

# **NEP 2020**

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

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

**DISCIPLINE – ZOOLOGY**

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**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. Shubhada Rahalkar*  
10.06.2024

*Shobha Ram Yadav*

*Dr. Nazam Memon*

*Dr. Ajit Kumar*

*Dr. Rajesh Kumar*

*Dr. Lalit Meshra*

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

<b>PART-A: Introduction</b>			
<b>Program: Bachelor in Life Science</b> (Certificate / Diploma / Degree)		<b>Semester – II/IV/V/VI</b>	<b>Session: 2024-2025</b>
1	<b>Course Code</b>	<b>ZOSEC-01</b>	
2	<b>Course Title</b>	<b>Vermiculture and Vermicomposting</b>	
3	<b>Course Type</b>	<b>Skill Enhancement Course</b>	
4	<b>Pre-requisite (if, any)</b>	<b>As per Program</b>	
5	<b>Course Learning Outcomes (CLO)</b>	<p style="text-align: center;"><b>After successfully completing this course, the students will be able to:</b></p> <ul style="list-style-type: none"> <li>➤ Learn the identifiable features of earthworm species for vermiculture and vermicomposting.</li> <li>➤ Cultivate the skills of vermiculture.</li> <li>➤ Understand the challenges in vermiculture and vermicomposting.</li> <li>➤ Analyze the features of different vermicomposting methods.</li> <li>➤ Create entrepreneurial prospects in this field.</li> </ul>	
6	<b>Credit Value</b>	<b>2 Credits</b> (1C + 1C)	<b>Credit = 15 Hours –Theoretical learning and = 30 Hours Laboratory or Field learning/Training</b>
7	<b>Total Marks</b>	<b>Max.Marks:50</b>	<b>Min Passing Marks:20</b>
<b>PART -B: Content of the Course</b>			
<b>Total No. of Teaching–learning Periods:</b> <b>Theory–15 Periods (15 Hrs) and Lab. or Field learning/Training 30 Periods (30 Hours)</b>			
<b>Module</b>	<b>Topics (Course contents)</b>		<b>No. of Period</b>
<b>Theory Contents</b>	<p><b>General Introduction:</b> Distribution and habit, habitat. Food: Phytophagous and Geophagous earthworm. Morphology of earthworm. Ecological categories: Epigeic, Endogeic and Anecic earthworms. Ecological requirements: moisture, temperature, light, pH and, organic matter. Ecosystem services: role played by earthworms in soil ecosystem. Difference between vermiculture and vermicomposting. Role of earthworm and vermicompost in growth of plants.</p> <p><b>Vermiculture:</b> Definition and features. Selective features of earthworms for vermiculture. Vermiculture methods: Wormery, breeding techniques: indoor and outdoor cultures, monoculture and polyculture, merits and demerits. Obstacles in Vermiculture: Prevention and Management.</p> <p><b>Vermicomposting:</b> Definition and features. Scientific names and distinguishing features of native and exotic vermicomposting earthworms (Native Indian earthworms. <i>Perionyx excavatus</i>, <i>Perionyx ceylanensis</i>, European earthworms. <i>Eisenia fetida</i>, <i>Eisenia andrei</i>, South African earthworms. <i>Eudriluseugeniae</i>), Principle of vermicomposting, Methods of vermicomposting: Low-cost Floor beds, Grow bags &amp; Tank system. Management during vermicomposting (Physical and Biological). Products of vermicomposting, physiochemical features and their utility: earthworm biomass (vermi-protein), vermicompost and vermiwash. Harvesting the vermicompost &amp; storage. Marketing prospects of Vermicomposting in Chhattisgarh and India.</p>		<b>15</b>
<b>Lab./Field Training Contents</b>	<ul style="list-style-type: none"> <li>➤ Key to identify different types of earthworms.</li> <li>➤ Identification of materials/waste products for vermiculture and vermicomposting.</li> <li>➤ Study of systematic position, habits, and habitat &amp; External characters of <i>Eisenia fetida</i>.</li> <li>➤ Study of Life stages &amp; development of <i>Eisenia fetida</i>.</li> <li>➤ Culture of earthworms in Grow Bags.</li> <li>➤ Study of devices and instruments of Vermiculture and Vermicomposting.</li> <li>➤ Preparation of vermibed, maintenance of vermicompost &amp; management of climatic conditions.</li> <li>➤ Study the effects of vermicompost &amp; vermiwash on any two short duration plants.</li> <li>➤ Study of different methods of vermicomposting (NADEP Composting, Bangalore Method, Coimbatore Method &amp; Indore Method).</li> <li>➤ Creation of set up for vermiwash collection.</li> <li>➤ Field Visit to Vermiculture &amp; Vermicomposting sites and interaction with self help groups/ personnel engaged in these activities.</li> <li>➤ Projects/ Assignments/ Chart/ Model preparation.</li> <li>➤ Practical Record</li> </ul>		<b>30</b>
<b>Keywords</b>	<b>Earthworm, Vermiculture, Vermicomposting, Vermiwash, Grow Bags, NADEP.</b>		
<b>Signature of Convener &amp; Members (CBoS):</b>			

## PART-C: Learning Resources

### Text Books, Reference Books and Others

#### Text Books Recommended –

- Chauhan, A. (2012) Vermitechnology, Vermiculture, Vermicompost and Earthworms: Vermiculture, Vermicomposting, Vermitechnology and Microbes, Lambert Academic Publishing, Germany.
- National Institute of Industrial Research, (2010): The Complete Technology Book on Vermiculture and Vermicompost, Published by National Institute of Industrial Research, Delhi-7, India.
- Kumar, A. (2005) Verms and Vermitechnology, APH Publishing.
- Bhatnagar & Patla, 2007. Earthworm vermiculture and vermin-composting, Kalyani Publishers, New Delhi.
- Sultan Ahmed Ismail, 2005. The Earthworm Book, Second Revised Edition. Other India Press, Goa, India.
- Panda Himadri: The Complete Technology Book on Vermiculture and Vermicompost (Earthworm) with Manufacturing Process, Machinery Equipment Details & Plant Layout; Asia Pacific Business Press Inc.
- EIRI Board : Hand Book Of Biofertilizers & Vermiculture.

#### Online Resources–

- [https://agritech.tnau.ac.in/org\\_farm/orgfarm\\_composting.html#:~:text=In%20the%20Bangalore%20method%20of,laid%20over%20the%20moistened%20layer.](https://agritech.tnau.ac.in/org_farm/orgfarm_composting.html#:~:text=In%20the%20Bangalore%20method%20of,laid%20over%20the%20moistened%20layer.)
- <https://www.thepharmajournal.com/archives/2021/vol10issue12/PartAR/11-5-248-926.pdf>

#### Online Resources–

- <https://megbrdc.nic.in/publications/fliers-Pamphlets/nadep-composting-english.pdf>

## 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 Coordinator)	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 learned skill - 20 Marks B. Spotting based on tools (written) - 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Coordinator as per skilling

Name and Signature of Convener & Members of CBoS:

Dr. Subhash Chandra Rahalkar

Dr. Nazreen Ahmed Masani

Dr. Ajit K. Kulkarni

Shobha Ram Yadav

Dr. Lata Meshram

Dr. R. K. Tamboli