



Central University of Himachal Pradesh

(Established under Central Universities Act 2009)

PO BOX: 21, DHARAMSHALA, DISTRICT KANGRA – 176215, HIMACHAL
PRADESH

www.cuhimachal.ac.in

SEMESTER- I

Course Code: ZOOL 410

Credit: 04

Course Name: Animal Taxonomy

Course Contents:

Unit - I Definition and basic concepts of Biosystematics, Taxonomy and Classification

1. History of taxonomy
2. Importance and applications of biosystematics in biology
3. Stages in taxonomy
4. Important taxonomic terms (i.e Allochronic & Synchronic species, Binomial nomenclature, Cladism, Sympatry, Category, Cline, Deme, Key, Phenon, Sibling species, Taxon, Variety etc.)

Unit - II Trends in Biosystematics-concepts of different conventional and newer aspects

1. Ecotaxonomy
2. Behavioural taxonomy
3. Cytotaxonomy
4. Biochemical taxonomy
5. Numerical taxonomy

Unit - III Concept of zoological classification

1. Theories of biological classification
2. Hierarchy of categories
3. Species Concepts: Biological, Evolutionary, Typological and Nominalistic
4. Polytypic & monotypic species, subspecies, super species & other infraspecific groups.

Unit - IV Taxonomic Procedures

1. Taxonomic collections/ collecting ways
2. Preservation of collected material & Curation
3. Methods of identification & Problems encountered in identification.
4. Taxonomic key

Unit – V Zoological Nomenclature

1. International code of Zoological Nomenclature (ICZN)
2. Operative principles and important rules of nomenclature
3. Criteria of publication, criteria of availability of names, principles of priority, homonymy, synonymy, type concept.

Recommended Books:

M.Kato.The Biology of Biodiversity. Springer.

E.O. Wilson, biodiversity. Academic Press, Washington.

G.G. Simpson, Principle of animal taxonomy. Oxford IBH Publishing company.

E. Mayer. Elements of Taxonomy. Oxford IBH Publishing company.

E.O. Wilson. The diversity of Life (The College edition W.W. Northem & Co.

B.K. Tikadar. Threatened Animal of India, ZSI publication Calcutta

V.C. Kapoor. Theory and Practice of Animal Taxonomy. Oxford & IBH Publishing Co.

J.C. Avise, Molecular Markers, Natural History and Evolution, Chapman & Hall, New York.



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SEMESTER- I

Course Code: ZOOL 411

Credit: 02

Course Name: Ecology and Environment

Course Contents:

UNIT-1 Concept of ecosystem

1. Physical environment; biotic and abiotic factors,
2. Ecosystem and its types,

UNIT-II Structure of ecosystem

1. Ecosystem structure, function productivity and energy flow
2. Habitat, ecological niche, fundamental and realized niche; resource partitioning; character displacement.
3. Ecological succession and its types

UNIT-III Population ecology

1. Characteristics of a population; population growth curves; population regulation; life history strategies (r and K selection);
2. Species Interactions and its types

UNIT-IV Biodiversity and its conservation

1. Biological diversity: concepts and levels, role of biodiversity in ecosystem functions and stability,
2. Categories of threat, Terrestrial biodiversity hot spots.
3. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-V Environmental Pollution

1. Air pollution
2. Water pollution
3. Soil pollution
4. Noise pollution
5. Ozone and climate change

Recommended Books:

- Charls J. Krebs. 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 Hall of India, New Delhi.
- Ricklefs, R. E. 1973. Ecology. Thomes Nelson and sons ltd.
- Colinbaux, P. A. 1985 Introduction to ecology. John Wiley & Sons.
- Wiegert, R. G. 1976. Ecological Energetic Dowden, Hutchinson & Ross. Inc. Pennsylvania.
- Scuthwick, C. H. 1976. Ecology and the quality of four environment. D. Van Nestrand
- Fahey, J. J, and Knapp, A. K. 2007. Principles and Standards for measuring primary production. Oxford Univ. Press. UK.
- Grant, W. E. and Swanmack, T. M. 2008. Ecological Modeling. Blackwell Publ. Hou



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SEMESTER- I

Course Code: ZOOL 412

Credit: 04

Course Name: Cellular and Molecular Biology

Course contents:

UNIT- I: Cell structure and functions:

1. Introduction to Cell biology.
2. Basic properties of cells.
3. Structural organization and function of intracellular organelles: Nucleus, Mitochondria, Endoplasmic reticulum, Lysosomes, Peroxisomes.

