



Form: Course Syllabus	Form Number	EXC-01-02-02A
	Issue Number and Date	2963/2022/24/3/2 5/12/2022
	Number and Date of Revision or Modification	2/(10/12/2023)
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	The Date of the Deans Council Approval Decision	26/12/2023
	Number of Pages	06

1.	Course Title	Pesticides Analysis
2.	Course Number	0606913
3.	Credit Hours (Theory, Practical)	3
	Contact Hours (Theory, Practical)	3
4.	Prerequisites/ Corequisites	Pesticides 0606351
5.	Program Title	Ph.D. in Plant Protection
6.	Program Code	
7.	Awarding Institution	The University of Jordan
8.	School/ Center	School of Agriculture
9.	Department	Plant Protection
10.	Course Level	Ph.D.
11.	Year of Study and Semester (s)	
12.	Other Department(s) Involved in Teaching the Course	/
13.	Main Learning Language	English
14.	Learning Types	<input checked="" type="checkbox"/> Face to face learning <input type="checkbox"/> Blended <input type="checkbox"/> Fully online
15.	Online Platforms(s)	<input type="checkbox"/> Moodle <input type="checkbox"/> Microsoft Teams
16.	Issuing Date	October 2024
17.	Revision Date	

18. Course Coordinator:

Name: Prof. Tawfiq Al Antary	Contact hours:
Office number:	Phone number:
Email: t.antary@ju.edu.jo	

19. Other Instructors:

None



20. Course Description:

This course provide student with information about pesticide impact on environment, concept of analytical of chemistry, pesticide risk, assessment, formulation and residue analysis, sample preparation and extraction, clean-up and determination methods. Recent techniques used for pesticide residues determination will be discussed particularly GC and HPLC.

This module requires practical work consists of at least 15 lab periods including one period for the midterm exam and another one for final exam. In each lab period, the student should conduct a practical work on extraction, clean up and determination methods. He should be exposed and worked on recent equipment such as GC and HPLC.

The student should submit a copybook containing all practical periods by the end of the semester

21. Course aims and Intended Learning Outcomes:

The main aims of the course are:

1. Understand the international and local standards for pesticides residues in food commodities and the environment.
2. Follow the proper procedures in residue analysis from sampling to determination.
3. Hands on various instruments, especially chromatography, used in residue analysis.
4. Understand the principles of pesticides formulation analysis.

(Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

A. Knowledge and Understanding: Student is expected to

1. Be able to handle samples for residue analysis; sampling, extraction, clean-up and determination.
2. Be able to use instruments like GC, HPLC and others.

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

1. Choose the suitable methods for extraction and clean-up methods.
2. Choose the suitable apparatus and techniques for residue determination.
3. Apply local and international standards concerning maximum residue levels and other parameter.

C. Subject- Specific Skills: Students is expected to

1. Use the proper solvent(s) system.
2. Use extraction apparatus.
3. Pack and use column chromatography and other techniques for cleaning up.
4. Calibrate and handle recent equipment needed for pesticide analysis.

Work independently in laboratories concerned with pesticide analysis

D. Transferable Key Skills: Students is expected to

1. Applying different extraction and clean –up methods.
2. Exposing to advance residues determination and identifying methods and apparatus.



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

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. Demonstrate a 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.

Program ILOs	ILO (1)	ILO (2)	ILO (3)	ILO (4)	ILO (5)	ILO (6)	ILO (7)	ILO (8)	ILO (9)	ILO (10)	ILO (11)
Course ILOs											
A1	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>						
A2	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>						
B1					<input checked="" type="checkbox"/>						
B2					<input checked="" type="checkbox"/>						
B3					<input checked="" type="checkbox"/>						
C1	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>						
C2		<input checked="" type="checkbox"/>									
C3	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>					
C4			<input checked="" type="checkbox"/>								
D1							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
D2									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

**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	Information sources for pesticides and their impact on the environment	A 1	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	6
	1.2	Information sources for pesticides and their impact on the environment	A 1	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	6
	1.3	Information sources for pesticides and their impact on the environment	A 1	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	6
2	2.1	Elementary concepts of analytical chemistry	A2	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	7
	2.2	Elementary concepts of analytical chemistry	A2	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	7
	2.3	Elementary concepts of analytical chemistry	A2	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	7
3	3.1	Pesticide risk assessment	A3	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	6, 9
	3.2	Pesticide risk assessment	A3	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	6, 9
	3.3	Pesticide risk assessment	A3	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	6, 9
4	4.1	Formulation versus residue analysis	B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	4,5,7,8
	4.2	Formulation versus residue analysis	B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	4,5,7,8
	4.3	Formulation versus residue analysis	B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	4,5,7,8
5	5.1	Sample preparation	B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	5, 7
	5.2	Sample preparation	B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	5, 7
	5.3	Sample preparation	B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	5, 7
6	6.1	Extraction of pesticides	A, B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	5, 7



