

**Choice based Credit System (CBCS)
Scheme and course structure for**

M.Sc Zoology 3rd semester effective from academic session 2015 and onwards

**Marks-100
Max. (Min.)**

Course Code	Course Title	Paper Category	Hours/Week			Credits	Ext.	Int.
			L	T	P			
ZOO14301CR	Ecology and Animal Behaviour	Core	4	0	0	4	80(32)	20(8)
ZOO14302CR	Basic Entomology	Core	4	0	0	4	80(32)	20(8)
ZOO14303CR	Lab. Course-3 (Based on ZOO14301CR & ZOO14302CR)	Core	0	0	8	4	80(32)	20(8)
ZOO14304EA	Fishery Resources and Technology	Elective (Allied)	3	0	1	4	80(32)	20(8)
ZOO14305EA	Veterinary Parasitology	Elective (Allied)	3	0	1	4	80(32)	20(8)
ZOO14306EA	Habitat Ecology & Management of Wildlife Resources	Elective (Allied)	3	0	1	4	80(32)	20(8)
ZOO14307EA	Applied Zoology III Fish Products	Elective (Allied)	3	0	1	4	80(32)	20(8)
ZOO14308EO	Aquaculture, Limnology and Fish Products	Elective (Open)	4	0	0	4	80(32)	20(8)
Credits = 28	Contact Hours = 41		25	3	12	28		

GENERAL INSTRUCTIONS FOR THE CANDIDATES

1. The two year (4 semester) programme is of 96 credits i.e. 24 credits/semester (24x4=96)
2. A candidate has compulsorily to opt for 12 credits from the core component in each semester.
3. A candidate has a choice to opt any 12 credits (3 papers) out of minimum of 16 credits (4 papers) offered as Elective (Allied), except for a particular semester where a candidate is required to gain a minimum of 4 credits (1 paper) from Elective (Open) offered by any other Department/ Faculty.
4. A candidate has compulsorily to obtain a minimum of 4 credits (1 paper) from Elective (Open) from outside the parent Department/Faculty.
5. A candidate can earn more than the minimum required credits (i.e. more than 96 credits for four Semester programme) which shall be counted towards the final result of the candidate.

MAX.MARKS=100 (Internal=20 + External=80) **CREDITS =4 (4+0+0)**

COURSE CODE: ZOO14301CR

COURSE TITLE: ECOLOGY

UNIT I: POPULATION ECOLOGY

- 1.1. Demography: Life tables, Survivorship curves and net reproductive rate
- 1.2. Population growth -Exponential and logistic growth patterns, growth models-(time lag models)
- 1.3. Population regulation
- 1.4. Life history strategies: r and k selection, clutch size and sex ratio

UNIT II: LIMNOLOGY

- 2.1. Fate of heat in water- Thermal stratification
- 2.2. Nutrients: Micro and Macro
- 2.3. Planktonic communities : classification and distribution.
- 2.4. Benthic communities of Inland waters

UNIT III: SOCIAL AND LEARNING BEHAVIOUR

- 3.1. Home range, Territoriality and Dispersal.
- 3.2. Parental care in birds and Insects
- 3.3. Migration in insects and mammals
- 3.4. Learning behaviour in vertebrates

UNIT IV: REPRODUCTIVE BEHAVIOUR

- 4.1. Courtship
- 4.2. Parental investment and reproductive strategies
- 4.3. Mating systems
- 4.4. Communication in animals.

MAX. MARKS=100 (Internal=20 + External=80) **CREDITS =4** (4+0+0)

COURSE CODE: ZOO14302CR

COURSE TITLE: BASIC ENTOMOLGY

UNIT I: INSECT CLASSIFICATION

- 1.1. Classification of Apterygota with important orders and families
- 1.2. Classification upto family level of the orders, viz. Isoptera, Hemiptera, Anoplura, Mallophaga and Siphonaptera
- 1.3. Classification of Insect orders, viz. Diptera and Coleoptera, with economically important families
- 1.4. Classification of Insect orders, viz. Lepidoptera and Hymenoptera, with economically important families

UNIT II: INSECT MORPHOLOGY

- 2.1. Integument - structure, composition and modification
- 2.2. Head -structure, region/sulci/suture and appendages - antennae
- 2.3. Thorax -structure, modifications and appendages: Wing - origin, development, structure and modifications and Leg-structure and modifications
- 2.4. Abdomen and its modification, with special reference to genitalia

Unit III: INSECT ANATOMY AND PHYSIOLOGY

- 3.1. Digestive System
- 3.2. Endocrine Glands
- 3.3. Tracheal Respiratory System
- 3.4. Nervous System

Unit IV: INSECT ECOLOGY

- 4.1. Effects of temperature, humidity and light on the activities of insects.
- 4.2. Effects of High-altitude environment on morphology, physiology and development of insects
- 4.3. Insect-plant interaction
- 4.4. Population dynamics.

