

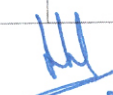
**Scheme of B.Sc.
Zoology**

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	ZOOL-1T	Animal Diversity:Non-Chordata and Chordata , Comparative Anatomy and Physiology of Non-chordates	Theory	4	50	17
	ZOOL-2T	Cell Biology , Histology and Comparative Anatomy & Physiology Of Chordates	Theory	4	50	17
	ZOOL-1P	Practical	Practical	2	50	17
Second year	ZOOL-3T	Genetics , Developmental Biology and Evolution	Theory	4	50	17
	ZOOL-4T	Biochemistry and Molecular Biology	Theory	4	50	17
	ZOOL-2P	Practical	Practical	2	50	17
Third year	ZOOL-5T	Animal Behavior , Chronobiology and Ecology	Theory	4	50	17
	ZOOL-6T	Microbiology , Parasitology , Immunology and Applied Zoology	Theory	4	50	17
	ZOOL-3P	Practical	Practical	2	50	17
Total				30	450	

Note: There shall be four extra credits in all the years of under graduation for internship/apprenticeship. The certificate of extra credits would be provided by the university concern.

Part A: Introduction			
Program: Certificate Course		Class: B.Sc. I Year	Year: 2022 Session: 2022-2023
1	Course Code	ZOOL-1P	
2	Course Title	Lab Course - I	
3	Course Type	Practical	
4	Pre-requisite (if any)	No	
5	Course Learning Outcomes (CLO)	After completion of practical work the outcome will be : <ul style="list-style-type: none"> • Able to know animal diversity in the form of museum/slide for invertebrate and invertebrates. • Capable to enumerate biology of invertebrates. • Capable to explore anatomy of animas. • Able to understand cytological, histological and osteological configuration for animal life. • Capable to explain hematology of animal system. 	
6	Credit Value	2	
7	Total Marks	Max. Marks: 50	Min Passing Marks : 17

Part B: Content of the Course		
Total classes: 30		
	Content	No. of classes
	<p>Tentative list of practical/exercise :</p> <p>The practical's work will be based on theory syllabus and the students will be required to show the knowledge of the following –</p> <ol style="list-style-type: none"> 1. Study of museum specimens representing to invertebrate phyla. 2. Study of permanent slides : Paramecium, Euglena, T. S. Sycon, Sponge Spicules, Sponge gemmule, Obelia colony, Obelia medusa, Ephyra larva, Fasciola larval forms (miracidium, Radia, Cercaria, Metacercaria), Trochophore larva, Zoea larva, Bipinnaria larva. 3. Dissection/ demonstration/ clay model of – <ol style="list-style-type: none"> a) Phretima : Digestive system, Reproductive system, Nervous system b) Palaemon : Appendages, Nervous system c) Periplaneta : Mouth parts, Digestive system d) Pila : Nervous system 4. Exercise based on cytology : squash preparation from onion root tip and study of cell division. 5. Study of museum specimens representing the chordata from cyclostomes to mammals. 6. Study of permanent slides of chordates – Fish skin, scales, V. S. Skin of frog, reptile, bird, mammal, T.S. liver, pancreas, testes, ovary of frog and mammal. 7. Osteology : Study of girdles of amphibian, reptile, bird and mammal. 8. Temporary mounting : <ol style="list-style-type: none"> a) Palaemon : Statocyst b) Pila : Ctenidium, osphradium c) Pheretima : Septal nephridia d) Fish scale : Placoid, Cycloid, Ctenoid 9. Exercise based on blood : blood group, blood pressure measure 10. Field visit report : Photography & identification of any five local invertebrate or vertebrate fauna. 	30


 H.K. Pathan
 31-5-2022

Part C - Learning Resource

Text Books, Reference Books, Other Resources -

1. Practical zoology Invertebrate : S. S. Lal
2. Practical zoology vertebrate : S. S. Lal
3. A Manual of practical zoology invertebrates : P. S. Verma
4. A Manual of practical zoology Chordates : P. S. Verma
5. Saras Practical zoology Vol. I, Vol. II, N. Arumugam

Part D: Assessment and Evaluation

University Exam(UE): Maximum Marks: 50 Marks

DECLARATION


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

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Assistant Professor, Govt. Lahiri P. G. College, Chirimiri, Koriya

