

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Diploma / Degree/ Honors)		Semester - IV	Session: 2024-2025
1	Course Code	ZOSC-04T	
2	Course Title	Diversity of Chordates and Comparative Anatomy	
3	Course Type	Discipline Specific Course	
4	Pre-requisite (if, any)	As per Program	
5	Course Learning Outcomes (CLO)	After successfully completing this course, the students will be able to: ➤ Develop understanding of the characters used to classify and differentiate the organisms belonging to different taxa and the evolutionary history and relationship between the different classes of chordates. ➤ Acquire knowledge and Develop critical understanding of the comparative anatomy and functioning of complex systems of Pisces to Mammalia. ➤ Learn the comparative account of integument with its derivatives, digestive system and Skeletal and Muscular System. ➤ Understand the Digestive system and its anatomical specializations with respect to different diets and feeding habits and respiratory organs in vertebrates used in aquatic, terrestrial and aerial vertebrates. ➤ Understand the evolution of heart, aortic arches, and Learn the evolution of brain, sense organs and urinogenital system.	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Diversity in Protochordates and Chordates: General characteristics & classification of Chordata up to orders with examples. Cephalochordates: Type study – Amphioxus and its affinities, Agnatha: Comparative account of Petromyzon and Myxine		11
II	Structure and function of integument and skeletal systems Alimentary canal: Structure of integument from fishes to mammals with an account on epidermal and dermal derivatives and their functional significance, Anatomy of Axial skeleton from fishes to mammals. Comparative anatomy of appendicular skeleton: limbs and girdles from fishes to mammals. Comparative account with structure of alimentary canal and digestive glands in vertebrates.		11
III	Comparative anatomy and functional Significance of, Respiratory organs, Heart Aortic Arches and Endocrine Glands: Structure of Gills, Lungs, Air sacs and Swim bladder in Vertebrates, Structure and evolution of heart in vertebrates, Evolution of aortic arches and their significance in vertebrates. Endocrine Glands & their function. Disorders of Thyroid, Adrenal, Pancreas and Pituitary.		11
IV	Comparative anatomy and functional Significance of Urinogenital System, Brain & Sense Organ: Types and development of kidneys and their ducts in anamniotes and amniotes. Nephron- structure, types and their function, Comparative anatomy of Urinogenital system. Comparative anatomy of Brain of vertebrates, Structure of Ear and Eye.		12
Keywords	Chordates, Protochordates, Petromyzon And Myxine, Comparative Anatomy, Integument Lungs, Air Sacs Aortic Arches, Kidney, Brain		
Signature of Convener & Members (CBoS) :			

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Jordan, E. L. and Verma, P. S. (2013) Chordate Zoology (14th edition).
- Saxena, R. K. and Saxena, S. (2015) Comparative Anatomy of Vertebrates (2nd edition).
- R.L. Kotpal, Modern Text Book of Zoology, Vertebrates, Rastogi Publication, Merut
- Tiwari, V.K. Unified Zoology, B.Sc. Part I, Shivalal Agarwal and Company, Indore

Reference Books Recommended –

- Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.
- Weichert, C.K. (1970) Anatomy of Chordates (4th edition).

Online Resources–

e-Resources / e-books and e-learning portal

- <https://swayamias.com/zoology-optional-coaching/>
- <https://www.swayamprabha.gov.in/index.php/program/archive/9>
- <https://www.acsedu.co.uk/Courses/Environmental/VERTEBRATE-ZOOLOGY-BEN104-528.aspx>
- <https://www.nu.edu/degrees/mathematics-and-natural-sciences/courses/bio416/>
- <https://www.youtube.com/watch?v=qSY5iXHHi88>
- <https://www.youtube.com/watch?v=tz8liJXbBCQ>
- <https://www.youtube.com/watch?v=mXECx3s8yEQ>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

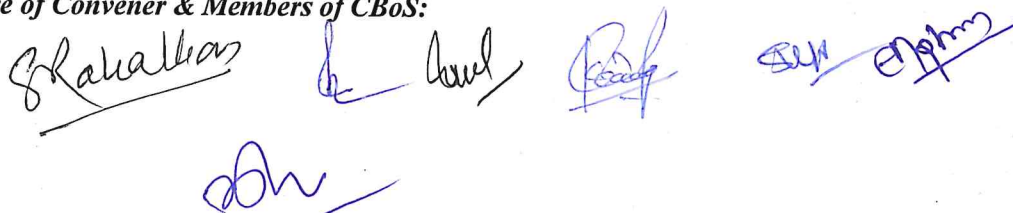
Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

