

Course Syllabus

1	Course title	Biotechnology in Plant Protection	
2	Course number	0606950	
3	Credit hours	2	
	Contact hours (theory, practical)	2	
4	Prerequisites/corequisites		
5	Program title	Ph.D. in Plant Protection	
6	Program code		
7	Awarding institution	The University of Jordan	
8	School	School of Agriculture	
9	Department	Department of Plant Protection	
10	Course level		
11	Final qualification	Ph.D. degree	
12	Year of study and semester (s)	2020-2021/ Second Semester	
13	Other department (s) involved in teaching the course		
14	Main teaching language	English	
15	Delivery method	✓ Face to face learning <input type="checkbox"/> Blended <input type="checkbox"/> Fully online	
16	Online platforms(s)	✓ Moodle ✓ Microsoft Teams <input type="checkbox"/> Skype <input type="checkbox"/> Zoom	
17	Issuing/Revision Date	22/02/2021	

18 Course Coordinator:

Name: Dr. Nida' Salem

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19 Other instructors:

**20 Course Description:**

As stated in the approved study plan.

This course deals with the most recent developments in modern technology through the use of living organisms, their materials, or residues for agricultural pest management including insects, plant diseases and weeds and application methods of this modern technology. It includes also a training part for students on the required instruments used in biotechnology. Certain lectures may be converted into practical.

21 Course aims and outcomes:



A- Aims:

At the end of the course:

1. Students will be more informed about “Biotechnology” means,
2. Understand how biotechnology is being used in different sectors of Plant Protection
3. Enable graduate students to work in such area in Plant Protection.

B- Intended Learning Outcomes (ILOs):

Upon successful completion of this course student will be able to

A. Knowledge and Understanding: Student is expected to:

- A1- Know the basic and principles of biotechnology.
- A2- Know the molecular techniques including biochemical techniques, immunoassays and nucleic acid-based techniques that used for detection of microbial pathogens and insects.
- A3- Know the molecular basis of variability of plant pathogens.
- A4- Recognize the molecular biology of plant disease development including attachment, germination, initiation of infection, colonization of host tissues and symptoms expression.
- A5- Understand the different strategies that used for exclusion and elimination of microbial plant pathogens.
- A6- Learn the causes and concerns related to transgenic resistance to crop diseases.
- A7- Know the molecular basis of biocontrol potential.
- A8- Understand at molecular level the resistance of the pathogen to chemicals.

B. Intellectual Analytical and Cognitive Skills: Student is expected to:

- B1- Diagnose the plant pathogens using the state-of-art molecular techniques.
- B2- Be able to assess and develop alternative strategies for control of plant pathogens.

C. Subject- Specific Skills: Student is expected to:

- C1- Apply the basic knowledge of Biotechnology for detection and diagnosis of plant pathogens and biocontrol agents.
- C2- Integrate different approaches for plant disease management based on the understanding the molecular biology of plant pathogens interactions.

D. Transferable Key Skills: Student is expected to:

- D1- Work effectively to identify plant problems related to microbial pathogens by using different molecular techniques.
- D2- Explore and assess a range of control measures to solve plant problems.

Upon successful completion of this course, students will be able to:

PLOs	1	2	3	4	5	6	7	8	9	10	11
SLOs of the course											
A1- Know the basic and principles of biotechnology.	√										
A2- Know the molecular techniques including biochemical techniques, immunoassays and nucleic acid-based techniques that used for detection of microbial pathogens and insects.	√										
A3- Know the molecular basis of variability of plant pathogens.	√										
A4- Recognize the molecular biology of plant disease development including attachment, germination, initiation of infection, colonization of host tissues and symptoms expression.	√										
A5- Understand the different strategies that used for exclusion and elimination of microbial plant pathogens.	√										
A6- Learn the causes and concerns related to transgenic resistance to crop diseases.	√										
A7- Know the molecular basis of biocontrol potential.	√										
A8- Understand at molecular level the resistance of the pathogen to chemicals.	√										
B1- Diagnose the plant pathogens using the state-of-art molecular techniques.		√	√								
B2- Be able to assess and develop alternative strategies for control of plant pathogens.		√	√								
C1- Apply the basic knowledge of Biotechnology for detection and diagnosis of plant pathogens and biocontrol agents.					√						
C2- Integrate different approaches for plant disease management based on the understanding the molecular biology of plant pathogens interactions.				√	√			√			
D1- Work effectively to identify plant problems related to microbial pathogens by using different molecular techniques.					√		√				
D2- Explore and assess a range of control measures to solve plant problems.				√			√				√



