



Govt. College for Women, Parade Ground, Jammu (An Autonomous College)

NAAC Accredited "A" Grade

Programme:- Undergraduate Programme in Zoology (FYUGP)			
Semester:- II	Course type:- MAJOR - Theory Course	Course title:- Life and Diversity of Chordates	Course code:- UZOMJT-201
Total marks:- 100	Total credits:- 4	Teaching hours:- 60 Hrs.	

Objectives of the Course:-

- To provide a basis for understanding the diversity within chordate groups, their inter-relationship and co-existence of different species.
- To enable the students to understand and appreciate the importance of diverse chordate life forms.
- To provide an overview of the protochordate and chordate forms like cephalochordates, urochordates, hemichordates, fishes, amphibians, reptiles, birds, and mammals.
- To provide knowledge of chordate phyla, their characteristic features, different modes of living, vital systems and special phenomenon exhibited by them.

Learning outcomes of the course:- After completing this course, the students will get familiar with the major groups of animals, their similarities and differences, and the evolutionary pathways that resulted in the current numbers and variety of animal species. They will be able to:

- Figure out the differences between major chordate phyla.
- Describe the distinguishing characteristics of these phyla.
- Understand the fundamental differences among animal body plans and functions.
- Illustrate lifecycles, structure, function and reasons for importance of few representative organisms from different groups of animals.

Unit-I. Protochordates Teaching Hours: 12

- 1.1 Salient features of Protochordates
- 1.2 Characteristic features of Cephalochordata
- 1.3 Characteristic features of Urochordata
- 1.4 Characteristic features of Hemichordata
- 1.5 Neoteny and retrogressive metamorphosis in Ascidians.
- 1.6 Affinities of Protochordates with
 - 1.6.1 Echinoderms
 - 1.6.2 Chordates

Unit-II Pisces Teaching Hours: 15

- 2.1 General Characters of Pisces (Chondrichthys, Ostrichithes and Dipnoi)
- 2.2 Structure and affinities of Dipnoi
- 2.3 Adaptation of Fishes to different habitats
 - 2.3.1 Cave Dwellers
 - 2.3.2 Bottom Dwellers
 - 2.3.3 Hill Stream Fishes
- 2.4 Osmoregulation in Fishes
- 2.5 Branchial Respiration in Fishes
- 2.6 Swim bladder and its types and significance
- 2.7 Migration in fishes

Unit-III Amphibia and Reptilia Teaching Hours: 15

3.1 Amphibia

- 3.1.1 Characters and affinities of Urodela, Apoda and Anura.
- 3.1.2 Parental Care in Amphibia
- 3.1.3 Respiration in Amphibia



Govt. College for Women, Parade Ground, Jammu (An Autonomous College)

NAAC Accredited "A" Grade

3.1.4 Neoteny and Paedogenesis

3.2 Reptilia

- 3.2.1 General Characters of Reptiles
- 3.2.2 Terrestrial Adaptation of reptiles
- 3.2.3 Poisonous and Non-poisonous snakes
- 3.2.4 Venom apparatus and biting mechanism
- 3.2.5 Sphenodon as living fossil

Unit-IV

Aves

Teaching Hours: 09

- 4.1 General Characters of Aves
- 4.2 Flightless birds (Endemism and Characters)
- 4.3 Volant Adaptation
- 4.4 Migration in Birds
- 4.5 Courtship Behavior In Birds

Unit-V Mammals

Teaching Hours: 09

- 5.1 General Characters of Mammals
- 5.2 Egg laying mammals (Endemism, Characteristic features and examples)
- 5.3 Pouched Mammals (Endemism, Characteristic features and examples)
- 5.4 Cetaceans: Characteristic features and examples
- 5.5 Primates: Characteristic features and examples
- 5.6 Hibernation, Aestivation and Tor Por in Mammals

References:-

1. Chordate Zoology by Parker & Haswell
2. Life of vertebrates by J.Z. Young
3. Hyman series (vertebrates)
4. Chordate Zoology- N. Arumugam, Vol. 2. SarasPublication
5. Chordate Zoology-E.L.Jordan & P.S. Verma. S. Chand Limited
6. Chordate zoology- P.S. Dhama & J.K. Dhama (1981) (R. Chand & Co.)
7. Textbook of zoology, Vertebrates-A.J. Marshall (1995) (The McMillan Press Ltd., UK).
8. Modern textbook of Zoology (Vertebrates) -R.L.Kotpal (2000). (Rastogi Publ., Meerut).
9. Functional Anatomy of the Vertebrates: An Evolutionary Perspective- Liem, Karel F., William E. Bemis, Warren F. Walker, Lance Grande (2001). Brooks Cole.
10. Advanced Chordate Zoology-Gurdarshan Singh & H. Bhaskar (2002). Campus Books.

Examination pattern shall be as under:-

1. 20 marks shall be earmarked for internal assessment (5 marks for attendance +15 for assessment test).
2. Scheme for award of marks for attendance shall be same as followed by the College.
3. Internal assessment test shall be conducted after the completion of 40% of the syllabus in a particular course.

Pattern for setting internal assessment test paper:-

Duration of the paper:- 1 hour

The paper shall comprise of three sections:

- a) Short answer questions - Attempt two questions of 2 marks each out of three questions (Maximum of 30 words each)
- b) Medium answer question - Attempt two questions of 3 marks each out of 3 questions (Maximum of 50 words each)
- c) Long answer question - Attempt one question out of two questions 5 marks (Maximum of 100 words)

Note:- Questions shall be set in such a way that the syllabi prescribed for the examination is fully represented

Pattern of External Examination:-



Govt. College for Women, Parade Ground, Jammu (An Autonomous College)

NAAC Accredited "A" Grade

Total marks:- 80

Time allowed:- 3 hours

The paper shall comprise of 3 sections:

- a) Short answer questions - 5 questions of 3 marks each (one question shall be asked from each unit). All questions are compulsory.
- b) Medium answer questions – 5 questions of 7 marks each (one question shall be asked from each unit). All questions are compulsory
- c) Long answer questions:- 5 questions be set from five units, and the students shall be asked to attempt 2 questions only. Each question shall be of 15 marks.
(The word limit shall be same as is the usual practice in external examination of similar weightage).



Govt. College for Women, Parade Ground, Jammu (An Autonomous College)

NAAC Accredited "A" Grade

Programme:- Undergraduate Programme in Zoology (FYUGP)			
Semester:- II	Course type:- MAJOR - Practical Course	Course title:- Life and Diversity of Chordates	Course code:- UZOMJP-201
Total marks:- 50	Total credits:- 2		

Objectives:-The practical course based on the course Life and Diversity of Animals, shall be helpful in expressing real appreciation for animal diversity that can only be achieved through first-hand study of these preserved animal forms in the laboratory. During the practical classes, the students will examine all the major groups of animals, starting with the most structurally simple and finishing with highly specialized and complex creatures like birds and mammals. The students shall learn and improve the practical skill in preparing permanent slides from the animal tissues. The students shall be able to study the animal tissues from the permanent slides readily available in the laboratory. The course shall enable the student to identify different snakes by using the key for identification of Venomous and non-venomous snakes.

Learning outcomes:- Upon completion of this course, the students will be able to:

- Recognize major animal phyla and their representative types on the basis of their phenotypic characteristics.
- Identify the morphological and anatomical structures from prepared tissues.
- State various adaptations shown by different parasites for their successful existence.
- Make a proficient use of the key for identification of different types of snakes.
- Cultivate a keen interest and curiosity in animal studies.

Total marks:- 50, Total Credits:- 2 and Minimum No. of practicals to be performed:-15

Practical Exercises:-

- I. Salient features and outline classification of different phyla to be recorded before commencing the type study.
- II. Characteristic features & classifications of the following:
 1. Protochordates: *Balanoglossus*, *Herdmania* and *Branchiostoma*
 2. Cyclostomes: *Petromyzon* and *Myxine*
 3. Pisces: *Sphyrna*, *Pristis*, *Torpedo*, *Chimaera*, *Protopterus*, *Exocoetus*, *Clarias*, *Heteropneustes*, *Anabas* and *Echineis*
 4. Amphibians: *Ichthyophis*, *Bufo*, *Hyla*, *Salamandra* and Axolotl larva
 5. Reptiles: *Chelone*, *Kachuga*, *Hemidactylus*, *Chamaeleon*, *Draco*, *Typhlops*, *Python*, *Bungarus*, *Vipera*, *Naja*, *Hydrophis* and *Crocodylus*
 6. Aves: Study of Flightless birds (*Struthio* and *Apteryx*) and flying birds (*Psittacula*, *Corvus*, *Columba* and *Bubo*)
 7. Mammals: *Echidna*, *Macrophus*, *Macaca*, *Pteropus* and *Funambulus*
- III. Preparation of permanent stained mounts of Scales of fish (Placoid), Oral hood of *Amphioxus*
- IV. Study of the following through permanent slides:
 1. Scales of fish (Placoid, Ctenoid and Cycloid)
 2. Oral hood of *Amphioxus*
- V. Key for the identification of venomous and non-venomous snakes.
- VI. Field visit to an aquatic body to study its fish fauna.
- VII. Field visit to a zoo and to prepare a pictorial report on the same.
- VIII. Field visit to record the avian fauna of the area visited.
- IX. 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.
- X. To observe and record the anthropogenic activities that have a negative impact on the animal diversity.



Govt. College for Women, Parade Ground, Jammu (An Autonomous College)

NAAC Accredited "A" Grade

Programme:- Undergraduate Programme in Zoology (FYUGP)			
Semester:- II	Course type:- <u>MINOR</u> - Theory Course	Course title:- Biodiversity of Chordates	Course code:- UZOMNT-201
Total marks:- 100	Total credits:- 4	Teaching hours:- 60 Hrs.	

