



Form: Course Syllabus	Form Number	EXC-01-02-02A
	Issue Number and Date	2963/2022/24/3/2 5/12/2022
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1	Course title	Ecology & Genetic of Phytopathogenic Bacteria
2	Course number	0606963
3	Credit hours	3
	Contact hours (theory, practical)	3
4	Prerequisites/corequisites	
5	Program title	PhD in Plant Protection
6	Program code	
7	Awarding institution	The University of Jordan
8	School	School of Agriculture
9	Department	Plant Protection
10	Course level	PhD
11	Year of study and semester (s)	First semester -2022/2023
12	Other department (s) involved in teaching the course	-
13	Main teaching language	English
14	Delivery method	Face to face learning <input checked="" type="checkbox"/> Blended <input type="checkbox"/> Fully online
15	Online platforms(s)	Moodle <input checked="" type="checkbox"/> Microsoft Teams <input type="checkbox"/> Skype <input type="checkbox"/> Zoom <input type="checkbox"/> Others.....
16	Issuing/Revision Date	02.10.2022



17. Course Coordinator:

Name: Dr. Nehaya Al-Karablieh	Contact hours: Tuesday, Thursday: 12:30-14:00
Office number: 184	Phone number: 22343
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18. Other Instructors:

Name:
Office number:
Phone number:
Email:
Contact hours:
Name:
Office number:
Phone number:
Email:
Contact hours:

19. Course Description:

This course deals with giving an idea of knowledge about the survival structures of bacteria in their environment under favorable and unfavorable environmental conditions. Students will learn basic and advanced information about bacterial genetics, bacterial diversity, types of mutation, the impact of the mutation on drug and antibiotic resistance, and the use of bacteria and bacteriophages in the biological control of bacterial plant pathogens. Part of the lectures in this course can be converted into practical laboratories, and the active learning methodology will be used.

20. Program Intended Learning Outcomes: (To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

- 1- Give the student an idea about the bacterial genetics, diversity, etc.
- 2- Give an idea about the bacterial strain development.
- 3- Give an idea about the virulence factors and their role in bacterial diseases.
- 4- Principles of bacterial strains resistance to antibiotic and chemicals



21. Course Intended Learning Outcomes: (Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

A: Knowledge and Understanding

- A1: Have an idea about DNA structure, models and replication
- A2: The basic concept and elements in bacterial genetic diversity
- A3: Role of plasmids, chromosome and virulence factors in disease induction
- A4: Resistant of bacterial cells to antibiotic and chemicals

B: Intellectual Analytical and Cognitive Skills

- B1: Develop of bacterial strains through mutation, mutagenesis, ultra violet light, chemicals
- B2: Genetic diversity within the same species
- B3: The role of Virulence factors; extrapolsaccharides, enzymes, CWDE, pectolytic enzymes, toxins, growth regulators. Ice nucleation and plasmids in bacterial diseases

C: Subject- Specific Skills

- C1: Know the genetic basis of the structure of DNA in bacterial cell and their models
- C2: Transfer of genetic material cell between the different bacterial cells
- C3: Convert bacterial cells from F- to F+ cell.
- C4: Transformation, transduction and conjugation processes

D: Transferable Key Skills

- D1: Difficulties in bacterial disease control as a result of developing new strains to bactericides

Program Learning Outcomes (PLOs)

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. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

PLOs	1	2	3	4	5	6	7	8	9	10	11
CLOs	1	2	3	4	5	6	7	8	9	10	11
A1: Have an idea about DNA structure, models and replication	X										
A2: The basic concept and elements in bacterial genetic diversity	X										
A3: Role of plasmids, chromosome and virulence factors in disease induction			X								
A4: Resistant of bacterial cells to antibiotic and chemicals			X								
B1: Develop of bacterial strains through mutation, mutagenesis, ultra violet light, chemicals				X							
B2: Genetic diversity within the same species				X							
B3: The role of Virulence factors; extrapolsaccharides, enzymes, CWDE, pectolytic enzymes, toxins, growth regulators. Ice nucleation and plasmids in bacterial diseases						X					
C1: Know the genetic basis of the structure of DNA in bacterial cell and their models											
C2: Transfer of genetic material cell between the different bacterial cells					X						
C3: Convert bacterial cells from F- to F+ cell.					X						
C4: Transformation, transduction and conjugation processes					X			X			
D1: Difficulties in bacterial disease control as a result of developing new strains to bactericides							X	X			