C- Intended Learning Outcomes (PLOS)

After the successful completion of this program student should be able to:

1. Demonstrate broad depth knowledge of core concepts in plant protection.
2. Exhibit teaching competence through teaching, seminars and speaking experiences.
3. Interpret scientific literature related to Plant pathology, Entomology, or Weed science.
4. Formulate hypotheses, and develop experimental designs to test these hypotheses.
5. Establish and maintain experiments in the field of Plant Pathology, Entomology, or Weed science.
6. Perform appropriate statistical analyses for data collected in in Plant Pathology, Entomology, and Weed science.
7. Think critically, solve research problems, and draw conclusions in the field of Plant Pathology, Entomology, or Weed science
8. Interpret and present research results in both oral and written formats.
9. Publish research in the field of Plant Protection in peer-reviewed scientific journals.
10. Maintain a leadership role in Plant Protection at the national and international levels.
11. Commit to ethics and compliance responsibilities for being an agricultural engineer, especially with regard to agricultural sector, environment, and society.

22. Topic Outline and Schedule:

Week	Lecture	Topic	Intended Learning Outcome	Learning Methods	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1	Introduction, outline discussion		Face to Face		Synchronous		
	1.2	DNA as a genetic material, structure, replication, gene expression	A1	Face to Face		Synchronous	Exam, quiz	Ref.1/Chp. 1
2	2.1	DNA as a genetic material, structure, replication, gene expression	A1	Face to Face		Synchronous	Exam, quiz	Ref.1/Chp. 1
	2.2	DNA as a genetic material, structure, replication, gene expression	A1	Face to Face		Synchronous	Exam, quiz	Ref.1/Chp. 1
3	3.1	Molecular techniques for detection of plant pathogens	A2, B1, C1, D1	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.1
	3.2	Molecular techniques for detection of plant pathogens	A2, B1, C1, D1	Face to Face		Synchronous	Exam, quiz, presentation,	Ref.2/Chp. 2/Vol.1

							assignment	
4	4.1	Molecular techniques for detection of plant pathogens	A2, B1, C1, D1	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.1
	4.2	Molecular techniques for detection of plant pathogens	A2, B1, C1, D1	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.1
5	5.1	Molecular variability of plant pathogens	A3, B1, C1, D1-D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 3/Vol.1
	5.2	Molecular variability of plant pathogens	A3, B1, C1, D1-D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 3/Vol.1
6	6.1	Molecular variability of plant pathogens	A3, B1, C1, D1-D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 3/Vol.1
	6.2	Molecular biology of plant disease development	A4-A5, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.2
7	7.1	Molecular biology of plant disease development	A4-A5, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.2
	7.2	Molecular biology of plant disease development	A4-A5, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.2
8	8.1	Molecular biology of plant disease development	A4-A5, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.2
	8.2	Molecular biology of plant disease development	A4-A5, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.2
9	9.1	Molecular biology of plant disease development	A4-A5, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.2
	9.2	Midterm exam						
10	10.1	Molecular biology of plant disease development	A4-A5, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.2
	10.2	Molecular biology of plant disease development	A4-A5, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.2
11	11.1	Exclusion and elimination of plant pathogens	A6-A8, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.3
	11.2	Exclusion and elimination of plant pathogens	A6-A8, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 2/Vol.3

