

**FOUR YEAR UNDERGRADUATE PROGRAM (NEP-2020)**

**Program: Bachelor in Science (2024 -28)**

**DISCIPLINE – ZOOLOGY**

**Session – 2024 -25**

DSC -01 to 08		DSE -01 to 12	
Code	Title	Code	Title
ZOSC -01T	Life on Earth and Unique Attributes of Animal Kingdom	ZOSE -01T	Parasitology
ZOSC -01P	Life on Earth and Unique Attributes of Animal Kingdom	ZOSE -01P	Parasitology
ZOSC -02T	Cell Biology and Histology	ZOSE -02T	Ecology and Wild life Conservation & Management
ZOSC -02P	Cell Biology and Histology	ZOSE -02P	Ecology and Wild life Conservation & Management
ZOSC -03T	Diversity of Invertebrates	ZOSE -03T	Biochemistry
ZOSC -03P	Diversity of Invertebrates	ZOSE -03P	Biochemistry
ZOSC -04T	Diversity of Chordates and Comparative Anatomy	ZOSE -04T	Evolutionary Biology
ZOSC -04P	Diversity of Chordates and Comparative Anatomy	ZOSE -04P	Evolutionary Biology
ZOSC -05T	Vertebrate Physiology	ZOSE -05T	Endocrinology
ZOSC -05P	Vertebrate Physiology	ZOSE -05P	Endocrinology
ZOSC -06T	Genetics	ZOSE -06T	Immunology
ZOSC -06P	Genetics	ZOSE -06P	Immunology
ZOSC -07T	Biosystematics and Taxonomy	ZOSE -07T	Biotechnology and Genetic Engineering
ZOSC -07P	Biosystematics and Taxonomy	ZOSE -07P	Biotechnology and Genetic Engineering
ZOSC -08T	Biotechniques	ZOSE -08T	Applied Zoology
ZOSC -08P	Biotechniques	ZOSE -08P	Applied Zoology
		ZOSE -09T	Basics of Computer & Biostatistics
		ZOSE -09P	Basics of Computer & Biostatistics
		ZOSE -10T	Behaviour & Chronobiology
		ZOSE -10P	Behaviour & Chronobiology
		ZOSE -11T	Developmental Biology
		ZOSE -11P	Developmental Biology
		ZOSE -12T	Molecular Biology
		ZOSE -12P	Molecular Biology
<b>GE -01 &amp; 02</b>		<b>VAC</b>	
ZOGE -01T	Life on Earth and Unique Attributes of Animal Kingdom	ZOVAC-01	Public health and Hygiene
ZOGE -01P	Life on Earth and Unique Attributes of Animal Kingdom		SEC
ZOGE -02T	Cell Biology and Histology	ZOSEC-01	Vermiculture
ZOGE -02P	Cell Biology and Histology		

**Program Outcomes (PO):**

- Demonstrate and apply the fundamental knowledge of the basic principles of major fields of Zoology and Modern tools and techniques
- Analyse complex interactions among the various animals of different phyla, their distribution and their relationship with the environment.
- Gain knowledge of small scale industries like sericulture, fish farming, bee keeping, aquaculture, animal husbandry, poultry farm.
- Apply the knowledge and understanding of Zoology to one's own life and work.
- Develops empathy and love towards the animals and consciousness for wild life conservation

**Program Specific Outcomes (PSO):**

- Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, Behaviour, Endocrinology, Immunology, Biostatistics, Parasitology, Biochemistry, Evolution, Developmental Biology, Animal biotechnology, Tools and Techniques of Zoology.
- Understand the applications of biological sciences in Apiculture, Aquaculture, Sericulture, Animal Husbandry, Poultry Farm.
- Understand the applications of Zoology in Medicine and daily life
- Contributes the knowledge for Nation building and sustainable development

