

B.SC. SEMESTER-I

Core Course No. : UZOTC 101
Core Course Title: ANIMAL DIVERSITY
CREDITS : 4

UNIVERSITY OF JAMMU
Syllabi and Course of Study in Zoology
For the examination to be held in the years Dec 2016, 2017 and 2018
UNDER CHOICE BASED CREDIT SYSTEM

1. Course /Paper Title	:	Animal Diversity (Theory)
2. Maximum Marks	:	100
i) External (Univ. Exam.)	:	80
ii) Internal Assessment	:	20
4. Minimum Pass Marks	:	
i) External	:	29
ii) Internal	:	07
5. Duration of Univ. Exam.	:	3 Hrs.

Unit 1: Protista, Porifera and Cnidaria **13 Hrs**

- 1.1 Introduction to kingdoms of organisms (Five kingdom system -a brief overview viz. Monera, Protista, Fungi, Plantae & Animalia).
- 1.2 Protista
 - 1.2.1 General characters and classification up to class level
 - 1.2.2 Locomotory Organelles and locomotion in Protozoa
- 1.3 Porifera
 - 1.3.1 General characters and classification up to class level.
 - 1.3.2 Canal System in Sponges
- 1.4 Cnidaria
 - 1.4.1 General characters and classification up to class level.
 - 1.4.2 Polymorphism in Cnidaria: Hydrozoa, Siphonophora
 - 1.4.3 Corals & Coral reefs

Unit 2: Helminthes and Annelida **13 Hrs**

- 2.1 Helminthes
 - 2.1.1 Platyhelminthes
 - 2.1.1.1 General characters and classification up to class level.
 - 2.1.1.2 Structure, reproduction, life cycle and pathogenesis of *Taeniasolium*
 - 2.1.2 Nematelminthes
 - 2.1.2.1 General characters and classification up to class level.
 - 2.1.2.2 Structure, reproduction, life cycle, parasitic adaptations and pathogenesis of *Ancylostomaduodenales*
- 2.2 Annelida
 - 2.2.1 General characters and classification up to class level.

2.2.2 Metamerism in Annelida

Unit 3: Arthropoda, Mollusca and Echinodermata 13 Hrs

- 3.1 Arthropoda
 - 3.1.1 General characters and classification up to class level.
 - 3.1.2 Eye structure and Vision in Arthropoda
 - 3.1.3 Metamorphosis in Insects
- 3.2 Mollusca
 - 3.2.1 General characters and classification up to class level.
 - 3.2.2 Torsion in gastropods
 - 3.2.3 Shell in mollusca
- 3.3 Echinodermata
 - 3.3.1 General characters and classification up to class level.
 - 3.3.2 Water-vascular system in Asteroidea
 - 3.3.3 Trochophore larval: Structure and Significance

Unit 4: Protochordates, Agnatha, Pisces and Ambhibia 13 Hrs

- 4.1 Origin of Chordates
- 4.2 Protochordates: General features and Phylogeny.
- 4.3 Agnatha
 - 4.3.1 General features of Agnatha and classification of cyclostomes up to class level.
- 4.4 Pisces
 - 4.4.1 General features and Classification up to order level.
 - 4.4.2 Osmoregulation in Fishes
- 4.5 Amphibia
 - 4.5.1 General features and Classification up to order level.
 - 4.5.2 Parental care in Amphibians

Unit 5: Reptiles, Aves and Mammals 13 Hrs

- 5.1 Reptiles
 - 5.1.1 General features and Classification up to order level.
 - 5.1.2 Poisonous and non-poisonous snakes.
 - 5.1.3 Biting mechanism in snakes
- 5.2 Aves
 - 5.2.1 General features and Classification up to order level.
 - 5.2.2 Flight adaptations in birds
- 5.3 Mammals
 - 5.3.1 Classification up to order level.
 - 5.3.2 Origin of mammals

Note: 1 There shall be one written theory paper of 100 marks and one practical paper of 100 marks. 20% (20 marks) of the marks shall be reserved for internal assessment in theory paper and 50 % (50 marks) in the practical paper. Theory paper will be set for 80 marks and the practical paper for 50 (40 marks for paper and 10 for viva-voce). Daily evaluation of practical records/viva voce/attendance etc. will be of 50 marks (including 20% (10 marks) for attendance, 20% (10 marks) for viva voce and 60% for the internal test and day to day performance (15 marks

each) In case of the regular students internal assessment received from the college will be added to the marks obtained by them in the university examination and in case of private candidates marks obtained by them in the University examination shall be increased proportionately in accordance with the statues / regulation.

