



हिमाचल प्रदेश केन्द्रीय विश्वविद्यालय

Central University of Himachal Pradesh

(Established under Central Universities Act 2009)

शैक्षणिक खण्ड, शाहपुर ज़िला काँगड़ा, हिमाचल प्रदेश - 176206

Academic Block, Shahpur, Distt. Kangra (HP) – 176206

Website: www.cuhimachal.ac.in

SEMESTER - I

INTERDISCIPLINARY COURSE

COURSE NAME: FOUNDATION COURSE IN ECOLOGY

Course Code: ZOO 426

Credit: 02

Course Learning Objectives:

- To acquaint the students with the habitat and interactions of diverse animal groups with their environment.
- To educate the students about the basic environmental phenomena like ecosystem, energy flow through the ecosystem and biogeochemical cycles.
- To enable the students to develop an appreciation for the biodiversity of invertebrate and vertebrates.

Course Learning Outcomes:

- Students will be exposed to the fundamental aspects of ecology.
- They will get idea about the impact of anthropogenic activities on the environment.
- Students will get idea about the natural resources and their conservation.
- Apply the basic principles of ecology in wildlife conservation and management.

Course Contents:

UNIT I: CONCEPT OF ECOLOGY

Definition, principle and scope of ecology, aquatic and terrestrial ecology, freshwater ecology, marine ecology, estuarine ecology, Community concept, types of community, succession process, competition and Coexistence, types of interactions: predation, parasitism, antibiosis, commensalism, cooperation and mutualism, population growth.

Ecosystem components: Producers, consumers and decomposer, Food chains, food web and ecological pyramids, Biotic and abiotic components, Ecological pyramids, Bioaccumulation and biomagnifications, mass, and energy transfer in successive tropical level.

UNIT II: ENERGY AND ECOLOGICAL SUCCESSION

Flow and energy fixation, Biogeochemical cycles: hydrological cycles, carbon cycle, oxygen cycle, nitrogen cycle -its importance and applications. Primary succession, secondary succession and ecological climax, impacts of development of ecosystem, population, community ecology, predator and prey relationship.



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UNIT III: CONCEPT OF BIODIVERSITY

Biodiversity concept, Biodiversity-components, Biodiversity- Types, Biodiversity-importance, ecological importance, economic importance, key stone umbrella and flagship species, National status and Global status, hotspot; threatened species, IUCN Red list, endangered species, vulnerable species, rare species, extinct species and endemic species. Climate change, induced losses.

UNIT IV: BIODIVERSITY CONSERVATION AND CONVENTION

Different approaches for Biodiversity conservation- In-situ conservation and ex-situ conservation. In-vitro Conservation. IPRs, national and international programs for biodiversity conservation. Wildlife values and eco-tourism, wildlife distribution in India, problem in wildlife protection, role of WWF, WCU, CITES, TRAFFIC.

UNIT V: ENVIRONMENTAL LEGISLATION

Environmental legislation enforcement authorities: (i) Under the Water and Air Act-composition, powers, and functions, and (ii) Under the Environment (Protection) Act, 1986- powers Environmental dispute redress bodies: (i) National Green Tribunal – composition and jurisdiction, (ii) Trial court- jurisdiction under the environmental legislations, and (iii) Executive Magistrate' s powers The Forest (Conservation) Act 1980: Objectives and Mechanism. The Wild Life (Protection) Act 1972: Objectives, prohibition on hunting and trade. The Biodiversity Act 2002: object and National Biodiversity Authority. Convention on Climate Change: objectives, principles and commitment-India's response.

SUGGESTED BOOKS:

- Charls J. Krieb. 1972. Ecology: The Experimental Analysis of Distribution and Abundance
- Philipson, J.1966.Ecological Energetic, Edward Arnold Ltd. London.
- Odum, E. P.1970: Ecology, Amerind Publ. Co. New Delhi.
- Kormondy, E. T. 1971. Concept of Ecology. Prentice Hal of India, New Delhi.
- Ricklefs, R. E. 1973. Ecology. Thomes Nelson and sons ltd.
- Colinbaux, P.A.1985Introductiontoecology.JohnWiley&Sons.
- Wiegert, R. G. 1976. Ecological Energetic Dowden, Hutchinson & Ross. Inc. Pennsylvania.
- Scuthwick, C. H. 1976.Ecology and the quality of our environment. D. Van Nestrand
- Fahey, J. J.,and Knapp, A.K. 2007. Principles and Standards for measuring primary production.
- Oxford Univ.Press.UK.