MAX.MARKS=100 (Internal=20 + External=80) **CREDITS =4 (0+0+8)**

COURSE CODE: ZOO14303CR

COURSE TITLE : LAB. COURSE-3

1. Taxonomy and identification of insects of economic importance belonging to following insect orders: Collembola, Thysanura, Orthoptera, Dictyoptera, Anoplura, Hemiptera, Thysanoptera, Mallophaga, Siphonoptera, Coleoptera, Lepidoptera and Diptera
2. Permanent whole mount preparation of the following insects:
Aphids, Thrips, Jassids, Psylla, Mosquitoes, Sucking louse and Fleas
3. Major dissections: Digestive, Respiratory, Excretory, Reproductive and Nervous system of the following insects: Grasshopper, Cricket and Cockroach
4. Minor dissection/permanent mount preparation of mouthparts, wings, spiracles, trachea, salivary glands, genitalia, pretarsus, head and legs of the following:
Housefly, Mosquito, Honey-bee, Moth, Butterfly and Grasshoppers.
5. Collection of insects from different localities of Kashmir.
6. Determine the soil and water pH.
7. Determine the frequency and density of various species occurring in area.
8. Estimation of biomass.
9. Study of species diversity of terrestrial fauna.
10. To determine dissolved oxygen content in water.
11. To determine free carbon dioxide in water.
12. To determine total alkalinity in water.

MAX.MARKS=100 (Internal=20 + External=80) **CREDITS = 4** (3+0+1)

COURSE CODE: ZOO14304EA

COURSE TITLE: FISHERY RESOURCES AND TECHNOLOGY

UNIT I: INLAND FISHERIES

- 1.1. Introduction of exotic fish species in J&K
- 1.2. Cold water fisheries ó Present status and scope for development
- 1.3. Reverine fisheries
- 1.4. Capture fisheries

UNIT II: FISH FARMING

- 2.1. Present status of Aquaculture in India
- 2.2. Integrated fish farming
- 2.3. Live feed culture
- 2.4. Composite/Polyculture in fishes

UNIT III: FISH FEED INGREDIENTS

- 3.1. Nutritional values of fish feed ingredients
- 3.2. Antinutritional factors in fish feed ingredients
- 3.3. Fish feed formulation
- 3.4. Nutritional deficiency and symptoms in fishes

UNIT IV: PRACTICALS WORK

- 4.1. Identification and classification of local fishes of J&K through museum specimen
- 4.2. Survey and collection of Reverine fishes of the Valley
- 4.3. Survey and collection of local fish feed ingredients
- 4.4. Analysis of feed ingredients
- 4.5. Hydro-biological condition of various Lakes and Rivers of the Valley
- 4.6. Formulation of various kind of diet for fish culture

MAX. MARKS=100 (Internal=20 + External=80) **CREDITS = 4 (3+0+1)**

COURSE CODE: ZOO14305EA

COURSE TITLE: VETERINARY PARASITOLOGY

UNIT I: NATURE AND CONSEQUENCES OF PARASITISM

- 1.1. Distribution of parasitism in animal kingdom
- 1.2. Parasitic adaptations in helminthes
- 1.3. Host-Parasite relationships
- 1.4. Zoonosis

UNIT II: PLATYHELMINTHS

- 2.1. Trematode parasites of ruminants with reference to the life cycle, Pathogenicity, prophylaxis and control of *Paramphistomum cervi* and *Dicocoelium dendriticum*
- 2.2. Cestode parasites of ruminants with reference to the life cycle, pathogenicity, prophylaxis and control of *Moneiza* and *Avitellina*
- 2.3. Trematode and cestode parasites of Fishes with special reference to the morphology, biology and control of *Diplozoon* sp. and *Adenoscolex*.
- 2.4. Trematode and cestode parasites of Aves with special reference to the morphology, pathology and control of *Echinostoma* sp. and *Davaina*.

UNIT III: NEMATYHELMINTHS AND ACANTHOCEPHALA

- 3.1. Nematode parasites of Sheep with special reference to life cycle, pathogenicity and control of *Haemonchus contortus* and *Dictyocaulus filaria*
- 3.2. Nematode parasites of Aves with special reference to life cycle, pathogenicity and control of *Heterakis gallinarum*
- 3.3. Nematode parasites of fishes with special reference to life cycle, pathogenicity and control of *Rhabdochona*
- 3.4. Acanthocephala-General account

UNIT IV: PRACTICALS

- 4.1. Study of prepared slides of Cestode and Trematode parasites of animals available in museum
- 4.2. Collection, preservation and preparation of permanent slides of parasitic cestodes and trematodes collected from different hosts
- 4.3. Study of prepared slides of nematodes and Acanthocephalan parasites available in museum
- 4.4. Collection, preservation and preparation of permanent slides of parasitic nematodes and Acanthocephalans collected from different hosts
- 4.5. En-face view preparation of a nematode
- 4.6. Collection of parasites from fish, fowl, duck , sheep ,goat and cattle.(Mini-project).