Internal Assessment Test

One long answer type question of 10 marks and five short answer type questions of 2 marks each

Note 2: For paper setters:

External End Semester University Exam

Section A: 10 very short answer type questions are to be set. The maximum length of answer shall be 50 words. All the questions are compulsory. Each question will carry 2 marks, total weightage being 20 marks.

Section B: This section will comprise of ten long answer type questions, with two questions from each unit. Candidate will have to attempt 5 questions selecting one question from each unit. Each question will, carry 12 marks and the totalweightage being 60 marks.

Books Recommended

1. Text book of Zoology-Hymen series McGraw Hills.
2. Protozoology-Kudo, Books & Periodicals Corporation (India).
3. Text-book of Zoology-Sedwick series. Central Book Depot.
4. Text-book of Zoology-Parker and Haswell Vol. I. Mac Millan & Co. 1986, New York.
5. Protozoology-Mackinen and Hawez, Canb University.
6. Treatise in Zoology-Lankester series.
7. Parasitic protozoa-Baker. Allen & Unwin, Inc. USA.
8. Human Helminthology-Faust, E.C, Lee and Febiger, Philadelphia.
9. Medical Parasitology- K. D. Charterjee
10. Helminthology- Kotpal
11. Arthropod Anatomy-Snod,.Grass. Principles of insect morphology (1935) Snodgrass, R.E. McGraw Hill London, New York.
12. Invertebrale-Bordale and Potts. C.L.
13. Integrated principles of Zoology by Hickman, C.P. Jr., F.M. Hickman &L.S. Roberts. (Mosby College Publ. St. Louis.).
14. Manual of Zoology Vol. I (invertibrata) part I and II. Ayyar, E.K. &T.N. Ananlha-Krishnan (S. Vishwanathan, Printers & Publ. Pvt. Ltd. Madras).
15. Invertebrate Zoology-Jordan,E.L. & P.S. Vemla (S. Chand & Co. Ltd. Madras).
16. Chordate Zoology- N. Arumugam, Vol. 2. SarasPublication
17. Chordate Zoology-E.L.Jordan& P.S. Verma. S. Chand Limited
18. Chordate zoology- P.S. Dhami&J.K. Dhami (1981) (R. Chand & Co.)
19. Principles of anatomy and physiology-G.J.Tortora&N.P. Anagnostakos (1984) (Harper & Row Publ., N.Y.).
20. Textbook of zoology, Vertebrates-A.J. Marshall (1995) (The McMillan Press Ltd., UK).
21. Modern textbook of Zoology (Vertebrates) -R.L.Kotpal (2000). (Rastogi Publ., Meerut).
22. Functional Anatomy of the Vertebrates: An Evolutionary Perspective- Liem, Karel F., William E. Bemis, Warren F. Walker, Lance Grande (2001). Brooks Cole.
23. Advanced Chordate Zoology-Gurdarshan Singh & H. Bhaskar (2002). Campus Books.

B.SC. SEMESTER-I

Core Course No. : UZOPC 101

Core Course Title: ANIMAL DIVERSITY (PRACTICAL)

CREDITS : 2

1. Study of external features of the following:

- 1.1 *Nereis*: External features with special emphasis on Head & Parapodia and Heteronereis phase.
- 1.2 Prawn: External morphology & Appendages
- 1.3 Cockroach: Mouthparts
- 1.4 *Pila, Unio*: External morphology of Shell.
- 1.5 Amphioxus: With special reference to oral hood, Velum, branchial wall, section through various regions.

2. Distinguishing characters & classifications of the following animals:

- 2.1 *Euglena, Plasmodium, Paramecium*
- 2.2 *Sycon, Hyalonema, and Euplectella.*
- 2.3 *Hydra, Obelia, Millipora, Sertularia, Physalia, Velella, Porpita, Aurelia, Tubipora, Metridium.*
- 2.4 *Planaria, Fasciola, Echinococcus, Taeniasolium, Ascarislumbricoides, Ancylostoma, Enetrobius*
- 2.5 *Aphrodite, Tubicola, Chaetopterus, Serpula, Arenicola, Pheretima, Pontobdella,*
- 2.6 *Balanus, Lepas, Cray fish, Palaemon, Cancer, Limulus, Palamnaeus, Scolopendra, Julus, Periplaneta, Apis.*
- 2.7 *Chiton, Mytillus, Dentalium, Pila, Unio, Loligo, Sepia, Octopus*
- 2.8 *Pentaceros, Ophiura, Echinus, Cucumaria and Antedon*
- 2.9 *Balanoglossus, Herdmania, Branchiostoma*
- 2.10 *Petromyzon, Myxine, Sphyrna, Pristis, Torpedo, Chimera, Protopterus, Amia, Salmo, Labeo, Exocoetus, Anguilla, Barbus, Cyprinus, Clarias, Heteropneustes, Ophiocephalus, Anabas, Echineis*
- 2.11 *Ichthyophis/Ureotyphlus, Salamandra, Axolotl larva, Bufo, Hyla*
- 2.12 *Chelone, Trionyx, Kachuga, Testudo, Sphenonodon, Hemidactylus, Chamaeleon, Draco, Calotes, Typhlops, Python, Bungarus, Vipera, Naja, Crocodylus, Hydrophis, Gavialis,*
- 2.13 Any six common birds from different orders,
- 2.14 *Echidna, Macrophus, Manis, Sorex, Bat, Funambulus, Loris*