Date : 31.05.2022


Part A: Introduction			
Program: Certificate Course		Class: B.Sc. I st Year	Year: 2022 Session: 2022-2023
1	Course Code	ZOOL-1T	
2	Course Title	Animal Diversity: Non-Chordata and Chordata, Comparative Anatomy and Physiology of Non-chordates	
3	Course Type	Theory	
4	Pre-requisite (if any)	No	
5	Course Learning Outcomes (CLO)	<p>Upon completion of the course students should be able to :</p> <ul style="list-style-type: none"> Learn about the importance of systemic, taxonomy and phylogeny to get a concrete idea of evolution of non-chordate phyla. Understand the various morphological, anatomical structures and functions of animals of different phyla. Get the knowledge about economic, ecological and medical significance of various animals in human welfare. Understand the important parasites and their control measures. Comparison of the anatomy and physiology of the different taxa of non-chordates. 	
6	Credit Value	4	
7	Total Marks	Max. Marks: 50	Min Passing Marks : 17

Part B: Content of the Course		
Total Lectures: 60		
Unit	Topics	No. of Lectures
I	<p>Taxonomy, Protozoa, Porifera Taxonomy- Elementary knowledge of Zoological Nomenclature and International Code. Classification of Animal Kingdom upto Phylum of acoelomate and coelomate non-chordates according to Parker and Haswell 7th edition. Protozoa- Phylum Protozoa: General characters of the phylum and classification up to order with characters and suitable examples. Structure, life history and pathogenicity of malaria parasite (<i>Plasmodium vivax</i>). Protozoa and disease. Porifera- Phylum Porifera: General characters of the phylum and classification up to order with characters and suitable examples. Type study of Sycon.</p>	12
II	<p>Coelenterata, Platyhelminthes, Nemathelminthes : Coelenterata- Phylum Coelenterata: General characters of the phylum and classification up to order with characters and suitable examples. Type Study of Obelia. Platyhelminthes - Phylum Platyhelminthes: General characters of the phylum and classification up to order with characters and suitable examples. Type Study of Liverfluke. Nemathelminthes- Phylum Nemathelminthes: General characters of the phylum and classification up to order with characters and suitable examples. Pathogenic nematodes and diseases.</p>	12
III	<p>Annelida, Arthropoda, Mollusca : Annelida- Phylum Annelida: General Characters of the phylum and classification up to order with characters and suitable examples. Types study of Earthworm (<i>Pheretima</i>). Arthropoda - Phylum Arthropoda: General Characters of the phylum and classification up to order with characters and suitable examples. Type study of Prawn. Insects as a vector of human disease. Mollusca - Phylum Mollusca: General characters of the phylum and classification up to order with characters and suitable examples. Type study of <i>Pila</i>.</p>	12


 A.K.R. Jahn
 31.5.2022

IV	<p>Echinodermata, Hemichordata, Classification of Chordata :</p> <p>Echinodermata - Phylum Echinodermata: General characters of the phylum and classification up to order with characters and suitable examples. Type study of Starfish (<i>Asterias</i>).</p> <p>Hemichordata - Phylum Hemichordata: General characters of the phylum hemichordate and relationship with non-chordates and chordates. Type study of <i>Balanoglossus</i></p> <p>Classification of Chordata - Classification of Chordata up to order with characters and suitable examples. Brief account of Urochordata, Cephalochordata and Vertebrata.</p>	11
V	<p>Comparative Anatomy and Physiology of Non-chordates: Coelom and coelomducts in Non-chordate. Locomotory organs and locomotion in Non-chordate. Pattern of feeding and digestion in lower Metazoans. Comparative anatomy and physiology of respiration and excretion in Non-chordate. Primitive, diffused and advance nervous system in Non-chordate. Reproduction in Non-chordates.</p>	13
<p>Keywords : Locomotory organ, feeding and digestion, respiration, International Commission on Zoological Nomenclature (ICZN), Classification, Protozoa, Classification, Liver Fluke, Trochophore, Arthropoda, Crustacea larva, Echinodermata larva</p>		

Part C - Learning Resource	
<p>1. Text Books, Reference Books, Other Resources –</p> <ol style="list-style-type: none"> 2. Parker, J, Haswell, WA, "A Text Book of Zoology", VII edition, Vol. I & II, Low Price Publications, Delhi, 1990. 3. Barnes, RD, "Invertebrate Zoology", VII Edition, Cengage Learning, India, 2006. 4. Pechenik, JA, "Biology of the Invertebrates" McGraw-Hill Educations, VII Edition, 2015. 5. Sedgwick, A, "A Students Text Book of Zoology", Vol. I, II & Vol. III., Low Price Publications, Delhi, 1990. 6. Dhama and Dhama, "Invertebrate Zoology" R., Chand & Co., India, 2009. 7. Jordan and Verma, "Invertebrate Zoology," S. Chand & Company, New Delhi, 2013. 8. Agarwal, VK, "Zoology for Degree Students: Non-Chordata", S Chand & Company, 2017. 9. Kotpal, R, "Modern Text Book of Invertebrates", Rastogi Publications, Meerut, 2017. 10. Kotpal, R, "Protozoa to Echinodermata (Phylum Series)", Rastogi Publications, Meerut, 2017. 11. Kardong, K.V. (2006) Vertebrates: Comparative Anatomy, Function, Evolution (4th edition), McGraw-Hill 12. Jordan, E. L. and Verma, P. S. (2013) Chordate Zoology (14th edition). 13. Saxena, R. K. and Saxena, S. (2015) Comparative Anatomy of Vertebrates (2nd edition). 	
<p>E- Resources –</p> <ol style="list-style-type: none"> 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 	


