

Department of Entomology
Faculty of Agricultural Sciences
University of the Punjab, Lahore
Course Outline



Programme	B.Sc. (Hons) Agriculture (Major: Entomology)	Course Code	ENT-306	Credit Hours	3 (2-1)
Course Title	AGRICULTURAL PESTS AND THEIR MANAGEMENT				
Course Introduction					
<p>The graduate-level course holds significant importance due to its practical and applied nature. Its primary goal is to provide a comprehensive understanding of the identification, damage mechanisms, and management strategies for prominent agricultural pests, encompassing insect, mite, and vertebrate species. The course aims to impart knowledge on the distribution, host crops, biology, ecology, damage characteristics, and control methods for insect and mite pests affecting field crops, vegetables, and orchards, while also delivering a concise overview of other significant vertebrate and invertebrate pests. Additionally, students will be equipped with insights into the damage manifestations and effective management approaches, including integrated pest management (IPM) strategies, for major agricultural pests across diverse agricultural domains.</p>					
Learning Outcomes					
<p>On the completion of the course, the students will:</p> <ol style="list-style-type: none"> 1. Attain broad knowledge of the ecological and physiological aspects that pertain to the field of agricultural entomology and pest management. 2. Attain awareness of the impacts that insects have on agricultural entomology and pest management. 3. Preparation to be professionals in agricultural entomology. 					
Course Content (Theory)				Assignments/Readings	
Week 1	Unit 1 1.1.Introduction 1.1.1. Introduction to Course Outline, 1.1.2. Weekly scheme of work, 1.1.3. Lecture break-up of whole semester. 1.2. Insect Pests of Cotton 1.2.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of American bollworm. 1.2.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Army worm.				
	Unit 2 3.1.Insect Pests of Cotton (Cont.)			Reading for Quiz # 1: Revision Shah, H.A. and M.A. Saleem. 2015. Applied	

	<p>3.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Dusky cotton bug,</p> <p>3.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Red cotton bug,</p> <p>3.1.3. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Cotton Mealy bug</p>	<p>Entomology. 4th Edi. Pak Book Empire, Lahore. Atwal, A.S. 2005. Agricultural Pests of South-east Asia and their Management. 5th ed. Kalyani Publishers, Ludhiana.</p>
Week 2	<p>Unit 3 3.1. Insect Pests of Cotton (Cont.)</p> <p>3.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of cotton aphid</p> <p>3.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of whitefly</p> <p>3.1.3. Identification, Biology, distribution, host range, period of activity, mode of damage and management of jassid</p>	
	<p>Unit 4 4.1. Insect Pests of Sugarcane</p> <p>4.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Sugarcane top borer,</p> <p>4.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Sugarcane top borer, sugarcane stem borer</p> <p>4.1.3. Identification, Biology, distribution, host range, period of activity, mode of damage and management of sugarcane root borer,</p> <p>4.1.4. Identification, Biology, distribution, host range, period of activity, mode of damage and management of sugarcane gurdaspur borer</p>	<p>Quiz #1 via LMS, complete before midnight</p>
Week 3	<p>Unit 5 5.1. Insect Pests of Sugarcane (cont.)</p> <p>5.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of sugarcane leafhopper.</p> <p>5.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of sugarcane termites</p>	<p>Reading for Quiz # 2: Revision Shah, H.A. and M.A. Saleem. 2015. Applied Entomology. 4th Edi. Pak Book Empire, Lahore.</p>

	<p>5.1.3. Identification, Biology, distribution, host range, period of activity, mode of damage and management of sugarcane mealybug,</p> <p>5.1.4. Identification, Biology, distribution, host range, period of activity, mode of damage and management of sugarcane black bug</p> <p>5.1.5. Identification, Biology, distribution, host range, period of activity, mode of damage and management of sugarcane whitefly</p>	
	<p>Unit 6</p> <p>6.1. Insect Pests of Maize</p> <p>6.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of maize stem borer</p> <p>6.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of maize shoot fly</p>	Quiz #2 via LMS, complete before midnight
Week 4	<p>Unit 7</p> <p>7.1. Insect Pests of Maize (Cont.)</p> <p>7.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of maize Jassid</p>	
	<p>Unit 8</p> <p>8.1. Insect Pests of Citrus fruits</p> <p>8.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Asian citrus psyllid</p> <p>8.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of citrus leaf miner</p>	<p>Reading for Quiz # 3: Revision</p> <p>Shah, H.A. and M.A. Saleem. 2015. Applied Entomology. 4th Edi. Pak Book Empire, Lahore.</p>
Week 5	<p>Unit 9</p> <p>9.1. Insect Pests of Citrus fruits (Cont.)</p> <p>9.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of citrus whitefly</p> <p>9.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of lemon butterfly</p>	Quiz #3 via LMS, complete before midnight
	<p>Unit 10</p> <p>10.1. Insect Pests of fruit plants</p>	