3. Dissection of the following animals to expose and study the various systems:

- 3.1 Earthworm: Alimentary canal, Reproductive system
- 3.2 *Palaemon*: Alimentary canal, Nervous system

4. Preparation of permanent stained mounts of the following:

Obelia, Parapodium of *Neries*, Nephridium of Earth worm, Ovary of Earthworm,
Mouthparts of Cockroach, mouth parts of mosquito and radula of *Pila*.

5. Key for Identification of poisonous and non-poisonous snakes

6. An “**animal album**” containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

B.SC. SEMESTER-II

Core Course No. : UZOTC 201

Core Course Title: COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATES

CREDITS : 4

UNIVERSITY OF JAMMU

Syllabi and Course of Study in Zoology

For the examination to be held in the years May 2017, 2018 and 2019

UNDER CHOICE BASED CREDIT SYSTEM

1. Course /Paper Title	:	Comparative anatomy and developmental biology of Vertebrates (Theory)
2. Maximum Marks	:	100
i) External (Univ. Exam.)	:	80
ii) Internal Assessment	:	20
4. Minimum Pass Marks	:	
i) External	:	29
ii) Internal	:	07
5. Duration of Univ. Exam.	:	3 Hrs.

Unit 1: Integumentary Skeletal System 13 Hrs

- 1.1 Integument System
 - 1.1.1 Integument: Structure and Function
 - 1.1.2 Derivatives of integument:
 - 1.1.2.1 Glands
 - 1.1.2.2 Scales and Scutes
 - 1.1.2.3 Digital Cornifications
 - 1.1.2.4 Horns
 - 1.1.2.5 Feathers
 - 1.1.3 Comparative account of Integument in different classes of chordates
- 1.2 Skeletal System
 - 1.2.1 Evolution of visceral arches
 - 1.2.2 Jaw suspension in vertebrates.

Unit 2: Digestive and Respiratory System 13 Hrs

- 2.1 Digestive System
 - 2.1.1 Comparative account of alimentary canal and digestive glands in vertebrates.
- 2.2 Respiratory System

- 2.2.1 Brief account of Gills, lungs in Vertebrates
- 2.2.2 Accessory Respiratory Organs in Vertebrates
 - 2.2.2.1 Swim Bladder
 - 2.2.2.2 Air Sacs

Unit 3: Circulatory and Urinogenital System 13 Hrs

- 3.1 Circulatory System
 - 3.1.1 Evolution of heart in vertebrates
 - 3.1.2 Evolution and modifications of aortic arches in vertebrates
 - 3.1.3 Venous system in vertebrates and its significance
- 3.2 Urinogenital System
 - 3.2.1 Origin and types of Vertebrate Kidney
 - 3.2.2 Evolution of Urinogenital ducts in vertebrates

Unit 4: Nervous System and Sense Organs 13 Hrs

- 4.1 Comparative account of vertebrate brain
- 4.2 Classification of Sensory Receptors
- 4.3 Photoreception in Vertebrates

Unit 5: Development Biology 13 Hrs

- 5.1 Gametogenesis: Spermatogenesis and oogenesis in mammals.
- 5.2 Fertilization
 - 5.2.1 Types of fertilization: External & Internal
 - 5.2.2 Capacitation, Acrosome Reaction, Penetration and Activation of Ovum, Migration of Pronuclei and amphimixis.
- 5.3 Cleavage: Planes and patterns, Blastulation and fate maps in Frog
- 5.4 Gastrulation in Frog up to formation of three germ layers, types of morphogenetic movements
- 5.5 Extraembryonic membranes of chick
- 5.6 Placentation in mammals
- 5.7 Metamorphic events in frog life cycle and its hormonal regulation.

