	0334382
3	**Credit hours**	3
	Contact hours (theory, practical)	(2,3)
4	**Prerequisites/corequisites**	Bio 0304101
5	**Program title**	B.Sc. in Biological Sciences
6	**Program code**	0304
7	**Awarding institution**	The University of Jordan
8	**School**	School of Science
9	**Department**	Biological Sciences Department
10	**Level of course**	Third year
11	**Year of study and semester (s)**	2020/2021, Fall Semester
12	**Final Qualification**	B.Sc. in Biological Sciences
13	**Other department (s) involved in teaching the course**	Non
14	**Language of Instruction**	English
15	**Teaching methodology**	☐Blended ☒Online
16	**Electronic platform(s)**	☒Moodle ☒Microsoft Teams ☐Skype ☐Zoom ☐Others……
17	**Date of production/revision**	Oct.23.2020

18 Course Coordinator:

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19 Other instructors:

Name: Non
Office number:
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Name:
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20 Course Description:

As stated in the approved study plan.
This course aims to introduce the students to the basic concepts of molecular biology. The first part covers the molecular nature of genes and organization of prokaryotic and eukaryotic chromosomes. The second part covers DNA replication, repair gene expression and gene regulation. Genomics, analysis of gene structure, and gene expression are covered briefly. Students are required to read selected chapters as self-studying. In the laboratory, the students learn hands-on techniques of recombinant DNA technology.

21 Course aims and outcomes:

A- Aims:
Gaining the knowledge and the skills of applying molecular biology concepts to explain how genes are replicated, transcribed, expressed, and regulated in both prokaryotic and eukaryotic domains.

B- Intended Learning Outcomes (ILOs):
Upon successful completion of this course, students will be able to:

1. Describe the DNA and RNA structures and properties.
2. Describe gene transcription process.
3. Describe the genetic code.
4. Describe gene translation process.
5. Summarize the basic steps of DNA replication and DNA repair mechanisms.
6. Describe the transcription control of genes in bacteria.

22. Topic Outline and Schedule:

Week	Lecture	Topic	Teaching Methods*/platform	Evaluation Methods**	References
1	1,2	**1. The beginning of Molecular Biology** 1.1 Introduction 1.2 Insights into the nature of the heredity material 1.3 A model for the structure of DNA: the DNA double helix 1.4 The central dogma of molecular biology	Lecturing/ Microsoft Team	Exam	**1** **4-6** **11** **12**
2	4,5	**2. The Structure of DNA** 2.1 Introduction 2.2 Primary structure: the components of nucleic acids 2.3 Secondary structure of DNA 2.4 Unusual DNA secondary structures 2.5 Tertiary structure of DNA	Lecturing/ Microsoft Team	Exam	**17** **18-22** **22-29** **30-34** **35-37**
3	7,8	**3. The Versatility of RNA** 3.1 Introduction 3.2 RNA is involved in a wide range of cellular processes 3.3 Structural motifs of RNA 3.4 The discovery of RNA catalysis 3.5 RNA-based genomes	Lecturing/ Microsoft Team	Exam	**39** **40-41** **42-50** **51-56** **59-62**
4	10,11	**5. Genome Organization and Evolution** 5.1 Introduction 5.2 Genome organization	Lecturing/ Microsoft Team	Exam	**91** **92-94** **95-102**

		varies in different organisms 5.3 Packaging of the eukaryotic genome			
5	13,14	5.4 The majority of the eukaryotic genome is noncoding 5.5 Lateral gene transfer in the eukaryotic genome 5.6 Prokaryotic and viral genome organization	Lecturing/ Microsoft Team	Exam	**104-105** **106-109** **110-112**
6	16,17	**6. DNA Replication and Telomere Maintenance** 6.1 Introduction 6.2 Early insights into the mode of bacterial DNA replication 6.3 DNA polymerases are the enzymes that catalyze DNA synthesis from 5□ to 3□	Lecturing/ Microsoft Team	Exam	**117** **118-120** **121**
7	19,20	6.4 Multi-protein machines mediate bacterial DNA replication 6.5 Multi-protein machines trade places during eukaryotic DNA replication 6.7 Telomere maintenance: the role of telomerase in DNA replication, aging, and cancer	Lecturing/ Microsoft Team	Exam	**124-129** **130-143** **147-150**
8	22,23	**7. DNA Repair Pathways** 7.1 Introduction 7.2 Mutations and DNA damage 7.3 Lesion bypass	Lecturing/ Microsoft Team		**159** **160-165** **166** **167-168**