	6.2	Extraction of pesticides	A, B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	5, 7
	6.3	Extraction of pesticides	A, B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	5, 7
7	7.1	Clean- up of pesticides	A, B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	5, 7
	7.2	Clean- up of pesticides	A, B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	5, 7
	7.3	Clean- up of pesticides	A, B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	5, 7
8	8.1	Gas chromatography	A, B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	2
	8.2	High pressure liquid chromatography	A, B	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	2,3
	8.3	High pressure liquid chromatography	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	2,3
9	9.1	Thin layer chromatography	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	2,3
	9.2	Thin layer chromatography	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	2,3
	9.3	Thin layer chromatography	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	2,3
10	10.1	Spectrometry	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	1, 2
	10.2	Spectrometry	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	1, 2
	10.3	Spectrometry	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	1, 2
11	11.1	Mass spectrometry	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	1, 2
	11.2	Mass spectrometry	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	1, 2
	11.3	Mass spectrometry	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	1, 2
12	12.1	Nuclear magnetic resonance	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	1, 2, 3
	12.2	Nuclear magnetic resonance	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	1, 2, 3
	12.3	Nuclear magnetic resonance	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	1, 2, 3
13	13.1	Enzymatic methods	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	5, 7
	13.2	Enzymatic methods	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	5, 7
	13.3	Enzymatic methods	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	5, 7
14	14.1	Electrophoresis	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	2
	14.2	Electrophoresis	C	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	2
	14.3	Electrophoresis	C	Face to		Asynchronous	Exam, Quiz, presentation, project, assignments	2



				Face			assignments	
15	15.1	Miscellaneous methods	D	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	7
	15.2	Miscellaneous methods	D	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	7
	15.3	Miscellaneous methods	D	Face to Face		Asynchronous	Exam, Quiz, presentation, project, assignments	7

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
First	15	To Be agreed Upon	A, B	Week 6	Face to face
Second Exam	15	To Be agreed Upon	A, B, C	Week 10	Face to face
Assignments	20	To Be agreed Upon	A, B, C, D	All weeks	Face to face
Project	10	To Be agreed Upon	A, B, C, D	All weeks	Face to face
Final Exam	40	All Topics	A, B, C, D	University Calendar	Face to face

25. Course Requirements:

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

26. Course Policies:

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:

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

27. References:



A- Required book(s), assigned reading and audio-visuals:

1. Cartmell, E. and Fowles, U.S.A. (1977) Valency and Molecular Structure. Butter Worth, London. PP311.

B- Recommended books, materials, and media:

2. Ewing, W. Galen. 1985. Instrumental Methods of Chemical Analysis. Fifth edition MAcGrow Hill international Editions. N.Y., USA.
3. Hariss, E. Watter Habgood W. Henry. Programmed Temperatures Gas Chromatography. John Wiley and Sone, Inc. N.Y., USA.
4. Henriet, J., Lovett, J.F, Martign, A. and Povlsen, H.H. (2012) CIAPC Handbook. Analysis of Technical and Formulated Pesticides Collaborative International Pesticides Analytical Council Ltd., London, U.K.
5. Myoe, H., Anson, ed. (1981). Analysis of Pesticide Residues, Vol. 58 John Willey and Sons, N.Y., USA.
6. Mervyn, L.B(1991) Chemistry, Agriculture and Environment. The Royal Society of Chemistry, London, U.K.
7. Skoog, D. An and West, D.M (1986) Analytical Chemistry. Sounders College Publishing Ltd, New York. PP. 686.
8. Zweig, Gunther and Joseph Sherma (1984) Analysis Methods for: Pesticides and Plant Growth Regulators, Vol. V1: Gas Chromatographic Analysis. Academic press, N.Y, USA.
9. White –Stevens, R. (1976) Pesticides in the Environment, Vol. 1., Part 11: Marcell Dekker, N.Y, USA.

28. Additional information:

None

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