Note: 1 There shall be one written theory paper of 100 marks and one practical paper of 100 marks. 20% (20 marks) of the marks shall be reserved for internal assessment in theory paper and 50 % (50 marks) in the practical paper. Theory paper will be set for 80 marks and the practical paper for 50 (40 marks for paper and 10 for viva-voce). Daily evaluation of practical records/viva voce/attendance etc. will be of 50 marks (including 20% (10 marks) for attendance, 20% (10 marks) for viva voce and 60% for the internal test and day to day performance (15 marks each) In case of the regular students internal assessment received from the college will be added to the marks obtained by them in the university examination and in case of private candidates marks obtained by them in the University examination shall be increased proportionately in accordance with the statues / regulation.

Internal Assessment Test

One long answer type question of 10 marks and five short answer type questions of 2 marks each

Note 2: For paper setters:

External End Semester University Exam

Section A: 10 very short answer type questions are to be set. The maximum length of answer shall be 50 words. All the questions are compulsory. Each question will carry 2 marks, total weightage being 20 marks.

Section B: This section will comprise of ten long answer type questions, with two questions from each unit. Candidate will have to attempt 5 questions selecting one question from each unit. Each question will, carry 12 marks and the total weightage being 60 marks.

Books recommended:

1. Text book of zoology – Parker and Haswell Vol. II
2. Chordate Zoology and Elements of Animal Physiology –E.L. Jordon and Verma, P.S.
3. Zoology and Chordates by H.C. Nigam, Vishal Publications, Jalandhar
4. Comparative Anatomy- M.D.L. Srivastava
5. Comparative Anatomy – Kingley
6. Manual of Zoology Vol II Chordata – Ayyar, E.K., T.N. Anorthakrishnan
7. Chordate structure and function – Waterman, A.N. and Others
8. General and Comparative Physiology – W.S. Hoar
9. Principles of Animal Physiology – Wood, D.W.
10. Animal physiology –Eckert
11. An Introduction to Embryology –Balinsky
12. Biology of Developing System – Grant
13. Developmental Biology – Gilbert.
14. Animal Physiology-Nagabhushnam
15. Chordate Zoology- N. Arumugam, Vol. 2. SarasPublication
16. Chordate Zoology-E.L.Jordan& P.S. Verma. S. Chand Limited
17. Chordate zoology- P.S. Dhama&J.K. Dhama (1981) (R. Chand & Co.)
18. Principles of anatomy and physiology-G.J.Tortora&N.P. Anagnostakos (1984) (Harper & Row Publ., N.Y.).
19. Textbook of zoology, Vertebrates-A.J. Marshall (1995) (The McMillan Press Ltd., UK).
20. Modern textbook of Zoology (Vertebrates) -R.L.Kotpal (2000). (Rastogi Publ., Meerut).
21. Functional Anatomy of the Vertebrates: An Evolutionary Perspective- Liem, Karel F., William E. Bemis, Warren F. Walker, Lance Grande (2001). Brooks Cole.
22. Advanced Chordate Zoology-Gurdarshan Singh & H. Bhaskar (2002). Campus Books.

B.SC. SEMESTER-II

Core Course No. : UZOPC 201

**Core Course Title: COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY
OF VERTEBRATES (PRACTICAL)**

CREDITS : 2

1. Preparation of permanent mounts of the following:
 - 1.1 Velum, Oral hood and Pharyngeal region of Amphioxus
 - 1.2 Ampullae of Lorenzini, Placoid scale, Ctenoid scale of fish, stripped muscles of frog from pectoral girdle or thigh
2. Study of following skeleton:
 - 2.1 Skull of Fowl and Rabbit
 - 2.2 Axial and Appendicular skeleton of Fowl and Rabbit
 - 2.3 Carapace and plastron of turtle /tortoise
3. Frog - Study of developmental stages - whole mounts and sections through permanent slides – cleavage stages, blastula, gastrula, neurula, tail bud stage, tadpole external and internal gill stages.
4. Study of chick embryology through stained mounts (18 Hrs.; 24 Hrs.; 36 Hrs.; 48 Hrs.; 72 Hrs.)
5. Demonstration of different types of Placenta in mammals through models or preserved specimens.
6. Study of histological sections of mammalian placenta through permanent slides or photomicrographs.
7. Examination of gametes - frog/rat - sperm and ova through permanent slides or photomicrographs.
8. Study of types of feet and claws, feathers and beaks in birds.
10. Dissect a locally available fish to study the following systems:
 - 10.1 Digestive system
 - 10.2 Nervous System
 - 10.3 Taking out Pituitary and Weberian ossicles