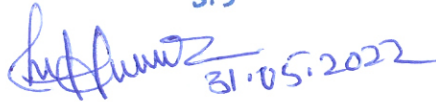
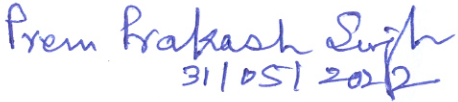
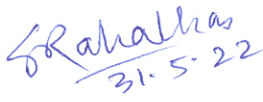
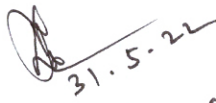
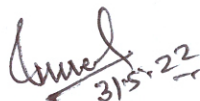
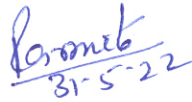
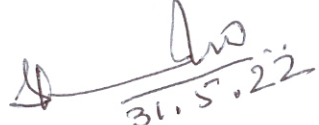
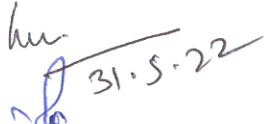
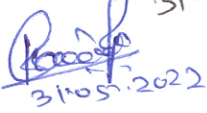
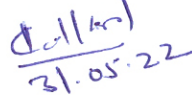

 Dr. K. R. Datta
 31.5.2022

Part D: Assessment and Evaluation

Maximum Marks, University exam. - :50

DECLARATION

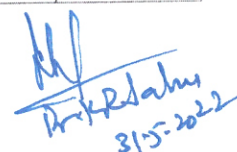
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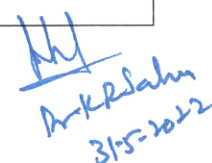
Part A: Introduction			
Program: Certificate Course		Class: B.Sc. I Year	Year: 2022 Session: 2022-2023
1	Course Code	ZOOOL- 2T	
2	Course Title	Cell Biology, Histology and Comparative Anatomy & Physiology of Chordates	
3	Course Type	Theory	
4	Pre-requisite (if any)	To study this course, a student must have/had the subject Biology in class 12 th .	
5	Course Learning Outcomes (CLO)	<p>At the end of this course, the students will be able :</p> <ul style="list-style-type: none"> • Understand the basic structure, functioning of the cell and cell organelles and understand the intricate cellular mechanisms involved. • Understand the tissues, how tissues are produced from cells in a normal course and about any malfunctioning which may lead to benign or malignant tumor. • Develop an understanding of the evolution of vertebrates thus integrating structure, function and development. • Understand the morphological, anatomical and physiological adaptation in diverse habitats. • 5. Develop an understanding of the evolution of vertebrates thus integrating structure, function and development. 	
6	Credit Value	Theory : 4	
7	Total Marks	Max. Marks: 50	Min Passing Marks : 17

Part B: Content of the Course		
Total Lecturer: 60		
Unit	Topics	No. of Lectures
I	<p>Prokaryotic and Eukaryotic cells : General structure of prokaryotes, bacteria, archaea and eukaryotes. Ultra structure and function of endoplasmic reticulum, ribosomes, Golgi apparatus, lysosome, Mitochondria, nuclear apparatus.</p> <p>Cell membrane and transport mechanism : Structure, composition, models and function. Fluid mosaic model Junctional complexes, membrane receptor modifications : microvilli, desmosomes and plasmodesmata.</p>	12
II	<p>Cell cycle, cell signaling and cell culturing : Cell cycle, cell division – mitosis and meiosis. Cell division check points and their regulation. Role of growth factors. Programmed cell death (Apoptosis).</p> <p>Cell regulation and cell signaling : Signaling molecules and their receptors. Functions of cell surface receptors. Regulation of signaling pathways.</p> <p>Cell culture : Types of cell culture – monolayer and suspension culture. Types of culture media. Basic characteristics of tissue culture media. Tissue culture and engineering.</p>	12
III	<p>Structure and functional significance of animal tissues : Introduction to tissues. Epithelial tissue: types, structure and characteristics. Exocrine and endocrine glands: type and structure. Structure and function of loose, dense and adipose tissue. Muscular tissue: Ultra structure of smooth, skeletal and cardiac muscles. Muscle contraction. Membrane of the brain and spinal cord.</p>	11
IV	<p>Structure and function of integument, skeletal, digestive, circulatory system :</p> <p>Integument : Structure of integument from fish to mammals. Function of integument. Epidermal and dermal derivatives of integument and their functional significance.</p> <p>Skeletal system : Comparative account of pelvic and pectoral girdles from fishes (cartilaginous and bony) to mammals.</p> <p>Digestive system : Dentition in mammals. Comparative study of alimentary canal and digestive glands from fish to mammal. Physiology of digestion in mammal.</p>	13