UNIT- II: Cellular membrane and cytoskeleton:

1. An overview of membrane functions.
2. Membrane models.
3. Chemical composition of cell membrane.
4. Structure and functions of membrane proteins: Integral protein, peripheral membrane proteins and lipid-anchored membrane proteins.

UNIT- III Cell transport

1. Movement of substances across cell membranes: Diffusion, active transport, uniport, symport and antiport.
2. Structure and organization of Microtubules, Intermediate filaments and Microfilaments and their role in cell motility.

UNIT- IV: Fundamental Processes In Molecular Biology

1. DNA and its organization in cell; structure; A, B, and Z forms
2. Replication, Transcription, translation, damage and repair.
3. Regulation of gene expression in prokaryotes and eukaryotes

UNIT- V: Basic techniques

1. Microscopy application and types (TEM and SEM).

2. Centrifugation and Polymerase chain reaction (PCR).
3. Molecular Markers (RFLP, RAPD, SSR's and SNP's)
4. Blotting techniques.

Recommended Books:

Lewin, B. 2000. Genes VIII Oxford University, Press, New York

Alberts, B. Bray, D., Lewis, J. Raff, M., Roberts, K. and Watson, J.D. 1999, Molecular biology of the cell. Garland Publishing, Inc. New York.

Wolfe, S.L. 1993, Gruissem, W. and Jones, R.L. 2000, Biochemistry and molecular biology of plants, American society of plant physiologists, Maryland, USA

Frifelder, D. Molecular Biology. John and Bartlett Publishers, inc., Boston, USA



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SEMESTER- I

Course Code: ZOOL 413

Credit: 02

Course Name: Invertebrate Biology

Course contents:

UNIT- I : Organisation of Coelom

1. Acoelomates, Pseudocoelomate, Coelomates; Fate of blastopore: Protostoma and Deuterostoma.

Locomotion:

2. Flagella and ciliary movement in Protozoa.
3. Hydrostatic movement in Coelenterata, Annelida and Echinodermata.

UNIT- II : Nutrition and Digestion

1. Patterns of feeding and digestion in protozoa and Coelenterata.
2. Filter feeding in Polychaeta, Mollusca and Echinodermata.

UNIT-III: Respiration

1. Organs of respiration: Gills, Lungs and trachea. Respiratory pigments.
2. Mechanism of respiration.

UNIT- IV: Excretion:

1. Organs of excretion: coelom, coelomoducts, Nephridia and Malpighian tubules.
2. Excretion and osmoregulation.

UNIT- V: Nervous system:

1. Primitive nervous system: Coelenterata and Echinodermata.
2. Advanced nervous system: Annelida, Arthropoda (Crustacea and Insecta) and Mollusca.

Recommended Books:

Hyman, L.H. The invertebrates. Vol. I protozoa through Ctenophora, McGrawHill Co., New York.

Barington, E.J.W. Invertebrate structure and function. Thomas Nelson and Sons Ltd. London.

Jagerstein, G. Evolution of Metazoan life cycle, Academic Press, New York & London.
Hyman, I. H. The Invertebrates. Vol. 2 McGraw-Hill Co., New York.
Hyman, L. H. The Invertebrates Vol. 8, McGraw-Hill Co., New York & London.



