

**Institute of Zoology**  
**University of the Punjab, Lahore**  
**Course Outline**



<b>Programme</b>	BS Zoology	<b>Course Code</b>	ZOOL-206	<b>Credit Hours</b>	1
<b>Course Title</b>	<b>Lab. Economic Zoology</b>				
<b>Course Introduction</b>					
<p>This course provides a practical understanding of the economic significance of various animals and their impact on human activities, agriculture and industry. The course will explore parasitic protozoans and diseases, vectors of human and animal diseases, ecto and endo-parasites of fish, poultry, cattle and humans. Additionally, course includes hands on studies of apiculture, sericulture, lac insect culture, fisheries and aquaculture, poultry farming, offering a comprehensive understanding of the field.</p>					
<b>Learning Outcomes</b>					
<p>Upon successful completion of the course, the student will be able to:</p> <ol style="list-style-type: none"> <li><b>ACQUIRE</b> basic knowledge of Commerce and Economics in relation to Zoology</li> <li><b>UNDERSTAND</b> the Economic relationship of Animals with Humans</li> <li><b>SOLVE</b> problems related to animal husbandry and pest management by applying practical knowledge with efficacy</li> <li><b>ANALYZE</b> and enhance Animal husbandry techniques by using different Entrepreneurship skills</li> <li><b>EVALUATE</b> problems using practical knowledge in Zoology</li> <li><b>DEMONSTRATE</b> the Economy based interactions of Man and Animals</li> </ol>					
<b>Course contents for Practical's</b>			<b>Assignments/Readings</b>		
<b>Week 1</b>	<b>Unit-I: Ecto- and Endo-parasites</b> 1.1 Slide preparation methods 1.1.1 Dry mount 1.1.2 Wet mount			<ul style="list-style-type: none"> <li>Preparation of a dry mount slide and a wet mount slide using a given parasite sample and observation under microscope.</li> </ul>	
<b>Week 2</b>	1.2 <b>Study of Prepared Slides</b> 1.3 Ecto-parasites ( Tsetse fly, Bed bugs, Human Louse) 1.4 Endo-parasites ( <i>Entamoeba histolytica</i> , Leishmania, <i>Fasciola hepatica</i> )			<ul style="list-style-type: none"> <li>Observation and identification of provided samples under microscope.</li> </ul>	
<b>Week 3</b>	<b>Unit II: Diagnostic procedure of protozoan parasites</b> 2.1 Examination of stool for parasites 2.2 Direct saline wet mount 2.3 Iodine wet mount 2.4 Concentration technique 2.1.1 Sedimentation 2.1.2 Floating method			<ul style="list-style-type: none"> <li>Preparation of microscopic slides using different techniques.</li> </ul>	
<b>Week 4</b>	<b>Unit III: Diagnostic procedure of Helminthic infections</b> 3.2 Examination of stool for parasites 3.3 Identification of eggs 3.4 Modified double centrifugation technique			<ul style="list-style-type: none"> <li>Preparation of microscopic slides using different techniques.</li> </ul>	
<b>Week 5</b>	<b>Unit IV: Examination of blood for parasites</b> 4.1 Thin film preparation			<ul style="list-style-type: none"> <li>Discussion on the significance of diagnosing blood parasites.</li> </ul>	

