Choice Based Credit System (CBCS) Scheme for 1st Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Examinations / Marks</th>
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<tbody>
<tr>
<td>ZO17101CR</td>
<td>Animal Taxonomy and Evolution</td>
<td>Core</td>
<td>4 0 0 4</td>
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<td>25 marks 25 marks 50 marks</td>
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<td>ZO17102CR</td>
<td>Structure and Function of Invertebrates</td>
<td>Core</td>
<td>4 0 0 4</td>
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<td>25 marks 25 marks 50 marks</td>
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<tr>
<td>ZO17103CR</td>
<td>Field Study+Lab Course</td>
<td>Core</td>
<td>0 2 6 1+3</td>
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<tr>
<td>ZO17104DCE</td>
<td>General and Medical Parasitology</td>
<td>Discipline Centric</td>
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<td>25 marks - 50 marks</td>
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<td>ZO17106DCE</td>
<td>General Parasitology &amp; Techniques</td>
<td>Discipline Centric</td>
<td>0 0 4 2</td>
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<td>ZO17001GE</td>
<td>Medical and Veterinary Entomology</td>
<td>Generic Elective</td>
<td>2 0 0 2</td>
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<tr>
<td>ZO17002GE</td>
<td>Basics of Wildlife Sciences</td>
<td>Generic Elective</td>
<td>2 0 0 2</td>
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<td>ZO17001OE</td>
<td>Fish &amp; Fish Nutrition</td>
<td>Open Elective</td>
<td>2 0 0 2</td>
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GENERAL INSTRUCTIONS

1. A candidate has to obtain 24 credits per semester *i.e.*, 96 credits in two year programme (4 semesters).
2. Out of 24 credits in a semester, a candidate has to compulsorily obtain 12 credits from “Core Courses” (CR) while the remaining 12 credits can be obtained from the “Electives” in the following manner:
   ► A candidate has to obtain 8 credits from his/her own Department as Discipline Centric Electives (DCE).
   ► 4 credits shall be obtained by a candidate from the Electives offered by the Departments other than his/her own. A candidate shall be free to obtain these 4 credits from the Generic or Open Electives or a combination of both; however, all 4 credits can be obtained from Generic Electives, but a maximum of 2 credits can be obtained from Open Electives.
3. Maximum Marks per Credit = 25 (One unit is equivalent to one credit).
4. One Credit in Theory is 16 hours direct teaching learning; where as in Practicals and Tutorials it is 32 hours.
Course No.: ZO17101CR       Course Title: Animal Taxonomy and Evolution
Total Credits: 4 (4 L + 0 T + 0 P)       Maximum Marks: 100 (25 + 25 + 50)

Unit I: Principles and Methods of Zoological Classification
1.1 Introduction: Terms and definitions, strategy of systematic research, future of systematics
1.2 Taxonomic characters: definition and kinds - morphological, physiological, molecular, ecological, behavioral and geographical
1.3 Curating of collections: preparation of material, housing, cataloging, arrangement of collection, curating of types, exchange of material and loans
1.4 Taxonomic keys: definition and kinds- bracket key, indented key and pictorial key

Unit II: Principles and Application of Zoological Nomenclature
2.1 ICZN: Historical background, Overview of Terms, Principles and Articles
2.2 Homonymy, Synonymy and Law of priority
2.3 Typification: Definitions, kinds and significance
2.4 Intraspecific Categories and their taxonomic status

Unit III: Dimensions of Speciation/ New Trends in Taxonomy
3.1 Species concepts: Morphological, Biological and Phylogenetic
3.2 Mechanisms of Speciation: Allopatric, Sympatric and Parapatric
3.3 Cytotaxonomy: back ground, chromosome evolution with specific reference to primates and grasshoppers
3.4 Molecular taxonomy:
   a) Concept of phylogenetic systematics
   b) Construction of phylogenetic trees

Unit IV: Evolution
4.1 Origin of life on earth, Special creation theory, Abiogenesis and Biogenesis
4.2 Modern synthetic theory of organic evolution, Genetic variations, Natural Selection, Isolation.
4.3 Convergent and divergent evolution
4.4 Speciation: Isolating mechanisms, Geographical isolation, Reproductive isolation

