

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



<b>Programme</b>	B.Sc. (Hons) Agriculture (Major: Entomology)	<b>Course Code</b>	ENT-402	<b>Credit Hours</b>	3 (2-1)
<b>Course Title</b>	<b>INTEGRATED PEST MANAGEMENT</b>				
<b>Course Introduction</b>					
<p>This course is an introduction to the application of ecological principles to the management of pest populations. Principles and concepts of pest management will be presented and discussed, and the importance of pest management as an environmentally sound practice will be emphasized based on economic, ecological and sociological consequences. Although examples of insect pest management will be emphasized, the principles and concepts of integrated pest management (IPM) apply across disciplines. The concept of "pest" and the major factors that influence pest populations will be explored. Ecological influences and historical overviews (especially the influence of Rachel Carson and her book Silent Spring) will lay the foundation for our present understanding of IPM. Pest management will be examined in a multi-faceted approach, incorporating the use of biological, cultural, physical, chemical, behavioral, genetic, and other control tactics to suppress populations of pests. "Laboratory" periods will be used to explore several aspects of pest management, including ecological influences, field sampling, and videotape overviews of IPM programs, simulation "modeling," and economic thresholds. "Laboratory" sessions will expose the student to both the expectations and limitations of the applications of the principles of pest management to pest problems.</p>					
<b>Learning Outcomes</b>					
<p>On the completion of the course, the students will have gained the ability to:</p> <ol style="list-style-type: none"> <li>1 Describe the economic, ecological, and sociological benefits of IPM.</li> <li>2 Distinguish positive and negative impacts of pesticide use.</li> <li>3 Understand problems resulting from misuse, overuse, and abuse of chemical pesticides.</li> <li>4 Define and describe pesticide resistance and how it develops.</li> <li>5 Identify ecological and biological characteristics important in development of pest populations.</li> <li>6 Identify different tactics commonly used in IPM and be able to distinguish them.</li> <li>7 Understand society's role in IPM decisions.</li> <li>8 Describe different groups of pests and compare them to weeds and plant pathogens.</li> <li>9 Analyze and compare management tactics to determine the best approach to reducing pest populations, weeds, and disease presence.</li> <li>10 Locate appropriate, scientifically valid sources of information on specific tactics to manage insect pests, weeds, and diseases.</li> </ol>					

11 Know and how to develop an IPM program.		
Course Content (Theory)		Assignments/Readings
Week 1	<b>Unit-I</b> 1.1. Basics of insect, Pest and its categories 1.1.1. Insect, abundance and diversity	Dent, D., 1996. Integrated Pest Management. Chapman & Hall, London.
	1.1.2. Insect classification based on economic importance	
	1.1.3. Pest, causes for outbreaks and categories	
Week 2	<b>Unit-II</b> 2.1. Pest, causes for outbreaks and categories, contd.... 2.2. Pest surveillance and methods of sampling	Develop a sanitation report for a site they have inspected.
	2.3. IPM, concepts and ecological components	
Week 3	<b>Unit-III</b> 3.1. Principles of Pest Management and History	Atwal, A. S. and S. S. Bains, 2005. Agricultural Pests of South East Asia and their Management. Kalyani Publishers, Ludhiana.
	3.2. IPM, Definition and Concepts	
Week 4	<b>Unit-IV</b> 4.1. Ecological Methods of Pest Management Legal & Cultural	Atwal, A. S. and S. S. Bains, 2005. Agricultural Pests of South East Asia and their Management. Kalyani Publishers, Ludhiana.
	4.2. Ecological Methods of Pest Management Cultural (Contd.)	
Week 5	<b>Unit-V</b> 5.1. Ecological Methods of Pest Management Cultural (Contd.)	Atwal, A. S. and S. S. Bains, 2005. Agricultural Pests of South East Asia and their Management. Kalyani Publishers, Ludhiana.
	5.2. Ecological Methods of Pest Management Physical	
Week 6	<b>Unit-VI</b> 6.1. Ecological Methods of Pest Management Mechanical	Provide monitoring data from a site they have monitored for crawling insects.
	6.2. Host plant resistance and Biological components of IPM	
	6.2.1. Host Plant Resistance	

<b>Week 7</b>	<b>Unit-VII</b> 7.1. Host Plant Resistance (Cont.)	Binns, M.R.2000. Sampling and Monitoring in Crop Protection. CABI Publishing Co.
	7.2. Biological Control Predators	
<b>Week 8</b>	<b>Unit-VIII</b> 8.1. Biological Control Parasitoids	Metcalf, R.L. & W.H, Luckmann. 1994. Introduction to Insect Pest Management. 3rd ed. Intercept Ltd. U.K. Antimetabolites, feeding deterrents. Dent, D., 1996.
	8.2. Biological Control Microbes: Fungi, Bacteria and Viruses	
<b>Week 9</b>	<b>MIDTERM EXAM</b>	
<b>Week 10</b>	<b>Unit-IX</b> 10.1. Biological Control Microbes: Fungi, Bacteria and Viruses (Contd.)	Metcalf, R.L. & W.H, Luckmann. 1994. Introduction to Insect Pest Management. 3rd ed. Intercept Ltd. U.K. Antimetabolites, feeding deterrents. Dent, D., 1996.
	10.2. Biological Control Microbes: Entomopathogenic Nematodes	
<b>Week 11</b>	<b>Unit-X</b> 1.1. Pest management through botanicals, behavioral modification and radiation technology 1.1.1. Pest management by modifying insect behaviour	Examine ornamental plants for insect pest presence and describe damage.
	1.1.2. Use of sex pheromones in pest management	
<b>Week 12</b>	<b>Unit-XI</b> 12.1. Use of attractants and repellants in pest management	Pimental, D., 1991. Handbook of Pest Management I - III. C.R.C. Press Inc. Florida, USA.
	12.2. Pest management through radiation technology Principles	
<b>Week 13</b>	<b>Unit-XII</b> 13.1. Sterile Insect Technique case studies	Pimental, D., 1991. Handbook of Pest Management I - III. C.R.C. Press Inc. Florida, USA.
	13.2. Chemical component of IPM	
	13.2.1. Pest management through botanicals	