	4.2 Thick film preparation 4.3 Staining	
<b>Week 6</b>	<b>Unit-V: Apiculture</b> 5.1 Bee-Keeping Practices 5.2 Honeybee byproducts, Bee health and management	<ul style="list-style-type: none"> <li>• Examination of different species of honeybees, including <i>Apis mellifera</i>, <i>Apis cerana</i>, and others, and their characteristics.</li> <li>• Research and document the seasonal tasks involved in beekeeping, including feeding, hive inspection, and disease prevention.</li> </ul>
<b>Week 7</b>	5.3 Honey Bee Farm Visit	<ul style="list-style-type: none"> <li>• Write a Report on Observations from Honey bee Farm Visit</li> <li>• Short Quizz</li> </ul>
<b>Week 8</b>	<b>Unit-VI: Sericulture</b> 6.1 Silk Worm Rearing Process 6.2 Sericulture Farm Visit 6.3 Report writing	<ul style="list-style-type: none"> <li>• Reading on diseases and pests in silkworm rearing</li> <li>• Write a Report on Observations from Sericulture Farm Visit</li> </ul>
<b>Week 9</b>	<b>Unit VII: Lac culture</b> 7.1 Introduction 7.2 Lifecycle of lac insect 7.3 production process and usage	<ul style="list-style-type: none"> <li>• Assignment on Versatile Uses of Lac: From Traditional Crafts to Modern Applications</li> </ul>
<b>Week 10</b>	<b>Unit-VIII: Aquaculture</b> 8.1 Components of Fish Farm and Fish Hatchery 8.2 Nursery Ponds, Stocking Ponds 8.3 Report Writing	<ul style="list-style-type: none"> <li>• Study Visit: Fish Hatchery, Nursery Ponds and Stocking Ponds</li> <li>• Write a Report on Observations from Fish Hatchery and Nursery Ponds</li> </ul>
<b>Week 11</b>	8.4 Fish Breeding Techniques	<ul style="list-style-type: none"> <li>• Write a Report on Observations from Fish Breeding process</li> <li>• Short Quizz.</li> </ul>
<b>Week 12</b>	<b>Unit-IX: Fish Identification</b> 9.1 Important Fish Species 9.2 Methods of fish Identification	<ul style="list-style-type: none"> <li>• Practical: Identification of Important Fish Species</li> </ul>
<b>Week 13</b>	9.3 Culturable fish species of Pakistan 9.3.1 Indian major carps 9.3.2 Chinese major carps	<ul style="list-style-type: none"> <li>• Research on the economic importance of Indian major carps and Chinese major carps in the aquaculture industry of Pakistan, including their market demand and profitability.</li> </ul>
<b>Week 14</b>	9.4 Fish Dissection	<ul style="list-style-type: none"> <li>• Short assignment to identify and examine internal organs such as the heart, liver, stomach, intestines, and reproductive organs, with descriptions of their functions.</li> </ul>
<b>Week 15</b>	<b>Unit-X: Poultry Farming</b> 10.1 Selecting the foundation stock 10.2 Poultry disease diagnosis 10.3 Poultry farm visit	<ul style="list-style-type: none"> <li>• Assignment on Analysis of different poultry breeds and their suitability for various farming objectives, such as egg production, meat production, and dual-purpose</li> <li>• Assignment: Write a Report on observations from poultry farm visit</li> </ul>
<b>Week 16</b>	<b>Unit-XI: Dairy Farming</b> 11.1 Requirements of Dairy Farming	<ul style="list-style-type: none"> <li>• Assignment: Write a Report on observations from poultry farm visit</li> </ul>

	11.2 Visit of Dairy Farm and Report Writing		
<b>Textbooks and Reading Material</b>			
<ol style="list-style-type: none"> <li>1. Akhtar, M. and Muzaffar, N., 2008. Introduction to Apiculture, Department of Zoology, Punjab University Press, 36 pp.</li> <li>2. Economic Zoology. Ravindranathan, K. R. 2003. 1st ed. Dominent Publishers and Distributers. New Delhi. India</li> <li>3. Blackiston, H., 2001. Beekeeping for Dummies. Wiley Publishing, Inc. Indiana, USA, pp. 303.</li> <li>4. A Primer of Conservation of Biology. Primack R. B. 2000. 2nd ed. Sinauer Associates Inc. USA.</li> <li>5. Anon, 1999. FAO Bulletins on Sericulture Nos. 1 &amp; 2. FAO Office, Rome, Italy.</li> <li>6. Animal biodiversity of Pakistan. Mirza, Z. B. 1998. 1st ed: Printopack, Rawalpindi. Pakistan.</li> <li>7. Shukla, G.S. and Upadhayay, V.B., 1997. Economic Zoology, 3rd Ed. Rastogi Publications, Mearut, India, pp. 369.</li> <li>8. Ahmad, R. and Muzaffar, N., 1987. Rearing of Silkworm. Misc. Pub. Pak. Agric. Res. Council, pp. 53.</li> <li>9. Principles of Wildlife Management. Bailey, J. A. 1986. John Wiley and Sons Inc. USA</li> <li>10. Anon, 1986. The Hive and the Honeybee. Dadant &amp; Sons. Illinois, USA, pp. 740.</li> <li>11. Wildlife ecology and management. Robinson, W. L. and Bolen, E. G. 1984. McMillan Publishing Company. Cambridge, UK.</li> </ol>			
<b>Teaching Learning Strategies</b>			
1. Teaching will be a combination of written assignments, class quizzes, presentations and class participation			
<b>Assignments: Types and Number with Calendar</b>			
<ol style="list-style-type: none"> <li>1. Report: Week 7,10, 11 &amp; 16</li> <li>2. Discussion: Week 5</li> <li>3. Written assignment: Week 9, 14, &amp; 15</li> <li>4. Quiz: Week 7 &amp; 11</li> <li>5. Field visits: Week 7,8, 10, 15 &amp; 16</li> </ol>			
<b>Assessment</b>			
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.