



Course Specifications

Course Title:	Biotechnology
Course Code:	23074449-3
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: Level 7 / 4 th year
4. Pre-requisites for this course (if any): Molecular Biology (23073447-3).
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	30
2	Laboratory/Studio	42
3	Tutorial	6
4	Practical/Field work/Internship	6
5	Others (specify)	
	Total	84
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

This course is designed to cover the basic scientific knowledge and its application in biotechnology field. Fundamental molecular biology & practical applications, some historical examples, modern applications of biotechnology will be discussed to provide tools and basic knowledge in order to understand biotechnology. The emerging areas of biotechnology, for example agricultural biotechnology, protein, forensic Biotechnology, bioremediation, aquatic biotechnology, regulatory agencies and issues that impact biotechnology industry will be discussed as well. In addition to that, a provocative and issues in Biotechnology, genetically modified food, genetic testing, embryos for research/human cloning, ethical/legal/social questions & dilemmas will be incorporated.

2. Course Main Objective

- Be able to define the term “biotechnology” and appreciate its scope.
- Have an awareness of the global significance of biotechnology and its resultant industries, and a broad knowledge of which are represented nationally and locally.
- Be familiar with the key events in the development of biotechnology.
- Be able to state the broad categories of biotechnological processes based on the products formed and/or the process or substrates used, and have detailed knowledge of examples of each of these.
- Understand the multidisciplinary nature of biotechnology and the associated role that has been played by enabling technologies in the development of biotechnology.
- Awareness of some of the current and future issues surrounding the relationship between biotechnology and government, investors, the environment and consumers and the impact of these on the development of future biotechnology enterprises.
- To acquire basic knowledge and definitions of biotechnology.
- To acquire knowledge of different biotechnology fields and its approaches.
- To enable students to acquire knowledge of diverse genetic engineering concepts and its tools.
- To enable students to understand and acquire knowledge of diverse biotechnological applications in agriculture, medicine and industry.
- To acquire knowledge regarding future applications and potentially risky outcomes of biotechnology applications in various disciplines.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.1	Identifying basic definitions of biotechnology.	
1.2	Describing different biotechnology fields and its approaches.	
1.3	Outlying diverse genetic engineering concepts and its tools.	
1.4	Recognizing diverse biotechnological applications in agriculture, medicine and industry.	
1.5	Defining future applications and potentially risky outcomes of biotechnology applications in various disciplines.	

CLOs		Aligned PLOs
2	Skills:	
2.1	Examine purify and quantify nucleic acids (DNA and RNA).	
2.2	Prepare biological samples from different sources (Blood, bacteria, liver, kidney, etc...).	
2.3	Prepare lab solutions (e.g. electrophoresis buffers and reagent).	
2.4	Using computers and internet to search for recent information in Biotechnology.	
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 biotechnology and its brief history ❖ Biotechnology in research and industry	1	2
2	DNA molecules and replication	1	2
3	RNA molecules and transcription in Prokaryotic and Eukaryotic	1	2
4	Protein and translation in Prokaryotic and Eukaryotic	1	2
5	Gene regulation and expression in both prokaryote and eukaryote	1	2
6	DNA fingerprint	1	2
7	Genetic engineering applications	1	2
8	1st Continuous Assessment Test	1	
9	Restriction endonucleases & vectors	1	2
10	DNA cloning; types and applications; development of recombinant protein; tissue cloning; animal and plant cloning	1	2
11	Polymerase chain reaction and applications	1	2
12	Recombinant DNA- technology- applications.	1	2
13	Microarray technology.		
14	Medical and Industry Biotechnology Applications		
15	Agricultural and Environmental Biotechnology Application.		

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 basic definitions of biotechnology.	In class lecturing (using PowerPoint presentation and illustrations)	Written and oral periodical and final exams.
1.2	Describing different biotechnology fields and its approaches.	Laboratory practice on new techniques involved in DNA	Lab exams and reports.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		technology, DNA profiling and genetic engineering implication (Conducting experiments and writing reports).	
...	Outlying diverse genetic engineering concepts and its tools.	Activities and assignments.	Evaluation of lab activities results
2.0	Skills		
2.1	Examine purify and quantify nucleic acids (DNA and RNA).	Application of essential scientific techniques through lectures, classes and essays.	Course work reports.
2.2	Prepare biological samples from different sources (Blood, bacteria, liver, kidney, etc...).	Small group discussion	Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic.
2.3	Using computers and internet to search for recent information in Biotechnology.	Making connections between different topics across the course.	Evaluation of lab reports on operating equipment
3.0	Competence		
3.1	Developing oral presentations.	Engage student in carrying out internet search.	Oral exams.
3.2	Communicating personal ideas and thoughts.	Close monitoring while performing behavioral examination and experimentation.	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%
7			
8	Total		100

*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	Aluizio Borem Santos (Author), Fabricio R. (Author), David E. Bowen Understanding Biotechnology (2003)
Essential References Materials	<ul style="list-style-type: none"> - Bollegi DM Rozycki MD Edelstein SJ ; Protein Methods. Wiley-Liss 1996 - Jeremy Dale, Malcom von Schantz: From Genes to Genome (2007) 2nd Ed. - ISBN-10: 0470017341 . - Lewin B (2004) gene 8 Pearson prentice hall ISBN:0-13-123924-4 - Lodge J <i>et al</i> (2007) gene cloning Taylor and Francis ISBN 0-7487-6534-4 - Carson S and Reportson D (2006) laboratory Manual of manipulation and expression of recombinant DNA Elsevier academic press ISBN: 13-978-0-120-088418-6
Electronic Materials	<p>Web sites on the internet that are relevant to the topic</p> <p>https://www.coursera.org/</p> <p>https://www.edx.org</p>
Other Learning Materials	Multimedia associated with the text books and the relevant websites

2. Facilities Required

Item	Resources
<p>Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>Prepared lecture hall with audio –visual aids Equipped laboratory with DNA facilities.</p>
<p>Technology Resources (AV, data show, Smart Board, software, etc.)</p>	<p>Digital lab containing 15 computers.</p>
<p>Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)</p>	<p>Incubators, autoclaves, measuring equipment, water bath, digital balances, pH meters, safety facilities.</p>

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Obtaining Student Feedback on Effectiveness of Teaching		Questionnaires
Obtaining Student Feedback on Effectiveness of Teaching		Peer consultation by departmental specialized committee.
Obtaining Student Feedback on Effectiveness of Teaching		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

