Program: Certificate Course | Class: B.Sc. III Year | Year: 2024 | Session: 2024-2025

1	Course Code	ZOOL – 6 T
2	Course Title	Microbiology, Parasitology, Immunology and Applied Zoology
3	Course Type	Theory
4	Pre-requisite (if any)	No
5	Course Learning Outcomes (CLO)	After completing this course, the students will be able to - • Understand causative agents, pathogenesis, diagnosis, prophylaxis, and chemotherapy for various bacterial, viral, protozoan, and helminthic diseases. • Understand the concept of immune mechanisms, their pathways, acquired immunity, hypersensitivity, and autoimmune disorders. • Understand the aquaculture techniques, their problems, and commercial viability. • Understand the techniques and commercial significance of apiculture, sericulture, and lac culture. • Understand the basic and technical skills related to dairy management, poultry, and vermicomposting.
6	Credit Value	4
7	Total Marks	Max. Marks: 50 / Min Passing Marks : 17

Part B: Content of the Course

Total Periods: 60

Unit	Topics	No. of Period
I	**Microbiology and Parasitology :** Bacterial diseases – Caused by *Salmonella typhi, Helicobactor pyloriand, Mycobacterium tuberculosis* with their pathogenesis, diagnosis, prophylaxis, and chemotherapy. Viral diseases – Hepatitis, influenza, AIDS, with their pathogenesis, diagnosis, prophylaxis, and chemotherapy. Protozoan diseases – Amoebiasis, Malaria, Trypanosomiasis, and Leishmaniasis with the life cycle of pathogen and possible treatments. Helminthic diseases – Schistosomiasis, Taeniasis, Ascariasis, and Filariasis with the life cycle of pathogen and possible treatment.	12
II	Immunology : Cells and organelles of the immune system. Characteristics of antigen, Antigenicity, Immunogenicity, Epitopes, Haptens, Adjuvant. Immunoglobulin : Classification, properties, and function of immunoglobulin. Antigen, and Antibody interaction. Humoral and cell:mediated immune response. The role of B and T cells in immunity. MHC complex, Hypersensitivity. Autoimmune disorders: Thyroid problem, Rheumetoid Arthritis . Monoclonal antibodies. Concept of vaccine.	12
III	**Aquaculture :** Prawn culture – Prawn culture in freshwater, its preservation, and processing. Pearl culture – Biology and technology followed (Fresh & Marine). Fish culture –Maintainance of fresh water fish farm and Breeding, Composite fish farming.	12
IV	**Apiculture, Sericulture, Lac culture :** Apiculture – types of the honey bee and culture technology. Lac culture – cultivation process with the life cycle of lac insect. Sericulture – types of silkworm and technology for mulberry silk worm culture. Economic values of Apiculture, Sericulture and Lac culture.	11
V	**Dairy Management, Poultry farming, and Vermicomposting :** Dairy Management : Techniques for dairy management; Cattle disease. Poultry – Types of breeds, rearing methods and diseases. Biology and rearing method of earthworm *Eisenia foetida/ Pharitima Posthuma.* The technology of Vermicompost production.	13

Keywords: Micro organism, Parasites, Immune System, Economic Zoology, Dairy Management, Poultry Management, Vermicomposting.

Part C :Learning Resource

Text Books, Reference Books, Other Resources –

1. Jawetz, M., and Adelberg (2015) Medical Microbiology (27 th edition).
2. Chatterjee, K.D. (2015) Parasitology (13 th edition).
3. Goldsby, R.A.; Kindt, T.J. and Kuby, J. (2006) Immunology (6th edition).
4. Roitt, I.; Brostoff, J. and Male, D. (2012) Immunology (8th edition).
5. Shukla, G.S. and Upadhyaya, V.B. (1999:2000). Economic Zoology (Rastogi Publishers).
6. Mani, M.S. (2006). Insects, NBT, India.
7. Jabde, P.V. (2005) Text Book of Applied Zoology: Vermiculture, Apiculture, Sericulture, Lac culture.

E: Resources –

1. SWAYAM: .https://swayam.gov.in/explorer?searchText
2. https://academic.oup.com
3. https://medineplus.gov
4. https://ncin.nlon.nih.gov
5. https://zoologylearningpoint.woodpress.com
6. https://zoologyresources.com
7. National digital library – https://ndl.iitkgp.ac.in
8. e:PG Pathshala (MHRD) Portal, https://egpg.inflibnet.ac.in
9. Science Direct Open Access Content – https://www.sciencedirect.com/book/9781843342038/ open Access
10. https://egyankosh.ac.in

Part D: Assessment andEvaluation

Maximum Marks, University exam. (UE) : : 50

DECLARATION

This is to certify that the syllabus is framed by the central board of study (Zoology) as per the guidelines of the department of higher education, Chhattisgarh government.

1. Dr. K. R. Sahu - Chairman -
   Assistant Professor, Govt. Pandit Madhav Rao Sapre College, Pendra Road
2. Dr. Ajit Hundet - Member -
   Professor, Govt. D. B. Girls College, Raipur
3. Dr. Prem Prakash Singh - Member - Prem Prakash Singh 13/06/2022
   Professor, Govt. College, Kusmi, Balrampur
4. Dr. Shubhada Rahalkar - Member - S Rahalkar 13.6.2022
   Professor, Govt. Bilasa Girls P. G. College, Bilaspur
5. Dr. Anil Kumar Shrivastava - Member -
   Professor, Govt. V. Y. T. P. G. Autonomous College, Durg
6. Dr. R. K. Tamboli - Member - 13.6.22
   Assistant Professor, Kirodimal Govt. Arts & Science College, Raigarh

Part A: Introduction				
Program : Degree course		Class: B.Sc.III Year	Year -2024	Session :-2024-2025
1	Course code	ZOOL-3P		
2	Course Title	Lab course - 3		
3	Course Type	Practical		
4	Pre-Requisite(If Any)	No		
5	Course Learning Outcome (CLO)	At The end of Course Students will be able to - • Learn a wide range of practical techniques used to study animal behaviour. • Develop skills, concepts and experience to understand all aspects of animal behaviour. • Objectively understand and evaluate information about animal behaviour and ecology encountered in our daily lives. • Understand and be able to objectively evaluate the role of behaviour in the protection and conservation of animals in the wild. • Consider and evaluate behaviour of all animals, including humans, in the complex ecological world, including the urban environment. • Understand causative agents, pathogenesis, diagnosis, prophylaxis, and chemotherapy for various bacterial, viral, protozoan, and helminthic diseases. • Understand the concept of immune mechanisms, their pathways, acquired immunity, hypersensitivity, and autoimmune disorders. • Understand the aquaculture techniques, their problems, and commercial viability. • Understand the techniques and commercial significance of apiculture, sericulture, and lac culture. • Understand the basic and technical skills related to dairy management, poultry, and vermicomposting.		
6	Credit Value	2		
7	Total marks	Maximum marks : 50 Minimum marks: 17		

13.6.2022

Part : B Content of course	
	Total lecture-30
Tentative Practical List	**Note :This is tentative list .The teacher concern can add per requirement** 1. Orientation of an animal to light. 2. Chemical communication in ants. 3. Predatory behaviour of a carnivorous animal. 4. Nests and nesting habits of the birds and social insects 5. To study geotaxis behaviour in earthworm. 6. To study the phototaxis behaviour in insect larvae. 7. Study of circadian functions in humans (daily eating, sleep and temperature patterns). 8. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of 9. Making an ecosystem in a wide-mouthed bottle. 10. Constructing a food web by observing and collecting organisms from a given area. 11. Studying the impact of herbivore on plant species (planted in pots under specific conditions) 12. Estimation of the ratio of the producers and consumers. 13. Studying insect diversity in a habitat. 14. Study of permanent slides and specimens of parasitic protozoans and helminthes. 15. Pathological examination of sputum, blood, urine and stool. 16. Staining and identification of Gram positive and Gram negative bacteria. 17. RBC and WBC counting. 18. Identification of Blood group. 19. Demonstration of antigen-antibody interaction in gel. 20. Morphological characterization of common fish species. 21. Identification of two major carps – Labeo *rohita* and Catla *catla* and their life cycles. 22. Through charts/specimens- study of bees. 23. Worker honey bee with emphasis on leg modifications (through specimens/charts). 24. Life cycle of mulberry silkworm, Bombyx mori and tasar silkworm (model/chart/specimens). 25. External morphology and nomenclature of dairy animals. 26. Determination of the specific gravity of milk by using a mercury factometer. 27. Test for good quality eggs (Floating test, cracking test) and for fertilized and unfertilized eggs (Light test, Cracking test). 28. External morphology of poultry birds (model). 29. Project report on visit to dairy farm and visit to Poultry farm (Poultry management).

Part-C Learning Resource
Text books, References, Books Other Resource : 1. Practical Ecology, Anmol Publications. 2. Practical Methods in Ecology and Environmental Science,R. K. Trivedy, P. K. Goel, C. L. Trisal Enviro Media Publications, 1987. 3. Ethology practical Vilmos Altbäcker Márta Gácsi András Kosztolányi Ákos Pogány Gabriella Lakatos Péter Pongrácz. 4. Animal Behaviour Reena Mathur Rastogi publication. 5. ANIMAL BEHAVIOUR Practical work and data response exercises for sixth form students Michael D. 6. Animal Cell Culture and Technology Michel butcher Publisher : .Taylor & Francis 7. Our Animal Resources: Animals and Their Economic Importance Hardcover. 8. Publisher Holt, Rinehart, and Winston : 9. Practical Microbiology D.K. Maheshwari. 10. practical microbiology R.C. Dubey. 11. microbiology textbook. Dr Arora. 12. Microbiology: A Laboratory Manual - Book by James G. Cappuccino and Natalie Sherman. 13. Micro extremely Lecturio and sketchy rock's. 14. Lehninger – Biochemistry. 15. Kuby – immunology. 16. Ananthnarayan- medical Microbiology. 17. Tortora- for studying diseases caused by the normal flora and antibiotic classes. 18. Stanbury and Whittekar -fermentation Microbiology. 19. Genes by Lewis- for Genetics/ molecular biology and genetic engineering 20. Watson- Molecular biology. 21. Kooper - Cell biology.

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: University exam (UE) : Maximum Marks: 50		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

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13.6.2022