

Course Specification

— (Postgraduate Programs)

Course Title:	Advanced Biotechnology
Course Code:	BIO-6130
Program:	Master of Science in Applied Biology (Common Course)
Department:	Biology
College:	Science
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	1
Last Revision Date:	<i>Pick Revision Date.</i>



Table of Contents

A. General information about the course:.....	3
C. Course Content:	5
D. Students Assessment Activities:	7
E. Learning Resources and Facilities:.....	7
F. Assessment of Course Quality:.....	7
G. Specification Approval Data:.....	8

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A. General information about the course:

1. Course Identification:

1. Credit hours: 4 (Lecture 3 + Lab 2)

2. Course type

A. ☐ University ☐ College ☐ Department ☒ Track

B. ☒ Required ☐ Elective

3. Level/year at which this course is offered: (Level 1 / first year)

4. Course general Description:

This course establishes a solid foundation in biotechnology for the students. An overview of the principles and methodologies underlying molecular and applied genetic engineering in relation to the genetic modification of organisms and their byproducts. It would encompass contemporary biotechnology techniques that are being applied in industrial, agricultural, and medicinal settings.

5. Pre-requirements for this course (if any):

None

6. Co-requisites for this course (if any):

None

7. Course Main Objective(s):

The objective of this course is to provide the students with a fundamental theoretical understanding of complex genetic manipulation. The course familiarizes the student with the current technology and drives principles of Biotechnology. Among the course aims is to allow the students to identify the state-of-the-art experimental approaches in "Biotechnology Research".



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	emerging problems with insights at the forefront of the discipline.			
	Demonstrate expertise in fundamental and specialized biotechnological methodologies and an understanding of their advantages, limitations and applications;		Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
1.2	Identify and resolve scientific and technical problems associated with the applications of biotechnology		Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
2.0	Skills			
2.1	Deal with complex scientific issues with confidence, independence, and originality		-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.2	Continue to advance knowledge and understanding, and develop new skills in the application of biotechnology		-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.3	Understand and adopt to future developments in biotechnology and their practical application.		-Two credits weekly lectures -Tutorials	-Presentations -Reports
3.0	Values, autonomy, and responsibility			
3.1	Show independence and responsibility and cooperate effectively in a team to carry out research work		Group discussions	-Presentations -Reports
3.2	Discuss the scientific issues and present research results via oral presentations and in written format.		Group discussions	-Presentations -Reports



C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction and DNA transcription - The structure and foundation of DNA and RNA - DNA transcription to RNA	6
2.	DNA Translation - The process of translation - The genetic code and its degeneracy - Introns/Exons	6
3.	Gene cloning: tools of the trade - Materials and methods of Gene cloning Classes and properties of the enzymes used in gene cloning - Polymerase chain reaction principle.	6
4.	Gene Cloning: how it is done - Listing the different types of cloning vectors - Basic properties of a plasmid - Outlining the methods of DNA introduction into cells - Outline the methods used for the selection of transformants including being able to describe the use of insertional inactivation, blue/white selection and replica plating	6
5.	Gene cloning: finding the gene - Outlining the strategies and methodologies for identifying a gene of interest. - Including marker rescue/ complementation and its limitations - Including the features of genomics and cDNA libraries showing why one or other is used. - Hybridization probing and detection of translation proteins.	6
6.	Industrial enzymes: - Major industrial sectors - Food enzymes - Producer organisms - Impact of genetic modification - Enzyme manufacture - Downstream processing	6
7.	Medical Biotechnology: - Importance of pharmaceutical production of recombinant proteins - Synthesis of recombinant enzymes from bacteria and fungi - Synthesis of recombinant enzymes from mammal cells	6
8	Agricultural Biotechnology	3





- Understand the importance of plant biotechnology - Learn about gene delivery into plants and their various methods	
Total	45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam-1	5 th week	20%
2.	Midterm exam-2	10 th week	20%
3.	Assignments, presentations, attendance, data search, participation	Throughout the semester duration	20%
4.	Final exam	16 th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	-Gene Cloning and DNA analysis, An Introduction, T.A.Brown seventh edition, ISBN-13-978-1119072560 - Fundamentals of Biotechnology, James Allen, ISBN-13-978-1639872442
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the specialty)	



F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of students assessment	Faculty	Direct
Quality of learning resources	Faculty	Direct
The extent to which CLOs have been achieved	Faculty	Direct
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

-	BIOLOGY DEPARTMENT COUNCIL
REFERENCE NO.	23
DATE	23/8/1445