<b>Week 14</b>	<b>Unit-XIII</b> 14.1. Pest management through botanicals (cont....)	Atwal, A. S. and S. S. Bains, 2005. Agricultural Pests of South East Asia and their Management. Kalyani Publishers, Ludhiana.
	14.2. Chemical Control History and classification	
<b>Week 15</b>	<b>Unit-XIV</b> 15.1. Mode of Action of different insecticide groups 15.2. Chemical Control Considerations for Chemicals Integration	Atwal, A. S. and S. S. Bains, 2005. Agricultural Pests of South East Asia and their Management. Kalyani Publishers, Ludhiana.
	15.3. Insecticide Resistance and Management	
<b>Week 16</b>	<b>Unit-XV</b> 16.1. Insecticide as component of IPM	Atwal, A. S. and S. S. Bains, 2005. Agricultural Pests of South East Asia and their Management. Kalyani Publishers, Ludhiana. Binns, M.R.2000. Sampling and Monitoring in Crop Protection. CABI Publishing Co.
	16.2. Concept of integrated pest management (IPM) 16.3. Economics of pest management.	
<b>Course Content (Practical)</b>		<b>Assignments/Readings</b>
<b>Week 1</b>	IPM case studies in oilseed and commercial crops	
<b>Week 2</b>	IPM in Groundnut	
<b>Week 3</b>	IPM in Mustard & Soyabean	
<b>Week 4</b>	IPM in Cotton	
<b>Week 5</b>	IPM in Cotton (Contd.)	
<b>Week 6</b>	IPM in Cotton (Contd.)	

<b>Week 7</b>	IPM in Sugarcane	
<b>Week 8</b>	IPM in Sugarcane (Contd.)	
<b>Week 9</b>	<b>MIDTERM EXAM</b>	
<b>Week 10</b>	IPM case studies in vegetable and fruit crops	
<b>Week 11</b>	IPM in Tomato	
<b>Week 12</b>	IPM in Cabbage	
<b>Week 13</b>	IPM in Mango	
<b>Week 14</b>	IPM in Grapes	
<b>Week 15</b>	IPM in bitter field	
<b>Week 16</b>	IPM in brinjal field	

#### **Textbooks and Reading Material**

1. Atwal, A.S. and Bains, S.S. 2005. Agricultural Pests of South East Asia and their Management. Kalyani Publishers, Ludhiana.
2. Awasthi, V.B. 2007. Agricultural Insect Pests and their Control. Scientific Publishers (India) Jodhpur.
3. Binns, M.R. 2000. Sampling and Monitoring in Crop Protection. CABI Publishing Co.
4. Dent, D. 1996. Integrated Pest Management. Chapman & Hall, London.
5. Dhaliwal, G.S. and Arora, R. 2006. Integrated Pest Management. Kalyani Pub. Ludhiana.
6. Goodenough, J.L. and Mckineon, J.M. 1992. Basics of Insect Modelling. Amer. Soc. Agri. Engineers, USA.
7. House, P. Stevens, I. and Jones, O. 1998. Insect Pheromones and their use in Pest Management. Chapman and Hall, London.
8. Maredia, K.M. Dakouo, D. and Mota-Sanclez, D. 2003. Integrated Pest Management in the Global Arena. CABI publishing UK.
9. Metcalf, R.L. and Luckmann, W.H, 1994. Introduction to Insect Pest Management. 3rd Ed. Intercept Ltd. U.K.
10. Pedigo, L.P. 2007. Entomology and Pest Management. 5thEd. Prentice Hall, Intl. Limited, London.

11. Subba, R.N.S. Balagopalan, C. and Ramakrishna, S.V. (Eds) 1992, New Trends in Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
12. Upadhyay, R. K. Mukerji, K. G. Chamola, B. P. and Dubly, O. P. 1998. Integrated Pest and Disease Management. A.P.H. Publ. Co., New Delhi.
13. Verma,L.R. Verma, A.K. and Gantam, D.C. 2004. Pest Management in Horticultural Crops (Principles & Practices). Asiotech Publishers Inc. New Delhi, India.

**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 7<sup>th</sup> 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**

1. Develop IPM module for cereals (paddy), pulses (pigeon pea and Soybean) and commercial crops (cotton and sugarcane) (Mid-term)
2. Develop IPM module for oilseed (groundnut), vegetable crops (cabbage and tomato) and fruit crops (mango and grapes) (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.