FACULTY OF AGRICULTURAL SCIENCES
University of the Punjab, Lahore
Course Outline

Programme	B.Sc. (Hons.) Agriculture	Course Code	ENT-202	Credit Hours	3(2-1)
Course Title	**GENERAL ENTOMOLOGY**				

Course Introduction

The course is an introduction to the fascinating world of insects and how they interact with people. The contents of the course focus on how insects live, their internal and external structures and their functions; classification, identification and control when desirable. Recognition of economically important beneficial and destructive insects and mites occurring in Pakistan, stressing information on their life histories, damage and control.

Learning Outcomes

On the completion of the course, the students will:

1. Knowledge about arthropods and especially insects with their morphological features
2. Identification of insects of economic importance
3. Knowledge of insect pests of crops, vegetables, fruits, stored grains and household pests.
4. Identification of insect pests, their control methods and pesticide application equipment.

	Course Content	Assignments/Readings
Week 1	**1.1. Introduction and economic importance of insects** 1.1.1. Definition and concepts of entomology 1.1.2. Harmful aspects of insects 1.1.3. Beneficial aspects of insects	
	1.1.Insect collection 1.1.1. Collection habitats and timings of insect collection 1.1.2. Insect collection equipment and their construction 1.1.3. Aerial net 1.1.4. Sifter 1.1.5. Light trap	

	1.1.6. Aspirator	
Week 2	**1.2.<u>Phylum arthropoda and its classification</u>** 1.2.1. Salient characteristics of phylum arthropoda 1.2.2. Pauropoda 1.2.3. Symphylan 1.2.4. Chilopoda 1.2.5. Diplopoda 1.2.6. Arachnida 1.2.7. Crustacea 1.2.8. Insecta	
	1.2.<u>Preservation of insect collection</u> 1.2.1. Killing 1.2.2. Pinning and mounting techniques 1.2.3. Setting or spreading 1.2.4. Labelling 1.2.5. Wet preservation 1.2.6. Dry preservation	
Week 3	**1.3. <u>External morphology and appendages of a typical insect</u>** 1.3.1. Head 1.3.2. Thorax 1.3.3. Abdomen	
	<u>Characters of arthopoda</u>	
Week 4	**1.4.<u>Anatomy of a typical insect</u>** 1.4.1. Endoskeleton 1.4.2. Digestive system 1.4.3. Excretory system 1.4.4. Circulatory system 1.4.5. Reproductive system 1.4.6. Respiratory system	

	1.4.7. Nervous system	
	1.3.<u>Morphology and dissection of a typical insect</u> 1.3.1. Digestive system 1.3.2. Reproductive system 1.3.3. Excretory system 1.3.4. Nervous system 1.3.5. Circulatory system 1.3.6. Tracheal system	
Week 5	**2.1.<u>Metamorphosis and its types</u>** 2.1.1. Ametamorphosis 2.1.2. Hemimetamorphosis 2.1.3. Holometamorphosis	
Week 6	**2.2.<u>Insect classification</u>** 2.2.1. Definition, concept and objectives 2.2.2. Salient characters of insect orders	
Week 7	**2.3.<u>Principles and methods of insect control</u>** 2.3.1. Cultural control 2.3.2. Biological control 2.3.3. Physical control 2.3.4. Mechanical control 2.3.5. Reproductive control 2.3.6. Legislative control 2.3.7. Chemical control 2.3.8. Bio-technological control	
Week 8	**2.4.<u>Introduction to IPM</u>** 2.4.1. Definition, importance and basic concepts	
Week 9	**Mid Term Exam**	

Week 10	**2.5.<u>Insecticides and their classification</u>** 2.5.1. Organochlorines 2.5.2. Organophosphates 2.5.3. Carbamates 2.5.4. Pyrethroids 2.5.5. New chemicals/biorationals	
Week 11	**2.6.<u>Introduction to entomological industries</u>** 2.6.1. Apiculture 2.6.2. Sericulture 2.6.3. Lac-culture	
Week 12	**2.7. <u>Insect pests of major crops (cotton, wheat, rice, sugarcane)</u>** 2.7.1. Identification 2.7.2. Life histories 2.7.3. Mode of damage 2.7.4. Control	
Week 13	**2.8. <u>Insect pests of major fruit crops (citrus, mango etc.)</u>** 2.8.1. Identification 2.8.2. Life histories 2.8.3. Mode of damage 2.8.4. Control	
Week 14	**2.9.<u>Insect pests of stored grain</u>** 2.9.1. Identification 2.9.2. Life histories 2.9.3. Mode of damage 2.9.4. Control	

Week 15	**2.10. <u>Major insect pests of household (flies, mosquitoes, bedbugs, termites)</u>** 2.10.1. Identification 2.10.2. Life histories 2.10.3. Mode of damage 2.10.4. Control	
Week 16	**Final Term Exam**	

Textbooks and Reading Material

In the detail course outline, one may mention chapters of the textbook with the content topic(s).

1. Ahmad, I.1970. Hashriat "Insects". NBF. Lahore, Pakistan.
2. Elzinga, R.T. 2003. Fundamentals of entomology. Prentice Hall. London, UK. ISBN 0130480304.
3. Gullan, P.I. and P.S. Crauston. 1994. The insects (an outline of entomology). Chapman & Hall New York.
4. Lohar, M.K. 1998. Introductory entomology. Kashif Publications, Hyderabad, Pakistan.
5. Mani, M.S. 1990. General entomology (4th Ed.). Oxford & IBH Publishing Co. Pvt. Ltd. New Dehli, India.
6. Richards, O.W. and R.G. Davies. 1984. Imm's general text-book of entomology, Vol. I & II, (10th Ed.). Chapman & Hall, London, UK.
7. Shahid, M. 1984. Lab manual of general entomology. NBF, Islamabad, Pakistan.
8. Tonapi, G.T., 1994. Experimental entomology, An aid to Lab. and field studies. CBS. Pub. & Dist. New Dehli, India.
9. Yousuf, M., 1996. Manual of introductory entomology, University of Agriculture, Faisalabad, Pakistan.
10. Atwal, A.S. and S.S. Bains. 2005. Agricultural pests of Southeast Asia and their management. Kalyani Publishers, Ludhiana, India.
11. Hashmi, A.A. 1994. Insect pest management. Vols. I- III. Pak. Agri. Res. Council, Islamabad, Pakistan.
12. Jhonson, N.F., Triplehorn, C.A. Borror and Delong's. 2004. Introduction to the study of Insects. (7th Ed.). Brooks Cole.

13. Pedigo, L.P. 2002. Entomology and pest management. (4th Ed.). Prentice and Hall Intl. Ltd. London, UK.
14. Shah, H.A. and M.A. Saleem, 2002, Applied entomology. (2nd Ed.). Izhar Sons Printers, Lahore, Pakistan.

Teaching Learning Strategies

1. Lectures
2. Discussions
3. Presentations
4. Quiz
5. Assignments

Assignments: Types and Number with Calendar

As per University Rules

Mid-Term	Written Paper	**35 %**
Final Examination	Written Paper	**40 %**
Sessional	Quizzes and Tests, Assignment and Presentations, Attendance, Class Participations and Discipline etc.	**25 %**

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.