23. Topic Outline and Schedule:

Week	Lecture	Topic	ILO/s Linked to the Topic	Learning Types (Face to Face/ Blended/ Fully Online)	Platform Used	Synchronous / Asynchronous Lecturing	Evaluation Methods	Learning Resources
1	1.1	Overview bacteria, structure of bacterial cells, bacterial growth, genera of Plant Pathogenic Bacteria.	A1-A5	Blended	Microsoft teams	S	Exam, Assignment, Presentation	7.9.12
	1.2	Cont.	A1-A5	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	7.9.12
2	2.1	Cont.	A1-A5	Blended	Microsoft teams	S	Exam, Assignment, Presentation	7.9.12
	2.2	Cont.	A1-A5	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	7.9.12
3	3.1	Concepts and terminology, gene, genetics, plasmid, chromosome, gene expression, mutation, genotype, phenotype, variation, adaptation, life cycle, selection.	A1-A3	Blended	Microsoft teams	S	Exam, Assignment, Presentation	1,4.6
	3.2	Cont.	A1-A3	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	1,4.6
4	4.1	Cont.	A1-A3	Blended	Microsoft teams	S	Exam, Assignment, Presentation	1,4.6
	4.2	Cont.	A1-A3	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	1,4.6
5	5.1	Cytological basis of	B1-B3	Blended	Microsoft	S	Exam,	1,4.6, 12,13



		bacterial genetics.			teams		Assignment, Presentation	
	5.2	Cont.	B1-B3	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	1,4,6, 12,13
6	6.1	Cont.	B1-B3	Blended	Microsoft teams	S	Exam, Assignment, Presentation	1,4,6, 12,13
	6.2	Cont.	B1-B3	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	1,4,6, 12,13
7	7.1	Molecular aspects of bacterial genetics, DNA and RNA structure, DNA replication, recombination in bacteria. exchange genetic material bacteria, transformation, conjugation and transduction.	C1-C3	Blended	Microsoft teams	S	Exam, Assignment, Presentation	4,9,10,12,13
	7.2	Cont.	C1-C3	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	4,9,10,12,13
8	8.1	Cont.	C1-C3	Blended	Microsoft teams	S	Exam, Assignment, Presentation	4,9,10,12,13
	8.2	Mutation: molecular basis of mutation, mutagenic agent, induced and spontaneous mutation.	D1-D4	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	10,11,13
9	9.1	Cont.	D1-D4	Blended	Microsoft teams	S	Exam, Assignment, Presentation	10,11,13
	9.2	Cont.	D1-D4	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	10,11,13
10	10.1	Exam						
	10.2	Molecular genetic of pathogenicity to phytopathogenic bacteria. Virulence factors in Plant Pathogenic Bacteria : Plasmids their role in phytopathogenic bacteria, Toxins, functions,	A1-A5	Blended	Microsoft teams	S	Exam, Assignment, Presentation	1,2,5,6,10,12



		classification, mode of action with examples. Polysaccharides (homo and hetero polysaccharides) Enzymes: CWDE, pectolytic enzymes, Growth regulators, IAA, cytokinen. Ice nucleation						
11	11.1	Cont.	A1-A5	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	1,2,5,6,10,12
	11.2	Cont.	A1-A5	Blended	Microsoft teams	S	Exam, Assignment, Presentation	1, 3, 1,2,5,6,10,12
12	12.1	Antibiotic resistance in phytopathogenic bacteria, types, mode of action to heavy metals	A1-A5	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	3,7,11
	12.2	Cont.	A1-A5	Blended	Microsoft teams	S	Exam, Assignment, Presentation	3,7,11
13	13.1	Cont.	A1-A5	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	1, 3, 5,6,7
	13.2	Presentation						
14	14.1	Plant regulated bacterial genes: Agrobacterium , Rhizobium gene control host specificity.	C1-C3	Blended	Microsoft teams	S	Exam, Assignment, Presentation	2,3,6,8
	14.2	Cont.	C1-C3	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	2,3,6,8
15	15.1	Cont.	C1-C3	Blended	Microsoft teams	S	Exam, Assignment, Presentation	2,3,6,8
	15.2	Cont.	C1-C3	Blended	Microsoft teams	AS	Exam, Assignment, Presentation	2,3,6,8
		Final Exam based on university schedule						



24. Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	ILO/s Linked to the Evaluation activity	Period (Week)	Platform
Midterm Exam	30	Week 1-9	A1- A5 B1- B3 C1, C3 D1-D3	10	Face to Face
Presentation	30	Week 10-13	A1- A5 C1-C3	13	Face to Face
Final exam	40	all	all	University Schedule	Face to Face

25. 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.



26. Course Policies:

- A- Attendance policies: According to university regulations
- B- Absences from exams and submitting assignments on time: According to university regulations
- C- Health and safety procedures: General Laboratory instructions will be explained and discussed with the students during laboratory work.
- D- Honesty policy regarding cheating, plagiarism, misbehavior: According to university regulations
- For more details on University regulations please visit:
<http://www.ju.edu.jo/rules/index.htm>
- E- Grading policy: According to university regulations
- F- Available university services that support achievement in the course: Literature room and Data show, Teaching laboratory, etc.

27. References:

- A- Required book(s), assigned reading and audio-visuals:
1. Agrios, G. N. 2005. Plant Pathology. 5th edition. University of Florida, Academic Press.
 2. Janes, J.D. 2005. Phytobacteriology Principles and Practices. Plant protection service. Wageningen. The Netherlands.
 3. Madigan, M.T. and Martinko, J. M. 2005. Brock Biology of Microorganisms, 11th edition. Southern Illinois University Carbondale, Pearson Education International.
- B- Recommended books, materials, and media:
1. Birge, A.E. 1981. Bacterial and Bacteriophage Genetics. Springer verlag, New York pp 359.
 2. Chatterjee, A.K. 1986 Genetics of pathogenicity factors: application to phytopathogenic bacteria: Advances in Plant Pathology Vol. 4: Academic Press, London.
 3. Crute, I. R. 1986. Investigation of gene for gene relationship for genetic analysis of both host and parasite. Plant pathology, 35: 15-17.
 4. Day, P.R. 1980. Genetics as a tool in microbiology. Cambridge University pp. 361-75.
 5. Donala, R. H 1985. Plasmids in Bacteria Plenum press, New York pp. 995.
 6. Dorman CJ: The genetics of bacterial virulence. Blackwell Scientific Press, Oxford, England, 1994.
 7. Gnanamanickam S. Sam et al. 2006. Plant Associated Bacteria, Springer. Netherland
 8. Gracen, V.E. 1982. Role of Genetics in Etiological Phytopathology. Ann. Rev. of phytopathology, 20: 219-33.
 9. Janes, J.D. 2005. Phytobacteriology Principles and Practices. Plant Protection service. Wageningen. The Netherlands.
 10. Miller VL, Kaper JB, Portnoy DA et al. (eds): Molecular genetics of bacterial pathogenesis. American Society for Microbiology, Washington DC, 1994.
 11. Miushushi, S. 1985. Drug Resistance in Bacteria. Genetic Biochemistry and Molecular Biology.
 12. Saylers AA, Whitt DD: Bacterial pathogenesis: a molecular approach. American Society for Microbiology, Washington DC, 1994.

**28. Additional information:**

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.

Name of the Instructor or the Course Coordinator:	Signature:	Date:
Name of the Head of Quality Assurance Committee/ Department	Signature:	Date:
Name of the Head of Department	Signature:	Date:
Name of the Head of Quality Assurance Committee/ School or Center	Signature:	Date:
Name of the Dean or the Director	Signature:	Date: