S.S.D. Girls' College, Bathinda

Multidisciplinary Course Based On NEP-2020

B.Sc. / B.Sc. (Honours)

Session: 2025-26

SYLLABUS

B.Sc. (Med.) Part-I (SEMESTER-I)

SUBJECT: MAJOR ZOOLOGY - ANIMAL DIVERSITY (PROTOZOA TO CHORDATA)

Paper Code: BM101

Max Marks: 70
Pass Marks: 35%
Theory Paper: 50
Internal Assessment: 20 marks

Total Teaching hours: 3 Hrs/week
Time Allowed: 3 hours
Paper Code: BM101
Credit: 03

INSTRUCTION FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C, Section A and B will have four questions each from the respective section of syllabus and will carry 8 marks each. Section C will consist of 9 short-answer type questions (8-10 lines) which will cover the entire syllabus uniformly and will carry 2 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

Section-A

1. **Phylum Protozoa:** General characters; Reproduction in Protozoa.
2. **Phylum Porifera:** General characters; Canal System in *Sycon*.
3. **Phylum Coelenterata:** General characters; Polymorphism in *Obelia*.
4. **Phylum Platyhelminthes:** General characters: Life history of *Taenia solium.*
5. **Phylum Nemathelminthes:** General characters: Life history of *Ascaris lumbricoides* and its parasitic adaptations
6. **Phylum Annelida:** General characters; Excretion in Annelida
7. **Phylum Arthropoda:** General characters; Respiration in Prawn and Cockroach, Metamorphosis in Insects
8. **Phylum Mollusca:** General characters
9. **Phylum Echinodermata:** General characters; Water-vascular system in Asteroidea

Section-B

10. **Protochordates:** General features
11. **Agnatha:** General features of Agnatha (Cyclostomata)
12. **Pisces:** General features; Migration and Osmoregulation in Fishes
13. **Amphibia:** General features; Parental Care, Neoteny and Paedogenesis
14. **Reptilia:** General features; venomous and non-venomous snakes, Biting mechanism in snakes and Poison apparatus
15. **Aves:** General features; Flight adaptations in birds
16. **Mammalia:** General features, Origin of mammals

Course Outcomes

- Students will be able to understand the diversity of invertebrate animals as well as identify and explain the general characteristics of major invertebrate phyla including Protozoa, Porifera, Coelenterata, Platyhelminthes, Nemathelminthes, Annelida, Arthropoda, Mollusca, and Echinodermata.
- Analyze physiological processes such as reproduction in Protozoa**,** canal system in Sycon**,** polymorphism in Obelia**,** excretion in Annelida**,** respiration in arthropods and water vascular system in echinoderms**.** Evaluate the adaptations and life cycles of parasitic organisms (*Taenia solium* and *Ascaris lumbricoides)*.

- Students will gain basic knowledge of chordate and protochordate groups and describe the general features of chordates. Comprehend functional anatomy and adaptations in fishes and amphibians and distinguish major adaptations in reptiles, birds, and mammals.

Recommended Books

- Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VII Edition. Holt Saunder International Edition.
- Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science
- Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.
- Pough H. Vertebrate life, VIII Edition, Pearson International.
- Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc.

PRACTICAL

Multidisciplinary Course Based On NEP-2020
B.Sc. / B.Sc. (Honours)
B.Sc.-I (Med.) Part-I Semester-I Major Zoology
2025-26 Syllabus
Practical Paper: ANIMAL DIVERSITY (PROTOZOA TO CHORDATA)
Practical Paper Code: BM101P

Total Marks: 30
Practical Marks: 20 marks
Internal Assessment: 10 marks
Pass marks: 35%

Time Allowed: 3 hours
Total Teaching hours: 2 hours/week
Credit: 1

1. Classification upto orders with ecological notes and economic importance of the following:

Protozoa: Slides: *Amoeba, Trypansoma, Paramecium, Vorticella*
Porifera: Specimens: *Sycon, Euplectella, Hyalonema, Spongilla and Euspongia.*
Coelenterata: Specimens: *Physalia, Metridium, Madrepora, Favia, Fungia, Aurelia, Hydra, Obelia*
Platyhelminthes: Specimens: *Fasciola, Taenia*. Scolex and Proglottids of *Taenia* (mature and gravid)
Aschelminthes: *Ascaris* (male and female).

Annelida: Specimens: Pheretima, Nereis, Chaetopterus, Tubifex and Pontobdella.
Arthropoda*:* *Peripatus, Palaemon* (Prawn), *Cancer* (Crab), *Daphnia, Periplaneta* (Cockroach), *Poecilocerus* (Ak grasshopper), *Mantis* (Praying mantis), *Cicada*, Dragonfly, termite queen, *Apis* (Honey bee), *Bombyx*, Millipede and Centipede, *Palamnaeus* (Scorpion), *Aranea* (Spider), and *Limulus* (King crab).
Mollusca*:* *Ostrea, Solen* (Razor fish), *Aplysia, Limax, Loligo, Octopus, Nautilus* shell (Complete and T.S.), *Chiton and Dentalium*.
Echinodermata: *Asterias, Echinus, Ophiothrix and Antedon.*
Hemichordata: *Balanoglossus.*
Urochordata: *Herdmania*
Cephalochordata: *Amphioxus.*
Cyclostomata: *Petromyzon, Myxine*
Chondrichthyes: *Zygaena* (Hammer headed shark), *Pristis* (saw fish), *Narcine* (Electric ray), *Trygon, Rhinobatus* and *Chimaera* (Rabbit fish).
Actinopterygii: *Polypterus, Acipenser, Lepidosteus, Muraena, Mystus, Catla, Hippocampus, Exocoetus*
Dipneusti (Dipnoi): Protopterus (African lung fish).
Amphibia: *Amblystoma* and its Axolotl Larva, *Salamandra, Hyla* and *Rhacophorus*.
Reptilia: *Hemidactylus, Draco, Varanus, Chameleon, Python, Naja, Hydrus, Viper, Crocodilus, Chelone* (Turtle) and *Testudo* (Tortoise).
Aves: *Pavo, Tyto, Alcedo, Eudynamis and Casuarius.*
Mammalia: *Ornithorhynchus, Echidna, Macropus, Loris, Manis, Herpestes and Pteropus.*

2. Study of the following permanent stained preparations/Photomicrographs:
A. L.S. and T.S. *Sycon*, Gemmules, Spicules and Spongin fibres of a sponge.
B. Spicules, pharynx of *Herdmania* and pharynx of *Amphioxus*, Scales of fishes

3. Preparation of the following slides:
Preparation of permanent whole mount stained in borax carmine: *Obelia, Sertularia and Plumularia.*

INSTRUCTIONS FOR PRACTICAL PAPER

1. 5 Museum specimens/slides from Protozoa to Echinodermata for identification, classification and short morphological note.
2. 5 Museum specimens/slides from Hemichordata to Mammalia for identification, classification and short morphological note.
3. Identification of 2 permanent slides
4. Preparation of Permanent stained slide
5. Viva-Voce
6. Practical note book

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Multidisciplinary Course Based On NEP-2020

B.Sc. / B.Sc. (Honours)

Session: 2025-26

SYLLABUS

B.Sc. (Med.) Part-I (SEMESTER-II)

SUBJECT: MAJOR ZOOLOGY - COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATES

Paper Code: BM201

Max Marks: 70	**Total Teaching hours: 3 Hrs/week**
Pass Marks: 35%	**Time Allowed: 3 hours**
Theory Paper: 50	**Paper Code: BM201**
Internal Assessment: 20 marks	**Credit: 03**

INSTRUCTION FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C, Section A and B will have four questions each from the respective section of syllabus and will carry 8 marks each. Section C will consist of 9 short-answer type questions (8-10 lines) which will cover the entire syllabus uniformly and will carry 2 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

SECTION A

1. **Integumentary System** Derivatives of integument w.r.t. glands and digital tips
2. **Skeletal System** Evolution of visceral arches
3. **Digestive System** Brief account of alimentary canal and digestive glands
4. **Respiratory System** Brief account of Gills, lungs, air sacs and swim bladder
5. **Circulatory System** Evolution of heart and aortic arches
6. **Urinogenital System** Succession of kidney, Evolution of urinogenital ducts
7. **Nervous System** Comparative account of brain
8. **Sense Organs** Types of receptors

SECTION B

9. **Early Embryonic Development Gametogenesis:** Spermatogenesis and oogenesis w.r.t. mammals, vitellogenesis in birds; Fertilization: external (amphibians), internal (mammals), blocks to polyspermy; Early development of frog and humans (structure of mature egg and its membranes, patterns of cleavage, fate map, up to formation of gastrula); Fate of germ layers.

10. **Late Embryonic Development:** Extraembryonic membranes, Implantation embryo in humans, Formation of human placenta and functions, other types of placenta on the basis of histology; Metamorphic events in frog life cycle and its hormonal regulation.

11. **Control of Development Fundamental processes in development** (brief idea) - Gene activation, determination, induction, Differentiation, morphogenesis and types of morphogenetic movements, intercellular communication and cell death.

Course Outcomes

- Gain knowledge of the comparative anatomy of major vertebrate systems including integumentary, skeletal, digestive, respiratory, circulatory, excretory, nervous, and sensory systems.
- Examine evolutionary modifications such as the transformation of visceral arches, development of kidneys and aortic arches, and adaptations in various organ systems across different vertebrate classes.
- Understand gametogenesis, fertilization, cleavage, gastrulation, and organogenesis with reference to frog and human development, including extraembryonic membranes and placentation.
- Explain fundamental developmental processes like gene activation, induction, differentiation, morphogenesis, and programmed cell death that govern animal development.

Recommended Books

- Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and Evolution. I Edition. McGraw-Hill Higher Education.
- Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies
- Gilbert, S. F. (2006). Developmental Biology, VIII Edition, Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts, USA.
- Hilderbrand, M and Gaslow G.E. Analysis of Vertebrate Structure, John Wiley and Sons.
- Walter, H.E. and Sayles, L.P; Biology of Vertebrates, Khosla Publishing House.
- Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Compter Press.
- Carlson, Bruce M (1996). Patten's Foundations of Embryology, McGraw Hill, Inc.

PRACTICAL

Multidisciplinary Course Based On NEP-2020
B.Sc. / B.Sc. (Honours)
B.Sc.-I (Med.) Part-I Semester-II Major Zoology
2025-26 Syllabus
Practical Paper: COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATES
Practical Paper Code: BM201P

Total Marks: 30
Practical Marks: 20 marks
Internal Assessment: 10 marks
Pass marks: 35%

Time Allowed: 3 hours
Total Teaching hours: 2 hours/week
Credit: 1

1. Osteology: a) Disarticulated skeleton of Frog, Varanus, Fowl and Rabbit b) Carapace and plastron of turtle /tortoise
2. Frog - Study of developmental stages - whole mounts and sections through permanent slides - cleavage stages, blastula, gastrula, tadpole external and internal gill stages.
3. Examination of gametes - frog/rat - sperm and ova through permanent slides or photomicrographs.
4. Study of the different types of placenta- histological sections through permanent slides or photomicrographs.
5. Comparatives study of Heart and Brain in Vertebrates through Models/Charts
6. Study of Mammalian Eye and Ear through Models/Charts
7. Study of histological slides of Mammalian tissues

INSTRUCTIONS FOR PRACTICAL PAPER

1. Identification and description of two bone specimens
2. Identify and write short note on any two- Model/Chart of Heart/Brain/Eye/Ear
3. Identification of permanent stained slides pertaining to Expt. 2, 3 & 7
4. Identification of Photomicrographs pertaining to Expt. 4
5. Viva-Voce
6. Practical note book