

**Choice based Credit System (CBCS)
Scheme and course structure for
M.Sc Zoology 2nd semester effective from academic session 2014 and onwards**

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

Course Code	Course Title	Paper Category	Hours/Week			Credits	Ext.	Int.
			L	T	P			
ZOO14201CR	Comparative Anatomy and Physiology of Vertebrates	Core	4	0	0	4	80 (32)	20 (8)
ZOO14202CR	Ichthyology and Aquaculture	Core	4	0	0	4	80 (32)	20 (8)
ZOO14203CR	Lab. Course-2 (Based on ZOO14201CR & ZOO14202CR)	Core	0	0	8	4	80 (32)	20 (8)
ZOO14204EA	Experimental Parasitology and Immunology	Elective (Allied)	3	0	1	4	80 (32)	20 (8)
ZOO14205EA	Industrial Entomology	Elective (Allied)	3	0	1	4	80 (32)	20 (8)
ZOO14206EA	Biodiversity and Conservation	Elec. Allied)	3	0	1	4	80 (32)	20 (8)
ZOO14207EA	Applied Zoology-II	Elective (Allied)	3	0	1	4	80 (32)	20 (8)
ZOO14208EO	Parasitology in Relation to Public Health	Elective (Open)	4	0	0	4	80 (32)	20 (8)
Credits = 32	Contact Hours = 36		24	0	12	32		

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: ZOO14201CR

COURSE TITLE: COMPARATIVE ANATOMY AND PHYSIOLOGY OF VERTEBRATES

UNIT I: SENSE ORGANS

- 1.1. Auditory Organs
- 1.2. Visual Organs
- 1.3. Peripheral Nervous system
- 1.4. Autonomous Nervous system

Unit II: VERTEBRATES ANATOMY

- 2.1. Structure of lungs
- 2.2. Structure of Girdles
- 2.3. Structure of Heart
- 2.4. Jaw suspension

UNIT III: METABOLIC REGULATION AND RECEPTOR PHYSIOLOGY

- 3.1. Bioenergetics
- 3.2. Thermoregulation in Animals: Homoeothermic animals, Poikilotherms and Hibernation
- 3.3. Muscle structure and function correlation
- 3.4. Receptor physiology-Mechanoreception, Photoreception and Chemoreception

UNIT IV: ENDOCRINOLOGY

- 4.1. Thyroid gland and its biological action
- 4.2. Role of hormone in regulation of growth and development
- 4.3. Role of rDNA technologies in hormone production
- 4.4. Abnormalities due to hormonal disorders in human beings.

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

COURSE CODE: ZOO14202CR

COURSE TITLE: ICHTHYOLOGY AND AQUACULTURE

UNIT I: SYSTEMATICS AND MORPHOLOGY

- 1.1. Outline Classification of fishes, distinguishing characters of principal subdivisions and elementary molecular approaches
- 1.2. General account and adaptive radiation of Elasmobranchii and Actinopterygii
- 1.3. Structure and function of fins
- 1.4. Colouration in fishes

UNIT II: NUTRITION AND CIRCULATION

- 2.1. Nutritional requirements in fishes with reference to protein, fat, carbohydrate, vitamins and minerals
- 2.2. Digestion and Absorption in fishes
- 2.3. Respirations in fishes; Structure and significance of Weberian ossicles
- 2.4. Heart and blood vessels in fishes

UNIT III: STRUCTURE AND PHYSIOLOGY

- 3.1. Kidney structure and functions
- 3.2. Endocrine organs in fishes
- 3.3. Reproductive organs in fishes
- 3.4. Structure and function of nervous system

UNIT IV: AQUACULTURE

- 4.1. Aquaculture; criteria, aquaculture practices and application of biotechnology in aquaculture
- 4.2. Induced breeding in fish
- 4.3. Artificial food and feeding
- 4.4. Brackish water fish culture.