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Practical Courses Sem. Ist

Course Code: ZOOL 414

Credit: 02

Course Name: Zoology Lab I

Course contents: Lab Course Based on ZOOL-410, ZOOL-411



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Course Code: ZOOL 415

Credit: 02

Course Name: Zoology Lab II

Course contents: Lab Course Based on ZOOL-412, ZOOL-413



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SEMESTER- I

Course Code: ZOOL 423

Credit: 02

Course Name: Aquaculture

Unit-I

Definition, History, Purpose, Scope and Status of Aquaculture, Kinds of Fisheries, Culture technology– freshwater (carps, Trout).

Unit-II

Abiotic (Physicochemical Factors in Freshwater Ecosystem): Physical characteristics of water: Temperature, thermal stratification, Light, Density, Water movement and thermal exchange.

Chemical characteristics of water: Hydrogen ion concentration (pH), Dissolved oxygen, Free carbon-dioxide, Total dissolved solids (T.D.S), Carbonates and Bicarbonates.

Unit-III

Integrated farming - fish-cum-live stock farming, paddy-cum-fish farming, Induced breeding, cryopreservation of gametes.

Unit-IV

Biochemical Composition, Preservation, Rigor mortis, feed types, manufacture and ingredients, Ailments and diseases of fishes, common fish pathogens, control of fish diseases.

Unit-V

Genetics approach to aquaculture – gynogenesis, androgenesis, triploidy, tetraploidy, hybridization, sex reversal and breeding, production of transgenic fish. Environmental impact of

aquaculture - aquacultural wastes and future developments in waste minimization, environmental consequences of hypernutrification.

Recommended Books:

1. Aquaculture Principles and Practices, Pillay, T. V. R., Blackwell Publishing, USA.
2. Aquaculture and Fisheries Biotechnology Genetic Approaches, Dunham, R. A., CABI Publishing, USA.
3. Joseph, M. Aquaculture in Asia. Manglore: Asian Fisheries Society, 1990.



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SEMESTER- I

Course Code: ZOOL 421

Credit: 02

Course Name: Sericulture

Course Content:

Unit-I

Silk and Silk Production: Origin and history of Sericulture, Different types of silk and silkworms in India; Rearing of *Bombyx mori* – Rearing racks and trays, disinfectants, rearing appliances, black boxing, Chawki rearing, bed cleaning, mountages, harvesting of cocoons.

Unit-II

Topography and climate for mulberry cultivation – latitude, temperature, humidity, rain fall, elevation and sun shine.

Silkworm diseases and Pest: Pebrine, Flacherie, Grasserie, Muscardine and Aspergillosis, and their management;

Unit-III

Beneficial and harmful insects: Rearing of silkworm, honey bee and lac insects. Silkworm rearing appliances and their uses. Disinfection of rearing house and appliances. Incubation and black boxing of silkworm eggs. Brushing of silkworm larvae. Feeding, bed cleaning and spacing in silkworm rearing. Moulting and care at moulting. Mounting and density of silkworm larvae for spinning.

Unit-IV

Processing of Silk: Physical and commercial characters of cocoons and silk. Cocoon sorting, stifling and cooking. Silk reeling devices – charaka, cottage basin, multi end, auto and semi-automatic reeling machines. Process of silk reeling, throwing, wet processing and weaving. Medicinal value of products and by-products of sericulture industry and their utilization.

Recommended Books:

1. Indian Journal of Sericulture - Cumulative Index by J. Justin Kumar.
2. Biological control of Insects pests in Mulbery sericulture by J.B. Narendra Kumar, Vinod Kumar and V. Sivaprasad.
3. Dandin, S.B.; Jayant Jayaswal and Giridhar, K. (Eds.) (2003) Handbook of Sericulture Technologies. CSB, Bangalore.
4. Dilip De Sarkar (1998) The Silkworm – Biology, Genetics and Breeding. Vikas Publishing House Pvt. Ltd., New Delhi
5. Journal of Sericulture and Technology - Published by NASSI, Bangalore.