

Vocational Course content for DSB Campus

Kumaun University, Nainital

B.Sc Zoology (NEP2022)

Vocational Elective Paper- I

Vermiculture and Vermi - Biotechnology

Credit-3

Unit – I Earthworms

Introduction of earthworms, Classification of earthworms and their types. The behavior of earthworms as indicators of soil fertility, as plant growth promoters & soil health regulators. Role of Earthworms to protect Environment.

Unit – II Vermicomposting

Vermiculture and Vermicomposting, Advantages of Vermicomposting, Chemical composition of vermicompost. Vermicomposting in everyday life earthworms and vermicomposting at commercial scale.

Vermicomposting and Sustainable agriculture, restoration of degraded soil systems, vermicomposting and its effect on the greenhouse effect. Vermicomposting and its economic viability.

Unit – III Economic Importance of Earthworms

Organic farming and earthworms, decomposers, food, medicine, and baits

HANDS-ON TRAINING/ FIELD VISIT

- Scientific Classification of Earthworm
- The Earthworm as study model and bioindicator (Soil toxicology)
- Study of the external morphology of Earthworm
- Study of Digestive system of Earthworm
- Study of Reproduction of Earthworm
- Vermicomposting unit Pit method
- Establishment of vermicomposting unit Bed method
- Study of cocoon and vermicast



B.Sc Zoology (NEP2022)
Vocational Elective Paper- II
Vermiculture and Vermi - Biotechnology

Credit-3

Unit – I Biology of Earthworm

Earthworms – Taxonomic position, external features- shape, size, color, segmentation, setae & clitellum. Body wall, coelom, locomotion, digestive, circulatory, respiratory, excretory & nervous systems. Reproductive system, copulation, cocoon formation & fertilization, and development of Earthworm.

Unit – II Earthworm Biotechnology.

Earthworms in bio-remediation, earthworms in alternative medicine, Earthworm as protein source and as model organism for current research special reference to soil toxicology.

Unit – III Integrated Farming, including vermiculture

Eco-friendly farming system technology, Criteria for ecological and appropriate technologies in agro-forestry, natural-management and planted forests (ranching, farmers' perception to organic Farming and case studies).



B.Sc Zoology (NEP2022); Year II

Vocational Elective Paper- I

Vermiculture and Vermi - Biotechnology

Credit -3

Unit – I Vermiculture and Vermicomposting material

Farm waste and its vermicomposting materials, types of vermicomposting (indoor and outdoor), requirements of vermicomposting bedding materials
Selection of suitable and dominant earthworm species: Composting materials; Production of vermicompost harvesting the compost and worm; vermicompost applications, predators, pathogens, and parasites of earthworms.

Unit – II Habitat Ecology

Burrowers, casts, nocturnal, poikilothermal, ecological grouping – Epigeic, Endogeic and Anecic.

Unit – III Species studies (Based on their availability in the mountains)

Detailed study of *Eisenia fetida*, *Amyntas gracillus*, *Amyntas alexandri*, *Perionyx excavates*.

B.Sc Zoology (NEP2022); Year II

Vocational Elective Paper- II

Vermiculture and Vermi - Biotechnology

Credit-3

Unit – I Composting and Farming

Small Scale Earthworm farming for home gardens; Conventional commercial composting, Earthworm Composting at a larger scale; Earthworm Farming (Vermiculture), Vermiwash collection, vermicomposting extraction, and processing. Organic matter dynamics and nutrient cycling, feeding habit, and food.

Unit – II Nutritional Composition

Nutritional Composition of Vermicompost for plants and comparison with other fertilizers. Natural Enemies of Earthworms and mechanical death of worms during agri-practices.

Unit – III Population of Earthworms

Selection of worms for vermiculture, the process in organic matter. Valuable local species of earthworms. Comparison of Local species of earthworms. With Exotic species of earthworms.



Recommended-Books

1. Biology and Ecology of Tropical Earthworms by Priya Shankar Chaudhari and S.M. Singh Discovery Publishing House Pvt. Ltd. New-Delhi.
2. Vermicomposting for Sustainable Agriculture by P.K. Gupta, Agrobios (India), Agro. House. Jodhpur. 342 or 2.
3. Earthworm Ecology by C.A. Edwards CRC Press U.S.A.
4. Soil Biodiversity Ecological Process and Landscaps Management by
5. P.S. Ramakrishnan. K.G. saxena, M.J. Sulift, K.S. Rao, R.K. Maikhuri, Oxford and IBH Publishing Co. RA Ltd. New Delhi.
6. Vermiculture Eco-technology: Bhawankar Earthworm Research Instiutute (BERI) Pune.
7. The Biological Management of Tropical soil Fertility- by P.L. Woomer and M. J Sulift Pub. John wiley & sons,New-York. Busbane Singapore.
8. Sultan Ahmed Ismail, 2005. The Earthworm Book, Second Revised Edition. Other India Press, Goa, India.
9. Bhatnagar & Patla,2007. Earthworm vermiculture and vermin-composting, Kalyani Publishers, New Delhi.
10. Jordan & Verma,2009. Invertebrate Zoology, Chand & Company Ltd.
11. Edwards, C.A & P.J Bohlen, 1996. Biology and ecology of earthworms III Edn. Chapman & Hall N.Y.U.S.A.
12. Edwards, C.A & J.R Lofty Vermicology – The Biology of Earthworm, 1997 Chapman & Hall Publications N.Y.U.S.A.
13. Lee, K.E. 1985. Earthworms their ecology and relationships
14. Aravind Kumar, 2005. Verms & Vermitechnology, A.P.H. Publishing Corporation, New Delhi.