Suggested Books / Reading Material
3. An Introduction to Taxonomy by T. C. Narendran.
4. Biosystematics & Taxonomy by R. C. Tripathi.
5. Animal Taxonomy by V.C. Kapoor.
6. Organic Evolution by N Arumugam Saras Publicatin
7. Genomes by T. A. Brown BIOS.
8. Biology by Campbell and Reece Pearson Education.
Course No.: ZO17I02CR  
Course Title: **Structure and Function of Non-Chordates**

Total Credits: \( 4 \) (4 L + 0 T + 0 P)  
Maximum Marks: \( 100 \) (25 + 25 + 50)

**Unit I: Protista and Porifera**
1.1 General account of Protista - Classification and Nutrition
1.2 Locomotion, Reproduction and economic importance of Protista
1.3 Origin, affinities and classification of Porifera
1.4 Canal system, skeleton and reproduction in Porifera

**Unit II: Cnidaria and Helminths**
2.1 General account and Classification of Cnidaria
2.2 Polymorphism in Cnidaria, Corals and Coral reefs
2.3 General account of Helminths
2.4 Larval forms of Cestodes and Trematodes

**Unit III: Annelida and Arthropoda**
3.1 Annelida: Nervous System, Adaptive radiation in Polychaetes, Trochophore larva and its evolutionary significance
3.2 Economic importance of Annelida; Vermiculture and Vermicomposting
3.3 Arthropoda: Crustacean larvae and their phylogenetic significance, Metamorphosis in Insects, Importance of Peripatus
3.4 Respiration and Excretion in Arthropods (Aquatic and Terrestrial)

**Unit IV: Mollusca and Echinodermata**
4.1 Mollusca: General account, Respiration, Nervous system (Cephalopoda) and General account on colouration & ink in Mollusca
4.2 Modification of foot, Shell in Mollusca, Torsion in gastropods and Economic importance of Mollusca
4.3 Echinodermata: General characters & Taxonomic history, Water vascular system, Autotomy & Regeneration
4.4 Echinodermata: Larval forms and their significance

**Suggested Books / Reading Material**
5. Invertebrate Zoology P. S. Verma.
Part A*: Field surveys to various parts of Jammu & Kashmir for collection, identification and presentation of local fauna.

Part B: Practicals
1. Collection and identification of different species of butterflies & grasshoppers
2. Collection and identification of different types of insects and their larvae
3. Construction of taxonomic keys within Class group taxa
4. Slide / Specimen study of Protista
5. Permanent mount preparation of Protista
6. Slide / Specimen study of Porifera
7. Slide / Specimen study of Cnidaria
8. Slide / Specimen study of Helminths
9. Permanent mount preparation of Cnidaria (Obelia / Hydra)
10. Slide study of larval forms of Cestodes and Trematodes
11. Specimen study of Annelida
12. Nervous system in Annelida (Earthworm / Neries)
13. Specimen study of Arthropoda
14. Mouth parts and sting apparatus of honey bee
15. Slide study of Larval forms of Crustacea
16. Permanent mount preparations of Crustacean larvae
17. Specimen study of Mollusca
18. Nervous system of Mollusca – Loligo / Sepia / Octopus
19. Specimen study of Echinodermata
20. Dissection of Star Fish so as to expose its digestive system and water vascular system

*Field Collection: The students in 1st semester shall have to earn 1 credit for field survey. A visit of about a week within the state would be conducted and the students are expected to collect fauna of that particular region and present the same to the Department in a processed form alongwith a write-up. The evaluation shall be done by an evaluation committee to be framed for the purpose by the Department. If for any genuine reason, a student is not in a position to join the field trip, he/she shall get the fauna of his/her native place.
Unit 1: Introduction to Parasitology
1.1 Concepts and definitions to animal associations with emphasis on parasitology
1.2 Origin, evolution and distribution of parasites in animal kingdom
1.3 Parasitic adaptations (Morphological, Physiological & Behavioral) & Zoonosis
1.4 Host parasite relationships - general account