MAX. MARKS=100 (Internal=20 + External=80) CREDITS =4 (3+0+1)

COURSE CODE: ZOO14306EA

COURSE TITLE: HABITAT ECOLOGY AND MANAGEMENT OF WILDLIFE RESOURCES

UNIT I: HABITAT ECOLOGY

- 1.1. Ramsar Sites of J&K- Ecological features, characteristic fauna and present status
- 1.2. Wildlife habitats of J & K, their important faunal and floral elements
- 1.3. Components of wildlife habitat
- 1.4. Factors affecting wildlife habitats

UNIT II: WILDLIFE RESOURCE MANAGEMENT

- 2.1. Evolution of wildlife management in Asia
- 2.2. Endangered fauna and flora of India and their distribution.
- 2.3. Conservation projects in India- Project Tiger, Elephant and Crocodile breeding project,
- 2.4. Biosphere reserves of India and their management

UNIT III: WILDLIFE HABITAT MANAGEMENT

- 3.1. Wildlife habitat types and their significance
- 3.2. Wetlands: Threats and management
- 3.3. Management and control of forest fire and soil erosion
- 3.4. Management of protected areas

UNIT IV: PRACTICALS

- 4.1. Wet and dry preservation of animals
- 4.2. Field collection of plant material and herbarium techniques
- 4.3. Collection and preservation of biological material- skull and bone
- 4.4. Identification and ecological distribution of some endangered plants.
- 4.5. Identification and ecological distribution of some endangered fauna.
- 4.6. Study of wetland fauna with reference to waterfowl.

MAX. MARKS=100 (Internal=20 + External=80) **CREDITS = 4 (3+0+1)**

COURSE CODE: ZOO14307EA

COURSE TITLE: APPLIED ZOOLOGY-III

UNIT I: DAMAGING AND DEFECTIVE IMMUNE RESPONSES

- 1.1. Types of hypersensitivity reactions
- 1.2. Mechanism of type I hypersensitivity reaction
- 1.3. Mechanism of Cytotoxic reaction
- 1.4. Mechanism of Homograft Rejection

UNIT II: INSECT DEVELOPMENT

- 2.1. Embryonic development of insects: early and late
- 2.2. Metamorphosis
- 2.3. Larval and pupal forms in insects
- 2.4. Diapause in insects

UNIT III: BIODIVERSITY VALUES-I

- 3.1. Food and Medicinal value
- 3.2. Industrial and Recreational value
- 3.3. Biological control value
- 3.4. Ecotourism value

UNIT IV: PRACTICALS WORK

- 4.1. Tests for cytotoxicity- in vitro methods.
- 4.2. Morphology and enumeration of human blood platelets
- 4.3. To study life cycle of Lepidoptera, Coleoptera, Orthoptera and diptera insects
- 4.4. To study larval and pupal stages of various insects
- 4.5. Chemical extraction of a medicinal plant.
- 4.6. Study of life stages of honey bee.

MAX. MARKS=100 (Internal=20 + External=80) **CREDITS = 4** (4+0+0)

COURSE CODE: ZOO14308EO

COURSE TITLE: AQUACULTURE, LIMNOLOGY AND FISH PRODUCTS

UNIT I: AQUACULTURE

- 1.1. Construction and management of fish ponds
- 1.2. Induced breeding in fishes
- 1.3. Wet and dry bundh techniques for breeding Indian major carps
- 1.4. Trout culture

UNIT II: LIMNOLOGY

- 2.1. High altitude lakes of Jammu and Kashmir - General Account.
- 2.2. Eutrophication in valley lakes.
- 2.3. Macro and Micro nutrients in water bodies
- 2.4. Biological communities in water bodies

UNIT III: ADAPTATION

- 3.1. Adaptation of Hill stream fishes
- 3.2. Adaptation of Deep sea fishes
- 3.3. Adaptation of Cave dwelling fishes
- 3.4. Luminescent organs: Distribution, Structure, Physiology and Significance

UNIT IV: FISH FEED AND BY-PRODUCTS

- 4.1. Artificial food and feeding
- 4.2. Preservation and Processing of Fishes.
- 4.3. Fish Products and by- products.
- 4.4. Sea weed of economic importance