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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	The Date of the Deans Council Approval Decision	26/12/2023
	Number of Pages	12

1.	**Course Title**	Insect ecology
2.	**Course Number**	0606418
3.	**Credit Hours (Theory, Practical)**	3
	Contact Hours (Theory, Practical)	3
4.	**Prerequisites/ Corequisites**	General entomology
5.	**Program Title**	BSc In Plant protection
6.	**Program Code**	
7.	**School/ Center**	School of Agriculture
8.	**Department**	Department of Plant protection
9.	**Course Level**	B.Sc.
10.	**Year of Study and Semester (s)**	4th year
11.	**Other Department(s) Involved in Teaching the Course**	/
12.	**Main Learning Language**	English
13.	**Learning Types**	Face to face learning ☐Blended ☒ Fully online
14.	**Online Platforms(s)**	Moodle ☐Microsoft Teams ☐Skype ☐Zoom ☐Others
15.	**Issuing Date**	October 2024
16.	**Revision Date**	October 2024

17. Course Coordinator:

Name: Prof. Salah Araj	Contact hours:
Office number:	Phone number: +962 6 5355000 Ext. 22520
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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 incorporated population ecology, and applied ecology. It deals with elementary concepts of insect ecology, the various factors regulating abundance and distribution of insect populations, the tritrophic relationship between host plants/herbivores /natural enemies, and the applied aspects of insect ecology in plant protection.

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. Demonstrate a depth in understanding of the fundamental knowledge and skills required in the field of Plant Protection sciences, which include weeds, insects, mites, fungi, bacteria, viruses and nematodes.

2. Identify and distinguish harmful and beneficial weeds, insects, mites, fungi, bacteria, and nematodes.

3. Predict the outbreaks of pests and determine the level of infection based on skills gained in the field of Plant Protection Sciences.

4. Recognize different techniques (biological, chemical, cultural, and physical) in pest control.

5. Design and develop appropriate management strategies of pests in an environmentally friendly manner.

6. Participate efficiently in agricultural projects in the field of pest management in various public and private sectors in Jordan and worldwide.

7. Communicate effectively in written, oral, and graphical forms.

8. Employ the gained skills in communication and serving different communities.

9. Commit to ethics and compliance responsibilities for being an agricultural engineer, especially with regard to agricultural sector, environment and society.

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

1. To develop a knowledge and understanding of ecological principles at the individual (physiological & behavioral), and population levels.
2. Awareness of students with the factors related to insects distribution and what factors affect their abundance
3. To develop a knowledge and understanding of the mechanisms that mediate interactions of insects with their biotic and some biotic environments
4. To think ingenuity how to control insect pests with minimum disturbance to the environment.

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

~~Program ILOs~~ / ~~Course ILOs~~	ILO (1)	ILO (2)	ILO (3)	ILO (4)
1	√			
2	√			
3	√			
4				√
5		√		
6				
7		√		
8				
9			√	

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	Introduction to course content. Definitions Foundations		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1, 22
	1.2	 Origins 		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1, 25
	1.3	Ecology as a science 		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1
2	2.1	Methods for analyzing distributions		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1
	2.2	Terminology		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1
	2.3	Environmental Conditions (Temperature, moisture, wind) Temperature		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1
3	3.1	Biogeographic patterns: Arctic insects		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1

	3.2	Developmental rate		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1
	3.3	Day-degree modeling		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	3, 7, 14
4	4.1	Survival and Species interactions		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1
	4.2	Population dynamics		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	12
	4.3	Global climate change..		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	2
5	5.1	Tolerance Insect performance and temperature		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1
	5.2	Thermoregulation and insects		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1
	5.3	Biochemical, physiological, behavioral, morphological mechanisms involved		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1
6	6.1	Thermoregulation consequences on individual insects to populations and communities		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	1,21

	6.2	Escape in time: Dormancy Predictive vs. consequential dormancy		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	14, 26
	6.3	Diapause vs. quiescence		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	14, 26
7	7.1	Obligatory vs. facultative diapause		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	14, 26
	7.2	Escape in space (dispersal) vs. escape in time (dormancy)		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	14, 26
	7.3	How diapause is regulated .		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	14, 26
8	8.1	Timing of life stages in field crickets in relation to environmental gradients (latitude, elevation)		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	14, 26
	8.2	Importance of diapause in ecology, evolution, pest management		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	14, 26
	8.3	Tolerance Insect performance and temperature		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	2, 4

9	9.1	Thermoregulation and insects		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	8, 9
	9.2	Biochemical, physiological, behavioral, morphological mechanisms involved		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	11, 12
	9.3	Thermoregulation consequences on individual insects to populations and communities		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	13
10	10.1	Escape in time: Dormancy Predictive vs. consequential dormancy Diapause vs. quiescence		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	15, 16, 17, 18, 19
	10.2	Obligatory vs. facultative diapause Escape in space (dispersal) vs. escape in time (dormancy)		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	15, 16, 17, 18, 19
	10.3	How diapause is regulated Timing of life stages in field crickets in relation to environmental gradients		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	15, 16, 17, 18, 19