*Dr. Shubhoda Rakshana*  
10.06.2024

*Shobha Ram Yadav*

*Dr. Nazam Ameen Memon*

*Dr. Ajay Kumar*  
*Dr. R. K. Ramani*  
*Dr. Rajesh Kumar*

*Dr. Lalita Meshra*

**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)**  
**DEPARTMENT OF ZOOLOGY**  
**Course Curriculum**

<b>PART- A: Introduction</b>			
<b>Program: Bachelor in Life Science</b> <i>(Certificate / Diploma / Degree/Honors)</i>		<b>Semester - I</b>	<b>Session: 2024-2025</b>
1	<b>Course Code</b>	<b>ZOSC-01T</b>	
2	<b>Course Title</b>	<b>Life on Earth and Unique Attributes of Animal Kingdom</b>	
3	<b>Course Type</b>	<b>Discipline Specific Course</b>	
4	<b>Pre-requisite (if, any)</b>	<i>As per program</i>	
5	<b>Course Learning Outcomes (CLO)</b>	<p><b>After successfully completing this course, the students will be able to-</b></p> <ul style="list-style-type: none"> <li>➤ Develop an understanding of concepts, mechanisms, evolutionary significance and relevance of Origin of life.</li> <li>➤ Understand General Idea about Invertebrate and Vertebrate animals with special reference and their specific qualities.</li> <li>➤ Understand and appreciate diversity of life forms.</li> <li>➤ Apply the knowledge about animals Sciences in daily life.</li> </ul>	
6	<b>Credit Value</b>	<b>3 Credits</b>	<b>Credit = 15 Hours - learning &amp; Observation</b>
7	<b>Total Marks</b>	<b>Max. Marks: 100</b>	<b>Min Passing Marks: 40</b>
<b>PART -B: Content of the Course</b>			
<b>Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)</b>			
<b>Unit</b>	<b>Topics (Course contents)</b>		<b>No. of Period</b>
<b>I</b>	<p><b>Origin of life: Theories of Origin of life:</b>  <b>Ancient Theory</b> Theory of Special Creation (Mythological approach), Theory of Panspermia or Cosmozoic Theory, Theory of Directed Panspermia, Theory of Catastrophism, Theory of Spontaneous Generation (Abiogenesis or Autogenesis), Theory of Biogenesis: Redi's Experiment and Pasteur's Experiment. <b>Modern Theory: Origin of Universe:</b> Big Bang Hypothesis in Brief, <b>Origin of Solar System and The Earth:</b> Nebular hypothesis, <b>Atomosphere and Eneargy Sources on Primitive Earth, Biochemical Origin of Life:</b> Oparin and Haldane Theory, <b>Chemogeny:</b> Formation of simple and complex organic compounds (Stanely Miller and Ure's Experiment), Formation of Coacervates, Nucleic Acids. <b>Biogeny:</b> Origin of primitive prokaryotic cell. <b>Evolution of modes of Nutrition:</b> Chemoheterotrophs, Anaerobic and Aerobic Photoautotrophs. Evolution of Eukaryotes.</p>		<b>12</b>
<b>II</b>	<p><b>Systematics &amp; Unique attributes of Invertebrate and Vertebrate animals with special reference to Coelentrata, Mollusca and Pisces:</b>            Definition and difference between Invertebrate and Vertebrate. <b>Nomenclature:</b> Binomial and Trinomial Nomenclature and International code of Nomenclature <b>Corals:</b> Meaning of Coral, Structure of Coral polyp, Coral Skeleton, Types of corals: Hydrozoan Coral, Example- Millipora, Octocorallian Coral, Example- Alcyonium, Hexacorallian Corals, Example- Gorgonia. <b>Torsion in Mollusca:</b> Definition, Mechanism of Torsion, Effects of Torsion, Significance of Torsion. <b>Pisces: Migration in fishes:</b> Catadromous: Eel fish and Anadromous: Salmon fish and <b>Parental care in fishes:</b> By nest formation, Coiling round eggs, Attachment to body, Integumentary cups, Shelter in mouth, Brood pouch, Mermaids purses, Viviparity.</p>		<b>11</b>
<b>III</b>	<p><b>Unique attributes of Vertebrate animals with special reference to Amphibia &amp; Reptilia:</b>  <b>Parental care in Amphibia:</b> by Nest, by Nursery or Shelter and by Parents <b>Neoteny in Amphibia:</b> Definition, Partial and Total Neotony, Factors Affecting Neotony, Examples- Axolotal larva, Necturus and Siren. <b>Reptilia: Venomous &amp; Non-venomous Snakes:</b> Identification, Poison apparatus: Poison Glands, Poison ducts and Fangs, Biting Mechanism.</p>		<b>11</b>
<b>IV</b>	<p><b>Unique attributes of Vertebrate animals with special reference to Aves and Mammals:</b>  <b>Birds:</b> Flight Adaptation, Migration and Perching Mechanism, Flightless Birds (Morphology and Special Characters of Emu, Ostrich and Penguins), Discuss-Birds are glorified reptiles: Archaeopteryx. <b>Monotremes or Egg laying mammals:</b> Morphology and Special Characters of Echidna and Duck bill platypus. <b>Aquatic Mammals:</b> Morphology and Special Characters of Whale and Dolphin. <b>Mammals: Flying Mammals:</b> Morphology and Special Characters of Bat.</p>		<b>11</b>
<b>Keywords</b>	<i>Origin of life, Invertebrate, Vertebrate, Corals, Torsion, parental care, Neotony, Fangs, Aves, Mammals</i>		
<b>Signature of Convener &amp; Members (CBoS) :</b>			

## PART-C: Learning Resources

### Text Books Recommended

- E. J. W. Barrington , Invertebrate structure and function, English Language Book Society UK
- Robert Barnes, Invertebrate Zoology, Robert Barnes IVth edition Holt Saunders International Edition Japan
- Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi
- Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, AITBS Publishing and Distributers, Delhi