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

COURSE CODE: ZOO14203CR

COURSE TITLE : LAB. COURSE-2

- 1) Comparative study of lungs in vertebrates through slides
- 2) Comparative study of urinogenital system and heart of frog, calotes, pigeon and rat through model and chart
- 3) Comparative slide study ó T.S. stomach, intestines, testis, ovary
- 4) Pectoral and Pelvic girdles frog, varanus, fowl and rabbit
- 5) Study of various endocrine glands of vertebrates through prepared slides
- 6) Dissection of mammalian eye
- 7) Study of skeletal elements of fore limbs and hind limbs of vertebrates
- 8) Study of animal tissues; T.S of bone of mammals
- 9) General survey of Elasmobranchii, Holocephali and Dipnoi
- 10) General survey of Teleostei
- 11) Histological study of different organ systems of fish from prepared slides
- 12) Study of important cranial nerves of Wallago.and nervous system of Dasyatis (sting ray)
- 13) Study and mounting of scales of fishes
- 14) Study of the Weberian ossicles of carp
- 15) Extraction of Endocrine organs from fish
- 16) Field trip to important hatcheries of Kashmir to study the methods of Pisciculture.

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

COURSE CODE: ZOO14204EA

COURSE TITLE: EXPERIMENTAL PARASITOLOGY AND IMMUNOLOGY

UNIT I: PARASITE CULTURE AND MOLECULAR TECHNIQUES

- 1.1. In - vitro culture of parasite: advantages & problems
- 1.2. Cells as experimental models in molecular biology
- 1.3. PCR analysis of parasite genomics
- 1.4. Blotting analysis (Southern, Northern and Western)

UNIT II: CLINICAL PARASITOLOGY

- 2.1. Coprological Examinations
- 2.2. Blood and Urine Examination
- 2.3. Histological techniques in Parasitology
- 2.4. Micrometry

UNIT III: TUMOUR IMMUNOLOGY

- 3.1. Theory of Immune surveillance
- 3.2. Host immune response to tumours
- 3.3. Tumour escape mechanisms
- 3.4. Tumour immune therapy: Non-Specific and antigen Specific treatment

UNIT IV: Practical work

- 4.1. Methods of killing, fixing and preserving of helminth Parasites
- 4.2. Processing, staining and mounting of Trematodes , Cestodes and Acanthocephala parasites
- 4.3. Processing and mounting of nematode parasites
- 4.4. Collection of faecal samples from animals for Identification & diagnosis of helminth eggs
- 4.5. Methods of extraction of nematodes from soil
- 4.6. Methods of fixing and mounting of plant parasitic nematodes.

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

COURSE CODE: ZOO14205EA

COURSE TITLE : INDUSTRIAL ENTOMOLOGY

UNIT I: SILKWORM AND SERICULTURE

- 1.1. Food plants and life cycle of Mulbery, Tasar and Moga silkworms
- 1.2. Silk gland- structure; synthesis of silk protein and chemical composition of silk
- 1.3. Rearing of silkworm: requirements of an ideal rearing house, silkworm races and their culture
- 1.4. Diseases of silkworm: protozoan, bacterial, viral, fungal and their Control

UNIT II: APICULTURE

- 2.1. Honey bees: their characters, types and distribution
- 2.2. Apiary equipments and their significance in apiculture
- 2.3. Honey: Production, Chemical composition and uses
- 2.4. Honey bees as pollinators: General account

UNIT III: LAC CULTURE

- 3.1. Lac Insect: Taxonomic characters, distribution, life cycle and host plants
- 3.2. Lac cultivation: local/improved practice and strains/races
- 3.3. Lac Harvesting: processing and composition
- 3.4. Lac products and their uses; enemies of lac insect

UNIT IV: Practical work

- 4.1. To study the various life-cycle stages of *Bombyx mori*
- 4.2. To compare cocoon weight and shell ratio of various silkworm races
- 4.3. To study the morphological features of honey bee castes
- 4.4. To dissect out the pollen basket of honey bee
- 4.5. To study leg modifications of honey bee through temporary mount preparations
- 4.6. To study the life-cycle stages of *Laccifera lacca*.

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

COURSE CODE: ZOO14206EA

COURSE TITLE : BIODIVERSITY AND CONSERVATION

UNIT I: BIODIVERSITY: COMPONENTS AND VALUES

- 1.1. Species Diversity, measuring biodiversity
- 1.2. Genetic Diversity- Gene frequencies in population, Loss of genetic diversity
- 1.3. Ecosystem Diversity- habitat, community and functional diversity
- 1.4. Biodiversity values ó Direct use values-food, medicinal, industrial, recreational harvesting, ecotourism and Indirect use values

UNIT II: CONSERVATION PRACTICE AND LOSS OF BIODIVERSITY

- 2.1. Mass extinctions, Causes of loss by habitat destruction and fragmentation
- 2.2. In-Situ and Ex-Situ conservation
- 2.3. Environmental Impact Assessment (EIA) Impact of developmental projects, management plans, guidelines for industries
- 2.4. Organizations involved in environmental protection - IUCN, CITES, WWF, UNEP & greenpeace