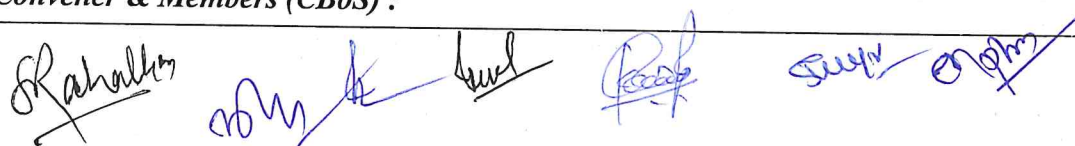
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10	
	Total Marks - 30	
End Semester Exam (ESE):	Two section – A & B	
	Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:



FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Diploma / Degree / Honors)		Semester - IV	Session: 2024-2025
1	Course Code	ZOSC-04P	
2	Course Title	Diversity of Chordates and Comparative Anatomy	
3	Course Type	Discipline Specific Lab Course	
4	Pre-requisite (if, any)	As per Program	
5	Course Learning Outcomes (CLO)	<p>After successfully completing lab course the students will be able to -</p> <ul style="list-style-type: none">➤ Develop understanding on the diversity of life with regard to different classes of vertebrates.➤ Gain knowledge to identify and classify the animals on the basis of their morphological characteristics.➤ Acquire the detailed knowledge about evolutionary history and relationship between the different classes of vertebrates through salient features some important animals.➤ Learn comparative account of various systems in all the classes of vertebrates.	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<p>List of labs to be conducted</p> <ul style="list-style-type: none">➤ Study of animals through models, slides and museum specimens in the laboratory with details on their classification, biogeography and diagnostic features of different class of Vertebrate.➤ Study of histological slides of different class of Vertebrate.➤ Study of Axial skeleton of Amphibia, Reptilia, Aves and Mammals. Comparative study of Appendicular skeleton Girdles and limb bones) of Amphibia, Reptilia, Aves and Mammals.➤ Comparative study of heart of Fish, Amphibia, Reptilia, Aves and Mammals with the help of models and charts.➤ Comparative study of Aortic Arches Fish, Amphibia, Reptilia, Aves and Mammals with the help of models and charts.➤ Comparative study of brain of Fish, Amphibia, Reptilia, Aves and Mammals with the help of models and charts.➤ Comparative study of Urinogenital system of Fish, Amphibia, Reptilia, Aves and Mammals with the help of models and charts.➤ Histological study of Endocrine tissue➤ Study of Vertebrate animals in nature during a survey of a National Park/ Forest area/College campus.➤ Group discussion/Viva or Seminar presentation on any one of above topics➤ An “animal album or Practical Record” containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa.➤ Study of some videos to develop understanding on the animals of different taxa.		30
Keywords	Museum specimens, Histological slides, Alternative of Dissection, Practical Record		
Signature of Convener & Members (CBoS) :			



PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- S.S. Lal, Practical Zoology, Vertebrate. 12th Edition Rastogi Publications, Meerut, New Delhi.
- A manual of practical Zoology. Dr. P.S Verma, S. Chand Publication, New Delhi
- Saxena, R. K. and Saxena, S. (2015) Comparative Anatomy of Vertebrates (2nd edition).
- R.L. Kotpal, Modern Text Book of Zoology, Vertebrates, Rastogi Publication, Merut
- Tiwari, V.K. Unified Zoology, B.Sc. Part I, Shivalal Agarwal and Company, Indore

Reference Books Recommended –

- Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.
- Weichert, C.K. (1970) *Anatomy of Chordates* (4th edition).