Unit II: Protozoology
2.1 Protistan parasites of Man (Luminal & Blood)
2.2 Detailed life cycle, pathogenicity and control of Entamoeba & Leishmania
2.3 Pathogenicity and control of falciparum malaria with special emphasis on immunoprophylaxis
2.4 Opportunistic protozoan parasites of man: Pneumocystis carinii & Cryptosporidium parvum

Unit III: Helminthology
3.1 Introduction, general organisation and outline classification of helminths
3.2 Trematode parasites of man with life cycle, pathogenicity & control of Schistosoma
3.3 Cestode parasites of man with life cycle, pathogenicity & control of Taenia
3.4 Nematode parasites of man with life cycle, pathogenicity & control of Enterobius

Suggested Books / Reading Material
1. Animal Parasitology by J. D. Smyth.
2. Foundations of Parasitology by Gerald D. Schmidt and Larry S. Roberts.
5. Georg’s parasitology for Veterinarians by D. D. Bowman
6. Parasitology (Protozoology & Helminthology) by K. D. Chatterjee.
7. Parasitology by Elmer R. Nobel and Glenn A. Noble.
8. Parasitology vector biology by Marquart, Demaree and Grieve

Besides, the students are asked to visit www.springer & www.biomed for latest advances.
Unit I: Protista
1.1. Protistan parasites of poultry with special reference to Eimaria
1.2. Epidemiology, life-cycle, pathogenicity and control of Trypanosoma & Babesia in cattle
1.3. Epidemiology, life-cycle, pathogenicity and control of Sarcocystis & Toxoplasma in sheep
1.4. Host immune response to protozoans

Unit II: Platyhelminths
1.1. Trematode and cestode parasites of Fishes with special reference to the morphology, biology and control of Diplozoon and Adenoscolex
1.2. Trematode and cestode parasites of Aves with special reference to life cycle, pathogenicity and control of Echinostomum and Davania
1.3. Trematode and cestode parasites of ruminants with reference to the life cycle, pathogenicity and control of Dicrocoelium & Monezia
1.4. General account of Antihelmintics and Antihelmintic resistance

Unit III: Nematyhelminths and Acanthocephala
2.1. Nematode parasites of fishes with special reference to life cycle, pathogenicity and control of Rhabdochona guptii
2.2. Nematode parasites of Aves with special reference to life cycle, pathogenicity and control of Heterakis gallinarum
2.3. Nematode parasites of Sheep with special reference to life cycle, pathogenicity and control of Haemonchus contortus
2.4. Acanthocephalan parasites of fishes with special reference to Pomphorhynchus kashmiriensis

Suggested Books/Reading Material
1. Introduction to Parasitology by ASA C. Chandler & Clark P. Read
2. Parasitology by Elmer R. Nobel and Glenn A. Noble
3. Animal Parasitology by J. D. Smyth
4. Foundations of Parasitology by Gerald D. Schmidt and Larry S. Roberts
5. General parasitology by Thomas C. Cheng
6. Foundations of Parasitology by Larry S. Roberts, John Janovy and Steve Nadler
7. Helminthes Arthropods and Protozoa of Domesticated Animals by EJL Soulsby
8. Parasitology and Vector Biology by William C. Marquardt, Richard S. Demaree and Robert B. Grieve
9. Monning’s Veterinary Helminthology and Entomology by Geoffrerg Lapege
10. Besides, the students are asked to visit www.springer & www.biomed for latest advances
Course Code: ZO17106DCE  
Course Title: General Parasitology & Techniques  
Total Credits: 2 (0 L + 0 T + 2 P)  
Maximum Marks: 50

Unit I: General Parasitology

1.1 Slide study of protistan parasites: Entamoeba, Balantidium, & Leishmani
1.2 Preparation of permanent mounts of parasitic protists
1.3 Slide study of helminth parasites: Fasciola, Taenia, Entrobius & Ancylostoma
1.4 Slide study of acanthocephalans
1.5 Slide study of arthropods