Week 6	10.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of fruit flies	
	10.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of guava fruit flies 10.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of peach fruit flies	
	Unit 11 11.1. Insect Pests of fruit plants (cont.) 11.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of oriental fruit fly	
Week 7	Unit 12 12.1. Insect Pests of fruit plants (cont.) 12.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Grape vine thrips 12.2. Insect Pests of fruit Date Palm 12.2.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Red palm weevil	
	Unit 13 13.1. Insect Pests of Mango fruit 13.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Mango leaf-hopper	
Week 8	Unit 14 14.1. Insect Pests of Mango fruit (Cont.) 15.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Mango Mealybug	Reading for Quiz # 4: Revision Shah, H.A. and M.A. Saleem. 2015. Applied Entomology. 4th Edi. Pak Book Empire, Lahore.
	Unit 15 15.1. Insect Pests of Rice 15.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Brown plant hopper 15.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of white-backed plant hopper	Quiz #4 via LMS, complete before midnight
Week 9	Midterm Exam	

Week 10	Unit 16 16.1. Insect Pests of Rice (cont.) 16.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of White Rice Leafhopper 16.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of yellow rice stem borer	
	Unit 17 17.1. Insect Pests of Rice (cont.) 17.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of white stem borer of rice	Reading for Quiz # 5: Revision Shah, H.A. and M.A. Saleem. 2015. Applied Entomology. 4th Edi. Pak Book Empire, Lahore.
Week 11	Unit 18 18.1. Insect Pests of Rice (cont.) 18.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of rice leaf folder 18.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of rice hispa	Quiz #5 via LMS, complete before midnight
	Unit 19 19.1. Insect Pests of summer vegetables 19.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Hadda beetles	
Week 12	Unit 20 20.1. Insect Pests of summer vegetables (Cont.) 20.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Red pumpkin beetle 20.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Pentatomid bug	Reading for Quiz # 6: Revision Shah, H.A. and M.A. Saleem. 2015. Applied Entomology. 4th Edi. Pak Book Empire, Lahore.
	Unit 21 21.1. Insect Pests of summer vegetables (Cont.) 21.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of brinjal lace bug	

Week 13	Unit 22 22.1. Insect Pests of summer vegetables (Cont.) 22.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of brinjal fruit borer 22.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Brinjal stem borer	Quiz #6 via LMS, complete before midnight
	Unit 23 23.1. Insect Pests of summer vegetables (Cont.) 23.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of melon fruit fly	
Week 14	Unit 24 24.1. Insect Pests of summer vegetables (Cont.) 24.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of kaddu bug	
	Unit 25 25.1. Insect Pests of Winter vegetables 25.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Painted bug 25.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of onion thrips	
Week 15	Unit 26 26.1. Insect Pests of Winter vegetables (cont.) 26.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of green/potato bug 26.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of cabbage butterfly	
	Unit 27 27.1. Insect Pests of Winter vegetables (cont.) 27.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Tomato fruit borer	Reading for Quiz # 7: Revision Shah, H.A. and M.A. Saleem. 2015. Applied Entomology. 4th Edi. Pak Book Empire, Lahore.
Week 16	Unit 28 28.1. Insect Pests of Gram	