### Reference Books Recommended

- Prof R. L. Kotpal, Protozoa to Echinodermata, Rastogi Publication Meerut
- E.L. Jordan, Dr. P. S. Verma, Invertebrate Zoology , S. Chand Publications, New Delhi
- N. Arumugam, N. C. Nair S. - Invertebrate Zoology, Saras Publication.
- N. Arumugam, N. C. Nair S. - vertebrate Zoology, Saras Publication.
- Barrington E. J. W., Invertebrate Structure and Function, Nelson London
- Barnes, R. D., Invertebrate Zoology –Saunders Philadelphia
- R. L. Kotpal, Invertebrate, Rastogi Publications
- R. L. Kotpal, Vertebrate, Rastogi Publications
- H. S. Bhamphah, KavitaJuneja, Recent trends in vertebrates vol 1 – 9, Anmol Publication
- S. N. Prasad, Life of invertebrates, Vikash Publication House Pvt Ltd New Delhi
- G. S. Sandhu, Harshwardhan Bhagskar – Advanced invertebrate zoology –Campus books international

### Online Resources–

- <https://www.coursera.org/lecture/emergence-of-life/4-5-invertebrates-successes-of-life-without-a-backbone-WQHqS>
- <https://www.shiksha.com/online-courses/introduction-to-biology-biodiversity-course-cour15385>
- <https://www.youtube.com/watch?v=k121Qv6loBA>
- <https://www.youtube.com/watch?v=uK-Xx OCYcI>
- <https://www.youtube.com/watch?v=vybbBil5Elk>
- <https://www.youtube.com/watch?v=WxMSckEeio4>

## 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

<b>Continuous Internal Assessment (CIA):</b> (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	

<b>End Semester Exam (ESE):</b>	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
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Signature of Convener & Members (CBoS) :

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

<b>PART- A: Introduction</b>			
<b>Program: Bachelor in Life Science</b> <i>(Certificate / Diploma / Degree / Honors)</i>		<b>Semester - I</b>	<b>Session: 2024-2025</b>
1	Course Code	ZOSC-01P	
2	Course Title	Life on Earth and Unique Attributes of Animal Kingdom	
3	Course Type	Discipline Specific Lab Course	
4	Pre-requisite (if, any)	<i>As per Program</i>	
5	Course Learning Outcomes (CLO)	<p>After successfully completing this course, the students will be able to-</p> <ul style="list-style-type: none"> <li>➤ To demonstrate comprehensive understanding of the current theories and hypotheses regarding the origin of life on Earth,</li> <li>➤ Understand diversity of life forms</li> <li>➤ Identify some distinctive invertebrate and vertebrate animals</li> <li>➤ Apply this Understanding to broader context of life</li> </ul>	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
<b>PART -B: Content of the Course</b>			
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	<ul style="list-style-type: none"> <li>➤ Study of origin of life through chart and models</li> <li>➤ Study of different Invertebrates and Vertebrates animals through models and museum specimens in the laboratory with details of biogeography and diagnostic features: Millipora, Alcyonium, Gorgonia, Hippocampus, Ichthyophis (Female), Alytes (Male), Axolotal larva, Necturus, Siren, Cobra, Viper (pit &amp; Pitless), Sea Snake, Rattle Snake, Archaeopteryx, Emu, Ostrich and Penguins, Echidna and Duck bill platypus, Whale, Dolphin, Bat.</li> <li>➤ Preparation and Demonstration of Key for Identification of Venomous and Non-venomous snakes.</li> <li>➤ Study of Coral Reefs through Models, Photographs</li> <li>➤ Study of Fossils through chart/ Models</li> <li>➤ An “Animal album or Practical Record” containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa.</li> <li>➤ Study of some videos to develop understanding and acquired knowledge on the animals salient features as mentioned above.</li> <li>➤ Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper.</li> </ul>		30
Keywords	<i>Museum specimens, Invertebrates, Vertebrates, Venomous and Non-venomous, Seminar</i>		
<b>Name and Signature of Convener &amp; Members of CBoS:</b>			

*Rahallam*

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## **PART-C: Learning Resources**

### **Text Books, Reference Books and Others**

#### **Text Books Recommended –**

- S.S. Lal, Practical Zoology, Invertebrate. 12<sup>th</sup> Edition Rastogi Publications, Meerut,  
o New Delhi.
- A manual of practical Zoology. Dr. P.S Verma, S. Chand Publication, New Delhi

#### **Reference Books Recommended –**

- Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi
- Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, AITBS Publishing and Distributers, Delhi

#### **Online Resources–**

- [http://ndl.iitkgp.ac.in/he\\_document/swayamprabha/swayam\\_prabha/gc5ua6m873i?e=3|\\*||](http://ndl.iitkgp.ac.in/he_document/swayamprabha/swayam_prabha/gc5ua6m873i?e=3|*||)
- <https://www.youtube.com/watch?v=JUdp3U6A1EA>

## **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**

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

*Name and Signature of Convener & Members of CBoS:*