		(latitude, elevation)						
11	11.1	Importance of diapause in ecology, evolution, pest management		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	15, 16, 17, 18, 19
	11.2	Escape in space: Migration Measuring migratory movements Migration and other forms of movements		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	6
	11.3	Movement in context of life histories Physiological controls		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	6
12	12.1	Polymorphism in migratory capacity Migration in pest outbreak		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	6
	12.2	Biological invasions importance of invasions Assess the current status and future prospects for a predictive theory of invasions		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	10
	12.3	Feeding The evolutionary hurdles to feeding and		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	5, 6. 7, 14, 20

		living on seed plants?						
13	13.1	Insects and nutrition?		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	5, 6. 7, 14, 20
	13.2	Optimal growth and reproduction?		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	5, 6. 7, 14, 20
	13.3	Basis for the claim that plants supply food that is of marginal quality? Webworm case study		Fully Online	MS Teams	Synchronous	Homework, Quiz, Presentations	5, 6. 7, 14, 20

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 midterm exam	30	According to lecturing schedule	1 to 5	To be agreed upon	Face to Face
Quizess, participations	30	According to lecturing schedule	1 to 5	To be agreed upon	MS Teams
Final Exam	40	According to lecturing schedule	1 to 5	To be agreed upon	Face to Face

25. Course Requirements:

Students should have a computer, internet connection, webcam, account on a specific software/platform MS Teams)

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. Sharaf, N. S. 2012. Insect Ecology: Individuals, Populations, Communities and Ecosystems. Jordan University Publications. Amman. P 611.

B- Recommended books, materials, and media:

Main Reference/s:

2. Bradshaw, W. E., and C. M. Holzapfel. 2001. Genetic shift in photoperiodic response correlated with global warming. Proceedings of the National Academy of Sciences of the United States of America 98:14509-14511.
3. Caswell, H. 2001. Matrix population models: Construction, Analysis, and Interpretation, Second edition. Sinauer, Sunderland, Massachusetts, USA.
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5. Denno, R. F., M. A. Peterson, C. Gratton, J. A. Cheng, G. A. Langellotto, A. F. Huberty, and D. L. Finke. 2000. Feeding-induced changes in plant quality mediate interspecific competition between sap-feeding herbivores. Ecology 81:1814-1827.
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7. Dwyer, G., J. Firestone, and T. E. Stevens. 2005. Should models of disease dynamics in herbivorous insects include the effects of variability in host-plant foliage quality? American Naturalist 165:16-31.
8. Gotelli, N. J. 2001. A Primer of Ecology.265.
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10. Hastings, A., K. Cuddington, K. F. Davies, C. J. Dugaw, S. Elmendorf, A. Freestone, S. Harrison, M. Holland, J. Lambrinos, U. Malvadkar, B. A. Melbourne, K. Moore, C. Taylor, and D. Thomson. 2005. The spatial spread of invasions: new developments in theory and evidence. Ecology Letters 8:91-101.

11. Heinrich, B. 2003. Thermoregulation. Pages 1119-1126 *in* V. H. Resh and R. T. Carde, editors. Encylopedia of Insects. Academic Press, San Francisco, California, USA.
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13. Luck, R. F. 1990. Evaluation of natural enemies for biological control: a behavioral approach. Trends in Ecology and Evolution 5:196-199.
14. Nathan, R., and R. Casagrandi. 2004. A simple mechanistic model of seed dispersal, predation and plant establishment: Janzen-Connell and beyond. Journal of Ecology 92:733-746.
15. Parmesan, C. 2006. Ecological and Evolutionary Responses to Recent Climate Change. Annual Review of Ecology, Evolution, and Systematics 37:637-669.
16. Pierce, N. E., M. F. Braby, A. Heath, D. J. Lohman, J. Mathew, D. B. Rand, and M. A. Travassos. 2002. The ecology and evolution of ant association in the Lycaenidae (Lepidoptera). Annual Review of Entomology 47:733-771.
17. Root, R. B., and N. Cappuccino. 1992. Patterns in population change and the organization of the insect community associated with goldenrod. Ecological Monographs 62:393-420.
18. Rose, K. E., S. M. Louda, and M. Rees. 2005. Demographic and evolutionary impacts of native and invasive insect herbivores on *Cirsium canescens*. Ecology 86:453-465.
19. Samways, M. J. 2007. Insect Conservation: A Synthetic Management Approach. Annual Review of Entomology 52:465-487.
20. Schoonhoven, L. M., J. J. A. v. Loon, and M. Dicke. 2005. Insect-Plant Biology, 2nd edition. Oxford, New York, New York, USA.
21. Sharaf, N. S. 2012. Insect Ecology: Individuals, Populations, Communities and Ecosystems. Jordan University Publications. Amman. P 611.
22. Snyder, W. E., and A. R. Ives. 2001. Generalist predators disrupt biological control by a specialist parasitoid. Ecology 82:705-716.
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26. Zera, A. J., and R. F. Denno. 1997. Physiology and ecology of dispersal polymorphism in insects. Annual Review of Entomology 42:207-230.

28. Additional information:

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: ……..……