



Course Specification

— (Bachelor)

Course Title: Agriculture Biotechnology

Course Code: 2054205-3

Program: Bachelor in Biotechnology

Department: Biotechnology Department

College: College of science

Institution: Taif University

Version: V4

Last Revision Date: 3/2445-9/2023



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A. General information about the course:

1. Course Identification

1. Credit hours:

3 (2 Lecture, 1 Lab)

2. Course type

A. University College Department Track Others

B. Required Elective

3. Level/year at which this course is offered: (12th level/ Year 4)

4. Course general Description:

This course introduces the principles of plant biotechnology and their applications. It covers plant genome structure and function, regulation of gene expression, plant gene isolation, reporter genes, vectors, techniques of plant transformation, plant biotechnology applications including herbicide resistance, insect resistance, abiotic resistance, and plant product quality improvement. The course also covers plant tissue culture and molecular marker technologies and their applications in plant improvement.

5. Pre-requirements for this course: (Genomics and Proteomics, 2053102-3)

Genomics and Proteomics, 2053102-3

6. CO-requirements for this course (if any):

NA

7. Course Main Objective(s):

Introduce the principal concepts of plant biotechnology to explain the molecular basis of plant biotechnology and to produce transgenic plants.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		
4	Distance learning		

3. Contact Hours (based on the academic semester)



No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	15
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Recognize the principles and concepts of plant biotechnology	K4	Lecture	Written Exams
1.2	Describe the ethics, risks, regulations, and economic impact of biotechnology.	K4	Lecture	Written Exams
...				
2.0	Skills			
2.1	Evaluate the applications of plant biotechnology	S1	Project	Practical Exam
2.2	Practice the use of tissue culture in plant biotechnology	S1	Discussion	Report
...				
3.0	Values, autonomy, and responsibility			
3.1	Represent personal organization	V2	project	Poster, Performance Evaluation
3.2	Adopt cooperation and working in a team	V4	Discussion	Assignment
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction in Agricultural biotechnology: identification, applications, and benefits	2



2.	Plant genome: including the structure of plant genomes, types of genome and comparative genomics.	2
3.	Plant gene, including the organization of genes, regulatory elements, and repetitive DNA sequences.	2
4.	Plant gene expression and regulation mechanism in plants, including transcriptional, post-transcriptional, and epigenetic regulation.	4
5.	Gene isolation, recombinant DNA, vectors	2
5.	Application of plant cells and tissues cultures in plants: Basic requirement for plant tissue culture; methods of plant tissue culture	4
6.	Clonal variation, Anther, and ovule culture somatic embryogenesis	2
7.	Plant transformation, agrobacterium-mediated, direct gene transfer	2
8.	Techniques of plant transformation: the methods used to transform plants, including, physical and chemical methods.	2
9.	Molecular markers and source of variation to study plant genetics and breeding	4
10.	Improvement of plant production- economic traits	2
11.	Improvement of nutritional value of plant products	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam	Week 7	20%
2.	Periodical exam	Week 10	10%
3.	Report, Poster, Assignment	Week 12	10%
4.	Practical Exam, Performance Evaluation	Week 15	20%
5.	Final Exam	Week 16	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	Pollard, Thomas D. Cell biology. 2nd Ed., Philadelphia Saunders/Elsevier, 2008
Supportive References	Plant Biotechnology and Genetics: Principles, Techniques, and Applications
Electronic Materials	Plant Biotechnology and Genetics: Principles, Techniques, and Applications 2nd Edition, C. Neal Stewart Jr. (Editor), ISBN-13: 978-1118820124, 2008
Other Learning Materials	Plant biotechnology websites, http://www.otago.ac.nz/plant-biotechnology/index.html



2. Required Facilities and equipment

Items	Resources
<p>facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)</p>	<ol style="list-style-type: none"> 1. One classroom 2 hours per week for each section 2. Laboratory 3 hours per week for each practical section
<p>Technology equipment (projector, smart board, software)</p>	<ol style="list-style-type: none"> 1. Projector for each classroom 2. Projector in each laboratory
<p>Other equipment (depending on the nature of the specialty)</p>	<ol style="list-style-type: none"> 1. Laboratory for 3 hours per week 2. Bacterial strains for cloning, Agrobacterium 3. Restriction enzymes, DNA ligase, plasmids, Chemicals 4. PCR mix, Primers 5. DNA isolation kits

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer Review, Students	Direct (Independent Reviewer), Indirect (survey)
Effectiveness of Students assessment	Faculty members	Direct (Random Correction)
Quality of learning resources	Students	Indirect (survey)
The extent to which CLOs have been achieved	Faculty members	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	6
DATE	5/11/2023