

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



Programme	B.Sc. (Hons) Agriculture (Major: Entomology)	Course Code	ENT-410	Credit Hours	3 (2-1)
Course Title	RANGE AND FOREST ENTOMOLOGY				
Course Introduction					
<p>The basic objective of this course ‘Range and Forest Entomology’ is to provide the concepts regarding range land and forest ecosystem entomology. Students will learn about the basic concepts of forest ecosystem, its functioning and important components and factors affecting forest ecosystems. Moreover, this course teaches students about the biology, ecology, damage potential and control practices recommend against some basic major insect pests of forest trees and forest nursery management strategies. Students will be able to understand basic steps and plans for proper integrated pest management of forest nurseries.</p>					
Learning Outcomes					
<p>On the completion of the course, the students will have gained the ability to:</p> <ol style="list-style-type: none"> 1. Identify insects common in forest ecosystems, in the Great Lakes region and world-wide, at the family, genus and species level. 2. Diagnose common insect damage and other common damage agents with examples in the lab and in the field, in rural and urban environments. 3. Describe integrated pest management techniques available for common forest pests of the Great Lakes region. 4. Apply forest health monitoring techniques and evaluate results of data collected in class. 5. Learn critical thinking skills as they relate to forest health and forest entomology. 					
Course Content (Theory)				Assignments/Readings	
Week 1	Unit-I				
	1.1.Introduction to and Importance of Insects				
	1.2. Importance of range and forest entomology in range land and forest ecosystems		Assignment 1: Describe the methods of monitoring of forest pest populations		
Week 2	Unit-II				
	2.1. Forest Arthropod Diversity				
	2.2. Forest Insect Population Dynamics				
Week 3	Unit-III				
	3.1. Forest Insect Population Dynamics (Cont.....)				

	3.2. Forest Insect-Natural Enemy Interactions	
Week 4	Unit-IV 4.1. Forest Insect-Plant Interactions	
	4.2. Insects and Forest Succession	
Week 5	Unit-V 5.1. Foliage Feeders 5.1.1. Bark Beetles	Assignment 2: Describe the legal acts regulating forest protection against pests
	5.2. Foliage Feeders (Cont.....) 5.2.1. Bark Beetles	
Week 6	Unit-VI 6.1. Foliage Feeders (Cont.....) 6.1.1. Bark Beetles	
	6.2. Foliage Feeders (Cont.....) 6.2.1. Ambrosia Beetles	
Week 7	Unit-VII 7.1. Woodborers in Forest	
	7.2. Woodborers in Forest (Cont.....)	
Week 8	Unit-VIII 8.1. Woodborers in Forest (Cont.....)	
	8.2. Woodborers in Forest (Cont.....)	
Week 9	MIDTERM EXAM	
Week 10	Unit-IX 9.1. Sap-Sucking Forest Pests	
	9.2. Diversity and Biology of Sap-Sucking Insects with Emphasis on Importance for Forestry	
Week 11	Unit-X 10.1. Diversity and Biology of Sap-Sucking Insects with Emphasis on Importance for Forestry (cont....)	Assignment 3: Define the principles of sustainable forestry in order to make forests resistant to various pests
	10.2. Diversity and Biology of Sap-Sucking Insects with Emphasis on Importance for Forestry (cont....)	
Week 12	Unit-XI 11.1. Biology and Ecology of Sap-Sucking Insects	
	11.2. Biology and Ecology of Sap-Sucking Insects (Cont....)	
Week 13	Unit-XII 12.1. Gall Formers insect 12.1.1. Natural History and Ecology	
	12.2. Gall Formers insect (Cont.....)	

	12.2.1. Evolution and Diversity	
Week 14	Unit-XIII 13.1. Estimation of losses and management of forest pest	
	13.2. Competition and complementary role of insects with range livestock	
Week 15	Unit-XIV 14.1. IPM: The Forest Context	
	14.2. Spatial Dynamics of Forest Insects	
Week 16	Unit-XV 15.1. Monitoring and Surveillance of Forest Insects	
	15.2. Forest Health in the Anthropocene	
Course Content (Practical)		Assignments/Readings
Week 1	Forest health monitoring	
Week 2	Survey and collection of forest pest	
Week 3	Preservation and identification of insect pests of range and forest trees	
Week 4	Study of nature of damage and demonstration of control measure	
Week 5	Survey and collection of forest pest	
Week 6	Preservation and identification of insect pests of range and forest trees	
Week 7	Study of nature of damage and demonstration of control measure	
Week 8	Field visits to range/ forests/ forest departments	
Week 9	MIDTERM EXAM	
Week 10	Silviculture	
Week 11	Sampling in a forest ecosystem: surveying and forecasting	
Week 12	Assessing risk of insect outbreaks	
Week 13	Outbreak prevention and silviculture (e.g., species composition, planting schedules, thinning, harvesting)	
Week 14	Biological control: natural components, introduced species, enhancement of natural enemies, and biotic insecticides	
Week 15	Pheromones and forest pests; biotechnology	

Week 16	Field trip: Insect sampling in forest ecosystems and making a collection		
Textbooks and Reading Material			
<ol style="list-style-type: none"> 1. Barbose, P., & Wagner, M.B. (1989). Introduction to Forest and Shade Tree Insects. London, UK: Academic Press. 2. Dajoz, R. (2000). Insects and Forests. UK: Intercept. 3. Hashmi, A. A. (1994). Insect Pest Management, Horticultural and Forest Crops (Vol. 2). Islamabad: Pakistan Agricultural Research Council. 4. Jha, K. (2003). Forest Entomology. India: Ashish Publishing House. 5. Knight, F.B., & Heikinen, H.J. (1980). Principles of Forest Entomology. New York: McGraw Hill Book. 6. Sathe, T.V. 2009. A Text Book of Forest Entomology. Daya Publishing House Delhi. <p>Note:</p> <ol style="list-style-type: none"> 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			
<ol style="list-style-type: none"> 1.1 Multimedia 1.2 White Board 1.3 Group discussion 1.4 Quiz/Assignments 1.5 Demonstration/Activity 			
Assignments: Types and Number with Calendar			
<ol style="list-style-type: none"> 1. Describe mechanical - physical, chemical protection measures against forest pests (Mid-term) 2. Describe the methods of determining the damage caused by forest pests and the methods of monitoring pest populations (Final-term) 			
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.
----	------------------	-----	--