Online Resources–

- <https://www.youtube.com/watch?v=W4gQxADcryw>
- <https://www.youtube.com/watch?v=Ts9GsrBviI8>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

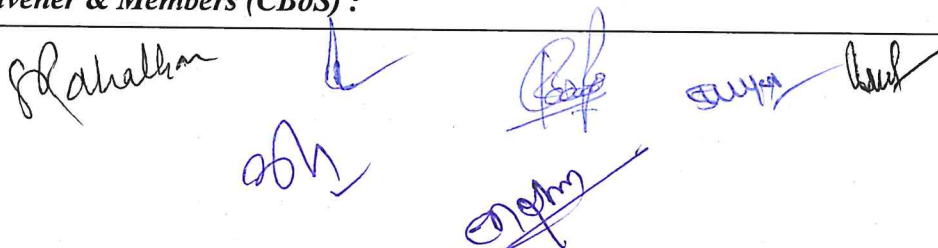
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance - 05 Total Marks - 15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment	
	A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:



FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
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COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Diploma / Degree/Honors)		Semester -IV	Session: 2024-2025
1	Course Code	ZOSE-02T	
2	Course Title	Ecology and Wildlife Conservation & Management	
3	Course Type	Discipline Specific Elective	
4	Pre-requisite (if, any)	As per Program	
5	Course Learning Outcomes (CLO)	After successfully completing this course, the students will be able to: ➤ Understand the concepts of fundamental ecological principles, including energy flow, nutrient cycling, and population dynamics. ➤ Apply the knowledge of ecology to understand equilibrium of nature. ➤ Analyze the strategies of Populations to survive and sustain. ➤ Evaluate the significance of biodiversity and its conservation. ➤ Create awareness about wildlife and nature.	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	An overview of Ecology and Biomes: Aims and scope of Ecology. Difference between Auto-ecology and Synecology. Abiotic & Biotic factors. Ecosystem and Ecological Pyramids. Bio-geo chemical cycles. Energy flow in ecosystem: Trophic levels. Food Chain, Food Web, Food chain in fresh water ecosystem. Laws of limiting factor: Leibig's Law of Minimum, Shelford Law of tolerance. Major Biomes of the world. Biogeographic zones of India.		11
II	Population ecology: Population characteristics: Density, Measurement of Population Density (Quadrat method and tagging method) Mortality, Natality, Age Pyramids, Migration and Dispersal. Life tables: Survivorship curves. Population Growth: Types of Population Growth, Growth Curves (S shaped & J shaped), Mathematical Expression of population growth: logistic & stochastic. R and K strategies. Carrying Capacity. Population Regulation: extrinsic & intrinsic factors.		12
III	Biotic community and Environmental degradation: Biotic community characteristics and attributes: Stratification; Dominance, diversity, species richness, abundance, Evenness, Similarity. Ecotone and edge effect. Ecological succession. Species interaction: Positive interactions: commensalism, proto-cooperation and mutualism. Negative interactions: parasitism. Competition: Interspecific and Intraspecific, Lotka Volterra Model, Gause's Principle. Prey-Predator Model. Environmental degradation: Air, water and noise pollution and their control. Natural resources: Mineral, water and forest, their significance and conservation.		11
IV	Biodiversity & Wildlife management: Biodiversity: Concept and characteristics. Levels of Biodiversity (Genetic Diversity, Species Diversity & Ecosystem Diversity), Hotspots of Biodiversity. Major National Parks of Chhattisgarh and their biodiversity. Endemic animal species of Chhattisgarh. IUCN red list categories and criteria. Conservation of Biodiversity (In Situ, & Ex Situ Conservation). Major international & national treaties, laws and regulations for conserving biodiversity. Important conservation projects undertaken in India: Project Tiger & Project Elephant. Tiger Census and Estimation (Techniques and Findings). Cheetah re-introduction plan. Captive breeding and Propagation: Founder population, rehabilitation, education, utilization, gene banks. GIS and other technologies in Forest & Wild life conservation.		11
Keywords Ecology, Biome, Abiotic, Biotic factors, Nutrient Cycle, Population, Wildlife conservation, In Situ & Ex Situ			
Signature of Convener & Members (CBoS) :			



Signature of Convener & Members (CBoS) :

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Sharma, P.D. Ecology and Environment, Rastogi Publication.
- Kumar Pranav, Meena Usha. Fundamentals of Ecology and Environment.
- Mathur Reena. Wildlife Conservation and Management, Rastogi Publication.
- Singh S.K., Text book of Wildlife Management, CBC Publishers and Distributors

Reference Books Recommended –

- Chapman, J.L. & M.J. Reiss. 1998. Ecology: Principles and Applications. Cambridge Univ. press. 2nd edition.
- Odum, E. P. (2004). Fundamentals of Ecology, Oxford and IBH Publishing Co. Pvt. Ltd.
- Smith, TM and Smith RL 2015. Elements of Ecology, Pearson Education, India.