							assignment	
12	12.1	Genetic resistance of crops to diseases	A6-A8, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 3/Vol.3
	12.2	Genetic resistance of crops to diseases	A6-A8, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 3/Vol.3
13	13.1	Molecular biology of biocontrol activity against crop diseases	A6-A8, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 6/Vol.3
	13.2	Molecular biology of biocontrol activity against crop diseases	A6-A8, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 7/Vol.3
14	14.1	Molecular biology of pathogen resistance to chemicals	A6-A8, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 7/Vol.3
	14.2	Molecular biology of pathogen resistance to chemicals	A6-A8, B2, C2, D2	Face to Face		Synchronous	Exam, quiz, presentation, assignment	Ref.2/Chp. 7/Vol.3
15	15.1	Students project	A1-A8, B1-B2, C1-C2, D1-D2	Face to Face		Synchronous	Exam, presentation	
	15.2	Students project	A1-A8, B1-B2, C1-C2, D1-D2	Face to Face		Synchronous	Exam, presentation	

23 Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
Midterm exam	30	Wk1- Wk8	A1-A5, B1-B2, C1-C2, D1-D2	9th week	
Activities:	30		A1-A8, B1-B2, C1-C2, D1-D2	At the end of each topic	
1. Quizzes	10				
2. Presentation	10				
3. Assignment	10				
Final Exam	40	W1- W15 all topics	A1-A8, B1-B2, C1-C2, D1-D2	Will be announced from registrar	



24 Course Requirements

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

Students should have a computer, internet connection, and account on Microsoft teams to have access to course materials and for some course activities.

25 Course Policies:

Concerns or complaints should be expressed in the first instance to the module lecturer; if no resolution is forthcoming, then the issue should be brought to the attention of the module coordinator (for multiple sections) who will take the concerns to the module representative meeting. Thereafter, problems are dealt with by the Department Chair and if still unresolved the Dean and then ultimately the Vice President. For final complaints, there will be a committee to review grading the final exam. For more details about the below issues (**A-F**), please read the University regulations and visit: <http://units.ju.edu.jo/ar/LegalAffairs/Regulations.aspx>

A- Attendance policies.

B- Absences from exams and submitting assignments on time.

C- Health and safety procedures.

D- Honesty policy regarding cheating, plagiarism, misbehavior.

E- Grading policy.

From (%)	To (%)	Scale	Mark	Result
0	59	0	C	Fail
60	63	2.5	C+	Good
64	67	2.75	B-	Very Good
68	75	3	B	Very Good
76	79	3.5	B+	Very Good
80	83	3.75	A ⁻	Excellent
84	100	4	A	Excellent

F- Available university services that support achievement in the course:



26 References:

Main References:

1. Barnum, S. S. (2005) Biotechnology: An Introduction. 2nd edition. Thomson Brooks/Cole.
2. Narayanasamy, P. (2008) Molecular Biology in Plant Pathogenesis and Disease Management. Vol. 1, 2 and 3. Springer Science and Business Media B. V.

Other references:

1. Pelt-Verkuil, E. V., Belkum, A. V., Hays, J. P. (2008) Principles and Technical Aspects of PCR Amplification. Springer Science and Business Media B. V.
2. Punja, Z.K., De Boer, S. H., Sanfacon, H. (2007) Biotechnology and Plant Disease Management. CAB International.
3. Sambrook, J., Russell, D. W. (2001) Molecular Cloning: A Laboratory Manual. CSHI. Press, Cold Spring Harbor.
4. Slater, A., Scott, N. W., Fowler, M. R. (2003) Plant Biotechnology: The genetic manipulation of plants. Oxford Press.
5. Weaver, R. F. (2001) Molecular Biology. 2nd edition. McGraw-Graw Hill Companies.
6. Selected papers will be discussed.

27 Additional information:

Certain lectures may be converted into practical (virtual).

Name of Course Coordinator: -----	Signature: -----	Date: -----
Head of Curriculum Committee/Department: -----	Signature: -----	
Head of Department: -----	Signature: -----	
Head of Curriculum Committee/Faculty: -----	Signature: -----	
Dean: -----	Signature: -----	