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SEMESTER - I

COURSE NAME: INTRODUCTION TO APICULTURE

Course Code: ZOO 427

Credit: 02

Course Learning Objectives:

- Introduction to the world of bees
- Development of understanding of beekeeping and rearing practices
- To learn about the excellent role of honey in pharmaceutical company, and cosmetic companies.

Course Learning Outcomes: After completion of the course student will be able to

- Develop and maintain an apiary
- Train the youths for rearing of bees
- Generate employment

UNIT I: INTRODUCTION TO APICULTURE

Apiculture- Definition, introduction, importance, and history of beekeeping. Introduction to honey bee; Origin, systematics, and distribution; different species of Honey Bees- *Apis dorsata*, *Apis indica*, *Apis florea* and *Apis mellifera*.

UNIT II: MORPHOLOGY AND ANATOMY OF HONEY BEE

General morphology, head, thorax, abdomen and anatomical features, life cycle, colony organization and division of labor, polymorphism, bee social behavior and bee communication. Bee dance- Round Dance, and Wag -Tail Dance.

UNIT III: FLORA AND BEE PRODUCTS

Ancient and modern beekeeping, Urban or backyard beekeeping. Bee keeping equipment.

Identification of flora for nectar and pollen. Honey- composition, quality control, by products of honey and their beneficial role. Importance and uses of honey. Composition and importance of bee wax, pollen, and royal jelly.

UNIT IV: HANDLING OF BEE COLONY AND MAINTENANCE OF APIARY RECORD

Selection of apiary site and bee species, examination of a bee colony, maintenance of apiary records, introduction to bee flora, qualities of a good bee flora, important honey flow sources in India.



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SEMESTER - I

Principles of Bee Management, management during- spring, winter, summer, monsoon, and autumn, swarming and control, honey extraction, migratory bee keeping, supplementary feeding, and queen management.

UNIT V: ENEMIES, DISEASES OF HONEY BEES AND THEIR CONTROL

An introduction, Bee enemies – wax moth, ants, wasps, microorganisms, pests. diagnosis and identification, mites attacking honey bees: varroa mites, mite biology and controlling varroa mites. bacterial disease, viral disease, and fungal disease.

Books Recommended:

1. Graham, J M (1992) The hive and the honey bee. Dadant and Sons, Hamilton, Illinois.
2. Mishra R.C. (1995) Honey bees and their management in India. ICAR Publication, New Delhi.
3. Singh, S. (1971) Beekeeping in India, ICAR publication.
4. Gupta, J.K., Sharma, H K and Thakur, R K. 2009. Practical Manual on Beekeeping. Department of Entomology and Apiculture, Dr Y S Parmar University of Horticulture and Forestry, Nauni, Solan, p 83.
5. Gupta, J K. 2010.Spring management of honey bee colonies. In “OAPI-012 Management of honey bee colonies; Seasonal and specific management (Block 2), Indira Gandhi National open university, school of Agriculture, New Delhi, UNIT-I, pp 5-14, p 105.
6. Gupta, J K. 2010.Management in summer. In “OAPI-012 Management of honey bee colonies; Seasonal and specific management (Block 2), Indira Gandhi National open university, school of Agriculture, New Delhi, UNIT-II, pp 15-25, p 105.
7. Gupta, J K. 2010.Management in monsoon season. In “OAPI-012 Management of honey bee colonies; Seasonal and specific management (Block 2), Indira Gandhi National open university, school of Agriculture, New Delhi, UNIT-III, pp 26-33, p 105.
8. Gupta, J K. 2010.Management in autumn season. In “OAPI-012 Management of honey bee colonies; Seasonal and specific management (Block 2), Indira Gandhi National open university, school of Agriculture, New Delhi, UNIT-IV, pp 34-40, p 105.
9. Gupta, J K. 2010.Management in winter. In “OAPI-012 Management of honey bee colonies; Seasonal and specific management (Block 2), Indira Gandhi National open university, school of Agriculture, New Delhi, UNIT-V, pp 41-50, p 105.
10. Gatoria, G.S., Gupta, J. K., Thakur, R.K. and Singh, J. 2011. Mass queen bee rearing and multiplication of honey bee colonies. All India Co-ordinated project on honey bees and pollinators, ICAR, HAU, Hisar, p70.
11. Lorry, P. Entomology and Pest management. Macmillon Publishing.