Online Resources–

- https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000035ZO/P000891/M020617/ET/1498712980Ecosystemprocesses-IPart-1Quad1.pdf
- https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000035ZO/P000891/M020612/ET/1498710746CommunitycharacteristicsstratificationPart4Quad1.pdf
- http://ndl.iitkgp.ac.in/he_document/swayam_prabha/cao2zsydjqu

Online Resources–

- <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1788373>
- https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000032SW/P001702/M020403/ET/14969150701-

PART -D: Assessment and Evaluation

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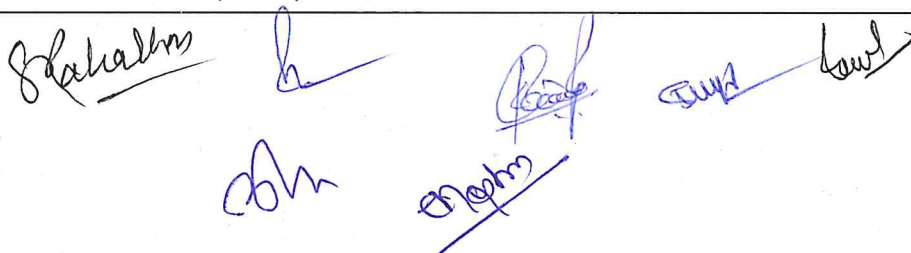






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Program:Bachelor in Life Science(Diploma / Degree/ Honors)		Semester -IV	Session:2024-2025
1	CourseCode	ZOSE-02P	
2	CourseTitle	Ecology and Wildlife Conservation & Management	
3	CourseType	Discipline Specific Elective Lab Course	
4	Pre-requisite(if, any)	As per Program	
5	Course Learning Outcomes(CLO)	After successfully completing this course, the students will be able to: ➤ Understand practical fieldwork skills, including sampling techniques, data collection and methods of analysis used in ecological research. ➤ Learn to design and implement ecological experiments. ➤ Understand soil profile and characteristics. ➤ Analyse chemical parameters of various water bodies. ➤ Create awareness about local faunaand evaluate biodiversity of an area.	
6	CreditValue	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	TotalMarks	Max.Marks:50	Min Passing Marks:20
PART -B: Content oftheCourse			
TotalNo.of learning-Training/performancePeriods:30 Periods (30 Hours)			
Module	Topics(Coursecontents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<ul style="list-style-type: none">• Study of biodegradable and non-biodegradable pollutants in the locality.• Study of a representative type of ecosystem.• Determination of pH of water samples from various water bodies.• To determine the transparency of water of Pond ecosystem by Secchi disc.• To study the profile of soil in the field/ Soil sampling by V- cut method.• To study the zooplankton communities in a fresh water ecosystem.• To prepare a checklist of birds/Insects in and around college campus.• Estimation of ecological density, diversity and frequency of college premises by quadrate method.• Estimation of Shannon – Weiner index of a given area.• Estimation of Simpson– biodiversity index of a given area.• Study of strategy for preventing and managing human-wildlife conflicts.• Project Work / Quiz / Poster / Model preparation/Viva.• Practical Record		30
Keywords	Density, Diversity, Frequency, Biodegradable, Non- biodegradable, Pollutants, Sechhi disc,		
SignatureofConvener&Members (CBoS):			



PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Yadav Vikas, Yadav Parul; 2022 Modern Practical Zoology; Kedar Nath Ram Nath.
- Verma P.S. A Manual of Practical Zoology Chordates, S.Chand.
- Lal S.S. Practical Zoology Vertebrate; Rastogi Publications.
- Jayasurya, Arumugam N.: Practical Zoology: Saras Publication.

Reference Books Recommended –

- Odum, E.P. 1971 Fundamentals of Ecology; W.B. Saunders
- Beard, J.M. 2013 Environmental Chemistry in Society (2nd Edition). CRC Press.

Online Resources–

- <https://www.statology.org/simpsons-diversity-index/>
- <https://www.statology.org/shannon-diversity-index/>

Online Resources–

- https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000014ER/P000280/M026066/ET/1520505951paper10 Module27 etext.pdf

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