	<p>28.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Gram pod borer</p> <p>28.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of gram aphid</p>	
	<p>Unit 29</p> <p>29.1.1. Insect Pests of Oil Seed Crop</p> <p>29.1.1. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Mustard Aphid and Till Hawk moth</p> <p>29.1.2. Identification, Biology, distribution, host range, period of activity, mode of damage and management of Till Hawk moth</p>	Quiz #7 via LMS, complete before midnight
Course Content (Practical)		Assignments/Readings
Week 1	<p>Unit 1</p> <p>1.1. Insect collection and preservation</p> <p>1.2. Introduction about methods of insect collection, killing, setting, labelling, storage, display of insect box.</p>	
Week 2	<p>Unit 2</p> <p>2.1. Insect Identification of insect</p> <p>2.1.1. Identification of the different agricultural pests from previous insect collection</p>	
Week 3	<p>Unit 3</p> <p>3.1. Insect Identification of insect</p> <p>3.1.1. Identification of the different agricultural pests from previous insect collection</p>	Write a reflective essay (1500-2000 words) that synthesizes the information from the readings and explores the connections between insect and their environment.
Week 4	<p>Unit 4</p> <p>4.1. Insect Identification of insect</p> <p>4.1.1. Identification of the different agricultural pests from previous insect collection</p>	
Week 5	<p>Unit 5</p> <p>5.1. Insect sampling</p> <p>5.1.1. Demonstration and practice of insect sampling methods in wheat crop</p>	
Week 6	<p>Unit 6</p> <p>6.1. Insect sampling</p> <p>6.1.1. Demonstration and practice of insect sampling methods in wheat crop</p>	Highlight the importance of environmental conditions and density of beneficial insects in maintaining pest population.

Week 7	Unit 7 7.1. Insect sampling 7.1. Demonstration and practice of insect sampling methods in wheat crop	
Week 8	Unit 8 8.1. Insect sampling	Practical notebook completion
Week 9	Midterm Exam	
Week 10	Unit 9 9.1. Insect collection	
Week 11	Unit 10 10.1. Insect collection	
Week 12	Unit 11 11.1. Insect collection	Write a reflective essay (1500-2000 words) that synthesizes the information from the readings and explores the connections between predator and pest interaction.
Week 13	Unit 12 12. Insect Sampling	
Week 14	Unit 13 13. Insect Sampling	
Week 15	Unit 14 14. Insect Sampling	
Week 16	Unit 15 15.1. Insect collection	

Textbooks and Reading Material

1. Agarwal, S. 2009. Insect Pests of Cereals and their Management. Oxford Book Co. India
2. Atwal, A.S. and Bains, S.S. 2005. Agricultural Pests of South East Asia and their Management. Kalyani Publishers, Ludhiana.
3. Awasthi, V.B. 2007. Agricultural Insect Pests and their Control. Scientific Publishers (India) Jodhpur.
4. Fenemore, P.G. 2006. Applied Entomology. New age International, Publication.
5. Fernald, H.T. 2008. Applied Entomology, An Introductory Textbook of Insects in their Relation to Man. Kessinger Publishing (Amazon).
6. Gurr, G.M. Wratten, S.D. and Alteri, M.A. 2004. Ecological Engineering for Pest Management: Advances in Halritat Mani Publication for Arthropods. CSIRO, Australia
7. Hashmi, A.A. 1994. Insect Pest Management. Vols. I, II and III. Pakistan Agriculture Research Council, Islamabad, Pakistan.

8. Hill, D. S. 1993. Agricultural Insect Pests of the Tropics and their Control. Cambridge University Press, Cambridge,
9. Lohar, M. K. 2001. Applied Entomology. 2nd Ed. Kashif Publications, Hyderabad, Pakistan.
10. Maredia, K.M. Dakouo, D. and Mota-Sanclez, D. 2003. Integrated Pest Management in the Global Arena. CABI publishing UK.
11. Pedigo, L. P. 2007. Entomology and Pest Management. 5th Ed. Prentice and Hall, Intl., London.
12. Shah, H.A. and Saleem, M. A. 2000. Applied Entomology. 2nd Ed. Izharsons Printers, Lahore

Note:

1. It is preferable to use latest available editions of books. Mention the publisher & year of publication.
2. The References/ bibliography may be in accordance with the typing manual of the concerned faculty/subject. Preferably follow APA 7th Edition publication manual.

Teaching Learning Strategies

1. Multimedia
2. White Board
3. Group discussion
4. Quiz/Assignments
5. Demonstration/Activity

Assignments: Types and Number with Calendar

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.