Unit II: Parasitological Techniques

2.1 Methods of collection, fixation and preservation of ecto- and endo-parasites from different hosts viz., fish, fowl, sheep and cattle
2.2 Methods of permanent mount preparation of ecto- and endo-parasites recovered from different hosts viz., fish, fowl, sheep and cattle
2.3 Faecal, Blood and Urine Examinations for diagnosis of parasitic diseases
3.4 Microtomy
3.5 Micrometry
Course Code: ZO17001GE
Total Credits: 2 (2 L + 0 T + 0 P)

Course Title: Medical and Veterinary Entomology
Maximum Marks: 50

Unit I: Medical Entomology
1.1 General account of insect vectors, mechanical and biological vectors
1.2 Insect-borne viral and bacterial diseases of man
1.3 Insect-borne protozoan and helminth diseases of man
1.4 Insect causing diseases of man– Myiasis (types and causes)

Unit II: Veterinary Entomology
2.1 General account of insects of veterinary importance
2.2 Insects as vectors of helminthic diseases of domestic animals
2.3 Insects as vectors of bacterial and viral diseases of domestic animals
2.4 Life-cycle and control of the following major vectors of animal diseases:
   i. Tabanus
   ii. Chrysops

Suggested Books / Reading Material
1. Medical & Veterinary Entomology by D. S. Kettle
2. Modern Entomology by D.B. Tembhare Himalaya Publishing House
3. Medical & Veterinary Entomology by Mullen &Durden Academic Press
5. A text book of Applied Zoology by Pradip V. Jabde
Course Code: ZO17002GE  
Course Title: Basics of Wildlife Science  
Total Credits: 2 (2 L + 0 T + 0 P)  
Maximum Marks: 50

Unit I: Wildlife, Mammalogy and Ornithology

1.1 Wildlife: Introduction and Importance
1.2 Birds and Mammals: Aquatic and Terrestrial adaptations
1.3 Distribution of important mammalian taxa in different biogeographical zones of India
1.4 Flight adaptations and migration in birds

Unit II: Herpetology, Human-Wildlife Conflict and Wildlife of Jammu & Kashmir

2.1 Amphibia: Introduction, Biology of frogs, Parental care
2.2 Reptilia: Introduction, Biology of Indian crocodiles, identification of poisonous & non-poisonous snakes
2.3 Human- wildlife conflict: Causes, Consequences and its management
2.4 An overview of wildlife of Jammu & Kashmir, Status and distribution of wildlife of Jammu & Kashmir

Suggested Books / Reading Material

1. Wildlife Biology by Raymond F. Dasmann
2. Mammalogy by Nicholas J. Czaplewski, James M. Ryan, Terry A. Vaughan
3. Handbook of Bird Biology by Irby J. Lovette and John W. Fitzpatrick
4. Herpetology: An Introductory Biology of Amphibians and Reptiles by Laurie J. Vitt
5. Indian mammals a field guide by Vivek Menon
Course Code: ZO17001OE  
Course Title: Fish & Fish Nutrition  
Total Credits: 2 (2 L + 0 T + 0 P)  
Maximum Marks: 50

Unit I: Introduction to Pisces  
1.1. General account on characteristics of Pisces  
1.2. Adaptations of hill stream fishes  
1.3. Larvivorous fishes and ornamental fishes  
1.4. Nest building and parental care in fishes

Unit II: Fish Nutrition  
2.1 Feeding strategies, Food and Feeding habits of local fishes  
2.2 Selection of feed ingredients and their proximate composition, Concept of feed formulation, Pearson Square method  
2.3 Types of Fish feed: Moist feed, Semi-moist feed and dry feed  
2.4 Probiotics and their use in aquaculture

Suggested Books / Reading Material  
1. Fishes: An Introduction to Ichthyology by Peter B. Moyle, Joseph J., Cech Jr. Prentice Hall India Learning Private Limited  
2. A Text Book of Fish Biology & Fisheries by S S Khanna and H R Singh Narendra Publishing House  
3. An Introduction to Fishes by H.S. Bhamrah, Kavita Juneja Anmol Publications Pvt Ltd  
4. Fish and Fisheries by B.N. Yadav Daya Publishing House  
5. Fundamentals of Ichthyology by S.P. Biswas  