



Course Specifications

Course Title:	Molecular Biology
Course Code:	23073447-3
Program:	BSc Biology
Department:	Biology
College:	Aljumum University College
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 3 hours
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 3 rd year/ Level 6
4. Pre-requisites for this course (if any): Biochemistry (23052231-3).
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		70 %
2	Blended		
3	E-learning		10 %
4	Correspondence		10 %
5	Other		10 %

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	28
2	Laboratory/Studio	42
3	Tutorial	6
4	Practical/Field work/Internship	6
5	Others (specify)	10
	Total	92
Other Learning Hours*		
1	Study	
2	Assignments	
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	Total	

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

The molecular biology course is about genes - their structure and function - therefore; students will learn nucleic acid structure and the mechanism of DNA replication, DNA repair, transcription, and translation in prokaryotic and eukaryotes. A central goal is to understand gene regulation at all levels, and the structure-function relationships of nucleic acids and proteins. In addition, critical experiments will be performed in the laboratory to learn how our current understandings have come about. Techniques in molecular biology will be discussed in lecture as necessary to understand experiments and concepts.

2. Course Main Objective

- Characteristics of the genetic material and DNA structure. - DNA and RNA as the genetic material.
- Gene concept at the molecular level.
- DNA organization in chromosomes and DNA replication.
- Concepts and regulation of gene expression. - Gel electrophoresis and gene libraries.
- Polymerase Chain Reaction (PCR).
- DNA sequencing and analysis.
- Genetic engineering and its application.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.1	Identifying characteristics of the genetic material and DNA structure.	
1.2	Recalling molecular structure of the gene.	
1.3	Recognizing DNA organization in chromosomes and DNA replication	
1.4	Describing gene expression regulation process	
1.5	Outlining gel electrophoresis and gene libraries.	
1.6	Identifying polymerase Chain Reaction (PCR) and DNA sequencing.	
2	Skills:	
2.1	Prepare lab solutions and reagent.	
2.2	Understanding instructions and operate DNA equipment	
2.3	Use statistical methods to analyze genetic data.	
2.4.	Use computer and internet to search the latest information in DNA	
3	Competence:	
3.1	Developing oral presentations.	
3.2	Communicating personal ideas and thoughts.	
3.3	Work independently and as part of a team to finish some assignments.	
3...	Communicate results of work to others.	

C. Course Content

#	List of Topics	No. of Weeks	Contact Hours
1	Introduction to Molecular Biology and Mendelian Genetics <ul style="list-style-type: none"> ▪ History ▪ Central Dogma of Molecular Biology: Genomes and DNA 	1	2
2	DNA structure	1	2
3	DNA replication		
4	RNA structure and types	1	2
5	Transcription	3	6
6	Genetic code	4	8
7	Translation	2	4
8	<ul style="list-style-type: none"> ❖ Regulation of gene expression in Prokaryote ❖ Regulation of gene expression in Eukaryote ❖ Mutation ❖ Some Bioinformatics 	2	4
Total		14 weeks	28h

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		
1.1	Identifying characteristics of the genetic material and DNA structure.	In class lecturing (using PowerPoint presentation and illustrations).	Written and oral periodical and final exams.
1.2	Recalling molecular structure of the gene.	Laboratory practice on new techniques involved in DNA technology, DNA extraction and PCR implication.	Lab exams and reports.
1.3	Recognizing DNA organization in chromosomes and DNA replication.	Activities and assignments.	Evaluation of lab activities results
2.0	Skills		
2.1	Prepare lab solutions and reagents.	Application of essential scientific techniques through lectures, classes and essays.	Course work reports.
2.2	Understanding instructions and operate DNA equipment.	Small group discussion.	Evaluation of the topics prepared by students according to the content, arrangement, and covering of the

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
			topic.
	Use statistical methods to analyze genetic data.	Ask the students to make small search project during the semester	Midterm and final exams.
3.0	Competence		
3.1	Developing oral presentations.	Engage student in carrying out internet search.	Oral exams.
3.2	Communicating personal ideas and thoughts.	The ability to debate the scientific basis of genetic makeup of body	Evaluation of student essays assignments and search work.
3.3	Work independently and as part of a team to finish some assignments.	Writing group reports	Observation of student ethical and moral behavior.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Periodical Exam(s)	4	10%
2	Mid Term Exam (Theoretic)	8	20%
3	Mid Term Exam (practical)	9	10%
4	Reports and essay	11	5%
5	Final Practical Exam	15	15%
6	Final Exam	16	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 :

- Two hours office per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Course note and PPT prepared by faculty member
Recommended Books and Reference Material	<ul style="list-style-type: none"> • Molecular Microbiology Stephen J.W. Busby Springer www.springer.com/us/book/9783642720734 • Molecular Microbiology: Diagnostic Principles and Practice ... www.amazon.com

	<ul style="list-style-type: none"> Advances in Molecular and Cellular Microbiology ebooks.cambridge.org/series_landing.jsf;...Molecular...Microbiology
Essential References Materials	Weaver R. F. (2008). Molecular Biology. McGraw Hill Higher Education; 4th edition
Electronic Materials	https://www.coursera.org/ https://www.edx.org
Other Learning Materials	Microsoft office package. Multi-media associated with the text book and the relevant websites.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> Prepared lecture hall with audio –visual aids. Equipped laboratory with DNA facilities.
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> Digital lab containing 15 computers.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<ul style="list-style-type: none"> Incubators, autoclaves, measuring equipment, water bath, digital balances, pH meters, safety facilities.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Strategies for Obtaining Student Feedback on Effectiveness of Teaching	the Instructor or by the Department	<ul style="list-style-type: none"> Questionnaires Discuss students Midterm and final tests. Former review.
Other Strategies for Evaluation of Teaching	the Instructor or by the Department	<ul style="list-style-type: none"> Peer consultation by departmental specialized committee. Self-evaluation of the program by the departmental plan committee.

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	
Reference No.	
Date	

Head of Department


Dr. Wessam M. Filfilan

Stamp

