TEACHING PLAN: Applied Zoology & Biostatistics

SCHOOL: SCHOOL OF BASIC & APPLIED SCIENCES (SOBAS), RAFFLES UNIVERSITY		
ACADEMIC SESSION: 2021 – 2024 & 2022-25		FOR STUDENT'S BATCH: B.Sc. (CBZ) III Year (VI- Semester)
1	**Course No.**	ZOO - 304
2	**Course Title**	Applied Zoology & Biostatistics
	Credits	**3**
4	**Learning Hours**	**Contact Hours: 36** **Assessment: 18** **Guided Study: 36** **Total hours: 90** **3 lectures per week**

5	**Course Objective**	1. Understand the principles and practices of Vermiculture, Sericulture, Lac culture, Apiculture, Prawn culture, Pisciculture, Pearlculture, and Poultry keeping. 2. Define pests and categorize types, explore control methods including insecticides, plant protection appliances, and natural control. 3. Study major crop pests such as stem borer and midge flies in Jowar, red cotton bug, and pink ballworm in cotton. 4. Introduce the scope and application of biostatistics in various biological contexts. 5. Apply the scientific method in experimental design and learn to formulate null and alternative hypotheses. 6. Comprehend basic statistical concepts including data presentation, tabulations, graphical representation, frequency distributions, and distinctions between samples and populations. 7. Utilize elementary statistical methods in biology, covering measures of central tendency (mean, mode, median), measures of dispersion (standard deviation, standard error, variance), and correlation and regression analysis.
6	**Course Outcomes**	1. Demonstrate proficiency in implementing principles and practices related to Vermiculture, Sericulture, Lac culture, Apiculture, Prawn culture, Pisciculture, Pearlculture, and Poultry keeping. 2. Apply effective pest control measures by defining and categorizing pests, and employing various methods including insecticides, plant protection appliances, and natural controls. 3. Identify and analyze major crop pests such as stem borer, midge flies, red cotton bug, and pink ballworm, specifically in crops like Jowar and cotton. 4. Exhibit a comprehensive understanding of the scope and application of biostatistics in the context of biological sciences. 5. Utilize the scientific method for experimental design, including the formulation of null and alternative hypotheses.

		6. Apply fundamental statistical concepts to present data, including tabulations, graphical representation, frequency distributions, and distinguish between samples and populations. 7. Demonstrate proficiency in elementary statistical methods in biology, including measures of central tendency (mean, mode, median), measures of dispersion (standard deviation, standard error, variance), and the application of correlation and regression analysis.

7.	Outline syllabus:				
7.01	Paper Code	Unit	Introduction	Reference number	Teaching methods
	Paper Code: ZOO-304	I	1. Principles and practices of Vermiculture, Sericulture (including Ericulture), Lac culture, 2. Apiculture, Prawn culture, Pisciculture, Pearlculture and Poultry keeping		Providing them notes, elucidating all processes and mechanisms on a whiteboard, and conveying information through presentations (PPT) and videos.
		II	1. Pest; definition, types of pests, control (insecticides and plant protection appliances (like hand compression spray, hand rotating duster, bucket pump etc. and natural control) 2. Study of major crop pest; Jowar (stem borer, midge flies), cotton (red cotton bug, pink ballworm) etc.		--------do-------
		III	1. Introduction, scope and application of biostatistics Scientific method, writing up an experiment, Hypothesis (null and alternative) 2. Basic concepts of statistics; presenting data (tabulations, graphical representation, frequency distributions, samples and populations.		--------do-------
		IV	1. Elementary statistical methods in biology; measures of central tendency (mean, mode, median), measures of dispersion (standard deviation, standard error, variance), correlation and regression		--------do-------

8.	Course Evaluation	
8.1	CA: 20%	
8.2	Attendance	5
8.3	Homework	-
8.4	Quizzes	5
8.5	Projects	-
8.6	Presentation	10
8.7	Any other	-
8.2	MTE	20%
8.3	End-term examination	60%
9.	Textbooks & References	
9.1	Textbook	-
9.2	References	Griffiths, M. (2015). Echidnas: International Series of Monographs in Pure and Applied Biology: Zoology (Vol. 38). Elsevier. Jabde, P. V. (2008). Textbook of applied zoology. Discovery Publishing House. Pedigo, L. P., Rice, M. E., & Krell, R. K. (2021). Entomology and pest management. Waveland Press. Wetherill, G. (2012). Elementary statistical methods (Vol. 179). Springer Science & Business Media.
9.3	Video References	https://youtu.be/pjpl_vgheHg?si=Dz8K_I9fbaEpuBsr https://youtu.be/2AI8Hk8W4Yo?si=8s6n45emQ84RBkJj https://youtu.be/1Q6_LRZwZrc?si=ufyTCXwwvXDH8aJF

Practical's: Zoology Lab – VI (6 labs per week)

Outcome	Unit 1	Unit 2	Unit 3	Unit 4
1	✓			
2		✓		
3		✓		
4				✓
5			✓	
6			✓	
7			✓	✓

Question Bank

1. What are the key principles and practices associated with Vermiculture?
2. Explain the aspects covered in Sericulture, including Ericulture.
3. How is Lac culture addressed in the study?
4. Describe the practices involved in Apiculture according to the material.
5. What is the focus of the material regarding Prawn culture?
6. Discuss the principles and practices related to Pisciculture outlined in the content.
7. What does the material cover regarding Pearlculture?
8. Explain the aspects of Poultry keeping discussed in the material.
9. How does the material define pests and what types are mentioned?
10. Discuss the various control methods for pests, including insecticides and natural controls.

11. Identify and describe the major crop pests in Jowar.
12. Explain the characteristics and control measures for stem borer in Jowar.
13. Discuss the major crop pests in cotton, focusing on red cotton bug and pink ballworm.
14. What is the scope of biostatistics as introduced in the material?
15. Explain the scientific method and its application in the context of biological sciences.
16. Define null and alternative hypotheses and explain their role in experimental design.
17. How are basic statistical concepts used to present data, including tabulations and graphical representation?
18. Distinguish between samples and populations in the context of statistics.
19. Discuss elementary statistical methods covered in the material for biology.
20. Explain the measures of central tendency, including mean, mode, and median.
21. Describe measures of dispersion, including standard deviation, standard error, and variance.
22. How is correlation analysis applied in the biological context according to the material?
23. Discuss the application of regression analysis in the field of biology.
24. Summarize key points without mentioning specific units.
25. Evaluate the significance of understanding and implementing effective pest control measures according to the material.

PROJECTS (To be given to group of students)

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1. Integrated Pest Management (IPM) Plan:
- Design a comprehensive IPM plan for a specific crop, considering the principles and practices discussed in the syllabus.
- Incorporate pest identification, selection of appropriate control methods (including natural controls), and the use of insecticides and plant protection appliances.
- Present the plan in a visually appealing format, including charts and graphs.

2. Biostatistics in Agricultural Research:
- Conduct a research project highlighting the application of biostatistics in agricultural studies.
- Utilize statistical methods to analyze data related to crop yields, pest populations, or other relevant agricultural parameters.
- Present findings through a research paper and visually appealing presentations.

3. Experimental Design in Vermiculture:
- Set up an experiment to investigate the impact of specific variables on vermiculture practices.
- Apply the scientific method, formulate null and alternative hypotheses, and design the experiment accordingly.
- Collect and analyze data, and draw conclusions about the effectiveness of certain practices in vermiculture.

4. Statistical Analysis of Poultry Keeping Practices:
- Collect data on various parameters related to poultry keeping, such as egg production, feed consumption, and health indicators.
- Apply fundamental statistical concepts to analyze and interpret the data.
- Present the statistical findings in a comprehensive report, highlighting key trends and correlations.

5. Aquaculture Sustainability Project:
- Develop a project focused on sustainable practices in aquaculture, covering Prawn culture, Pisciculture, and Pearlculture.

- Address ecological considerations, waste management, and the overall environmental impact of aquaculture practices.
- Present the project findings through a multimedia presentation, including visuals and recommendations for sustainable aquaculture.