 31/5/2022

	Circulatory system: Evolution of aortic arches and their significance. Structure and evolution of heart in vertebrates. Cardiac cycle. Blood : Composition and function.	
V	Structure and function of circulatory, respiratory, excretory, reproductive and endocrine system : Respiratory system : Aquatic and terrestrial respiration. Comparative anatomy of lungs in amphibian, reptile, bird and mammals. Excretory system : Physiology of excretion, urine formation. Reproductive system : Comparative details of testes and ovaries from fishes to mammals. Estrous and menstrual cycle. Endocrine system : Types and functional significance of endocrine glands and hormones.	12
Keywords: Tissue, Endocrine glands, Girdles, Cell signaling, Cell culture, Excretion, Circulatory system, Aortic arches, Heart, Reproductive cycle.		

Part C - Learning Resource	
Text Books, Reference Books, Other Resources -	
<ol style="list-style-type: none"> 1. Books of M. P. Hindi Granth Academy 2. Rastogi V. B. : Introduction to Cytology 3. Cell Biology and Molecular Biology : N. Arumugam 4. Cell Biology : N. Arumugam 5. Molecular Cell Biology : N. Arumugam 6. Cell Biology, Genetics, Molecular Biology and Evolution : Verma P. S., Agrawal V. K. 7. Sheelar and Binachi : Cell and Molecular Biology 8. Karp : Cell and Molecular Biology 9. De Robertis : Cell and Molecular Biology 10. Powar C. B. : Cell Biology 11. A Textbook of Animal Histology : A. K. Berry, Emkey Publication, Delhi 12. A Textbook of Histology and Practical guide: J. P. Gunasegam 13. Animal Cell Culture : R. Freshney 14. Animal Cell and Tissue Culture : Shivangi Mathur 15. Chordate Zoology : R. L. Kotpal & P. S. Verma 16. Modern Text Book of Zoology – Vertebrate : R. L. Kotpal 17. A Text Book of Chordates : A. Thangamani, N. Arumugam, Saras Pulpication 18. Biology of Animals, Volume – II, Sinha, Adhikari, Ganguly 19. Comparative Anatomy of vertebrates, 2nd edition : R. K. Saxena, Sunita Saxena 20. Comparative Anatomy and Developmental Biology : Kotpal, Shastry and Shukla 21. Chordata and Comparative Anatomy : R. L. Kotpal 22. Chordate Zoology : Jordan E. L. and Verma P. S. 23. Anatomy of Chordates, 4th edition : Weichert C. K. 24. Comparative vertebrate Anatomy : L. H. Hyman 	
E-Resources –	
<ol style="list-style-type: none"> 1. SWAYAM- https://swayam.gov.in/explorer?searchText= 2. https://academic.oup.com 3. https://medineplus.gov 4. https://ncin.nlm.nih.gov 5. https://zoologylearningpoint.woodpress.com 6. https://zoologyresources.com 7. National digital library – https://ndl.iitkgp.ac.in 7. e-PG Pathshala (MHRD) Portal, https://egpg.inflibnet.ac.in 8. Science Direct Open Access Content – https://www.sciencedirect.com/book/9781843342038/ open – Access 9. https://egyankosh.ac.in 	



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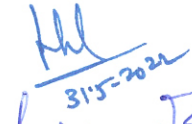
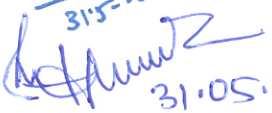
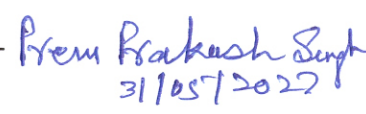

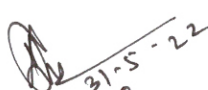

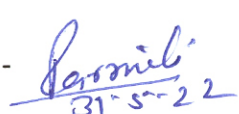
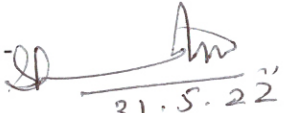
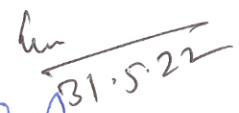
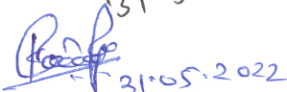
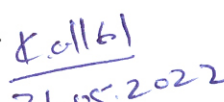
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Part D: Assessment and Evaluation

University Exam(UE): Maximum Marks: 50 Marks

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