		7.4 Direct reversal of DNA damage			
9	25,26	7.5 Repair of single base changes and structural distortions by removal of DNA damage 7.6 Double-strand break repair by removal of DNA damage	Lecturing/ Microsoft Team	Exam	**169-177** **178-180**
10	28,29	**8. Recombinant DNA Technology and Molecular Cloning** 8.1 Introduction 8.2 The beginnings of recombinant DNA technology 8.3 Cutting and joining DNA	Lecturing/ Microsoft Team	Exam	**185** **186-189** **190-194**
11	31,32	8.4 Molecular cloning 8.5 Library screening and probes 8.6 Restriction mapping and RFLP analysis 8.7 DNA sequencing	Lecturing/ Microsoft Team	Exam	**195-206** **207-214** **215-219** **220-223**
12	34,35	**10. Transcription in Bacteria** 10.1 Introduction 10.2 Mechanism of transcription 10.3 Insights into gene regulation from the lactose (lac) operon	Lecturing/ Microsoft Team	Exam	**263-264** **265-272** **273-278**
13	37,38	10.4 Mode of action of transcriptional	Lecturing/ Microsoft Team		**279-281** **282-285**

		regulators 10.5 Control of gene expression by RNA			
14	40,41	**11. Transcription in Eukaryotes** 11.1 Introduction 11.2 Overview of transcriptional regulation 11.3 Protein-coding gene regulatory elements	Lecturing/ Microsoft Team	Exam	**292** **293-295** **296-298**
15	43,44	11.4 The general transcription machinery 11.5 The role of specific transcription factors in gene regulation 11.6 Transcriptional coactivators and corepressors	Lecturing/ Microsoft Team	Exam	**299-314** **315-316** **324**

- Teaching methods include: Synchronous lecturing/meeting; Asynchronous lecturing/meeting
- Evaluation methods include: Homework, Quiz, Exam, pre-lab quiz…etc

23 Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	Period (Week)	Platform
Quizzes	15%	The first four labs		E-Learning
Report	5%			
Midterm Exam	30%	Chapter 1,2, 3, 5	Week 6	LMSysytem
Final Exam	50%	All Chapters	Week 15	LMSystem

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

Computer, Internet connection, E-Learning, LMSystem, Microsoft Team

25 Course Policies:

A- Attendance policies:
Students are allowed to not attend seven lectures (15%) in the whole semester. In this case, students must attend every lab weekly. If a student does not attend a lab, then he/she has a maximum number of four lectures to skip.

B- Absences from exams and submitting assignments on time:

If a student does not attend an exam, he/she will get zero grade in that exam, unless he/she shows a medical report that proves he/she could not attend the exam. In this case, a makeup exam will be offered to the student as soon as possible.

C- Health and safety procedures:

Students need to be aware of the basic procedure of laboratory safety. Part of the first lab in the first week of the semester is assigned to teach students these basic laboratory procedures.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

University regulations will be implemented for any cheating attempt, plagiarism, and misbehavior.

E- Grading policy:
70% will be counted for the lectures, and 30% will be counted for the lab.

F- Available university services that support achievement in the course:
The university provides lab materials and equipment.

26 References:

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

Fundamental Molecular Biology, by Lizabeth A. Allison, Second edition, 2012, Willy Publisher

B- Recommended books, materials and media:

Clips and animations will be posted on E-Learning

27 Additional information:

Name of Course Coordinator: Khaldoun Al-Hadid----------Signature: ---------- Date: ----------

Head of Curriculum Committee/Department: ---------- Signature: ----------

Head of Department: ---------- Signature: ----------

Head of Curriculum Committee/Faculty: ---------- Signature: ----------

Dean: ---------- Signature: ----------