UNIT III: BIODIVERSITY LAWS

- 3.1. Convention on Biological Diversity (CBD) and issues under the CBD
- 3.2. Biological Diversity Act, 2002, main provisions and rules of the Act
- 3.3. Evolution of Environmental Law in India
- 3.4. Indian Wildlife Protection Act 1972 and J and K Wildlife Protection Act 1978

UNIT IV: PRACTICALS WORK

- 4.1. Survey of Kashmir university botanical garden for identification of important fauna
- 4.2. Visit to National parks and sanctuaries for understanding in situ conservation
- 4.3. Comparative study of structural adaptations of some birds & mammals
- 4.4. Comparative study of plant adaptations in hydrophytes, xerophytes and mesophytes
- 4.5. Study of species diversity by various methods
- 4.6. Wetland fauna with special reference to waterfowl and summer migratory birds.

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

COURSE CODE: ZOO14207EA

COUSE TITLE: APPLIED ZOOLOGY-II

UNIT I: FISH BIOLOGY

- 1.1. Food and feeding habits of cultivable fishes
- 1.2. Fish migration with special emphasis on Eel
- 1.3. Matting and parental care in fishes
- 1.4. Fishing methods in inland waters

Unit II: INSECTICIDES AND INSECT CONTROL

- 2.1. Inorganic compounds ó Arsenicals and flourine compounds
- 2.2. Organic compounds of plant origin ó Nicotine, pyrethrum and rotenone
- 2.3. Synthetic organic compounds ó Dinitrophenols and organochlorine compounds
- 2.4. Synthetic organic compounds - Chlorinated tarpenes, cyclodiene insecticides and organophosphorous insecticides

UNIT III: ANIMAL PRODUCS AND MANAGEMENT

- 3.1. Meat, leather and wool industries and their production with special emphasis on their export potential
- 3.2. Poultry farming (chicken), commercial breeds in India, Poultry diseases
- 3.3. Dairy farming in India, breeds of cattle and buffalo, role of assisted reproduction in breed improvement
- 3.4. Animal waste recycling; biogas and its production, types of biogas plants

UNIT IV: PRACTICALS WORK

- 4.1. Gut content analysis of fishes: Schizothorax, trout and carp
- 4.2. Study of various kind of crafts and geares used for fishing
- 4.3. To study the LD50 of various insecticides
- 4.4. To study the methods of insecticide formations
- 4.5. Study of various stages in chick development
- 4.6. Study of various breeds of cattle, buffalo and poultry.

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

COURSE CODE: ZOO14208EO

COUSE TITLE: PARASITOLOGY IN RELATION TO PUBLIC HEALTH

UNIT I: INTRODUCTION TO PARASITOLOGY

- 1.1 Basic concepts and definitions in parasitology
- 1.2. Parasitic adaptations
- 1.3. Effects of parasites on the host - general account
- 1.4. Effects of host on the parasite

UNIT II: INTRODUCTION TO MEDICAL PARASITOLOGY

- 2.1. Parasitic protozoans of Man with special reference to Pathogenicity and Prophylaxis in Amoebiasis (Dysentery) and Giardiassis
- 2.2. Trematode parasites of man with special reference to Schistosomes
- 2.3. Local cestode parasites of man with reference to Life-cycle, pathogenicity, diagnosis and control of Taeniasis and Hydatidosis
- 2.4. Life- Cycle, pathogenicity, clinical symptoms and control of common nematode parasites of man viz., Roundworm and Pinworm

UNIT III: GENERAL DEFENCE MECHANISM

- 3.1. Concepts of health and disease
- 3.2. Introduction to innate and adaptive immunity
- 3.3. Cells and tissues of immune system
- 3.4. Immunization: Active and Passive immunization

UNIT IV: PARASITOLOGICAL TECHNIQUES

- 3.1. Stool examination for identification and diagnosis of parasitic infections
- 3.2. Study of prepared slides of protozoan parasites of men available in museum
- 3.3. Study of prepared slides of Trematode parasites of men available in museum
- 3.4. Study of prepared slides of Cestode parasites of men available in museum
- 3.5. Study of prepared slides of Nematode parasites of men available in museum
- 3.6. Demonstration of antigen-antibody reaction through blood grouping test.