Objectives of the Course:-

- To provide a basis for understanding the diversity within chordate groups, their inter-relationship and co-existence of different species.
- To enable the students to understand and appreciate the importance of diverse chordate life forms.
- To provide an overview of the protochordate and chordate forms like cephalochordates, urochordates, hemichordates, fishes, amphibians, reptiles, birds, and mammals.
- To provide knowledge of chordate phyla, their characteristic features, different modes of living, vital systems and special phenomenon exhibited by them.

Learning outcomes of the course:- After completing this course, the students will get familiar with the major groups of animals, their similarities and differences, and the evolutionary pathways that resulted in the current numbers and variety of animal species. They will be able to:

- Figure out the differences between major chordate phyla.
- Describe the distinguishing characteristics of these phyla.
- Understand the fundamental differences among animal body plans and functions.
- Illustrate lifecycles, structure, function and reasons for importance of few representative organisms from different groups of animals.

Unit-I. Protochordates Teaching Hours: 12

- 1.7 Salient features of Protochordates
- 1.8 Characteristic features of Cephalochordata
- 1.9 Characteristic features of Urochordata
- 1.10 Characteristic features of Hemichordata
- 1.11 Neoteny and retrogressive metamorphosis in Ascidians.
- 1.12 Affinities of Protochordates with
 - 1.12.1 Echinoderms
 - 1.12.2 Chordates

Unit-II Pisces Teaching Hours: 15

- 2.8 General Characters of Pisces (Chondrichthys, Ostrichithes and Dipnoi)
- 2.9 Structure and affinities of Dipnoi
- 2.10 Adaptation of Fishes to different habitats
 - 2.10.1 Cave Dwellers
 - 2.10.2 Bottom Dwellers
 - 2.10.3 Hill Stream Fishes
- 2.11 Osmoregulation in Fishes
- 2.12 Branchial Respiration in Fishes
- 2.13 Swim bladder and its types and significance
- 2.14 Migration in fishes

Unit-III Amphibia and Reptilia Teaching Hours: 15

3.3 Amphibia

- 3.3.1 Characters and affinities of Urodela, Apoda and Anura.
- 3.3.2 Parental Care in Amphibia
- 3.3.3 Respiration in Amphibia



Govt. College for Women, Parade Ground, Jammu (An Autonomous College)

NAAC Accredited "A" Grade

3.3.4 Neoteny and Paedogenesis

3.4 Reptilia

- 3.4.1 General Characters of Reptiles
- 3.4.2 Terrestrial Adaptation of reptiles
- 3.4.3 Poisonous and Non-poisonous snakes
- 3.4.4 Venom apparatus and biting mechanism
- 3.4.5 Sphenodon as living fossil

Unit-IV

Aves

Teaching Hours: 09

- 4.6 General Characters of Aves
- 4.7 Flightless birds (Endemism and Characters)
- 4.8 Volant Adaptation
- 4.9 Migration in Birds
- 4.10 Courtship Behavior In Birds

Unit-V Mammals

Teaching Hours: 09

- 5.7 General Characters of Mammals
- 5.8 Egg laying mammals (Endemism, Characteristic features and examples)
- 5.9 Pouched Mammals (Endemism, Characteristic features and examples)
- 5.10 Cetaceans: Characteristic features and examples
- 5.11 Primates: Characteristic features and examples
- 5.12 Hibernation, Aestivation and Tor Por in Mammals

References:-

11. Chordate Zoology by Parker & Haswell
12. Life of vertebrates by J.Z. Young
13. Hyman series (vertebrates)
14. Chordate Zoology- N. Arumugam, Vol. 2. SarasPublication
15. Chordate Zoology-E.L.Jordan & P.S. Verma. S. Chand Limited
16. Chordate zoology- P.S. Dhama & J.K. Dhama (1981) (R. Chand & Co.)
17. Textbook of zoology, Vertebrates-A.J. Marshall (1995) (The McMillan Press Ltd., UK).
18. Modern textbook of Zoology (Vertebrates) -R.L.Kotpal (2000). (Rastogi Publ., Meerut).
19. Functional Anatomy of the Vertebrates: An Evolutionary Perspective- Liem, Karel F., William E. Bemis, Warren F. Walker, Lance Grande (2001). Brooks Cole.
20. Advanced Chordate Zoology-Gurdarshan Singh & H. Bhaskar (2002). Campus Books.

Examination pattern shall be as under:-

4. 20 marks shall be earmarked for internal assessment (5 marks for attendance +15 for assessment test).
5. Scheme for award of marks for attendance shall be same as followed by the College.
6. Internal assessment test shall be conducted after the completion of 40% of the syllabus in a particular course.

Pattern for setting internal assessment test paper:-

Duration of the paper:- 1 hour

The paper shall comprise of three sections:

- d) Short answer questions - Attempt two questions of 2 marks each out of three questions (Maximum of 30 words each)
- e) Medium answer question - Attempt two questions of 3 marks each out of 3 questions (Maximum of 50 words each)
- f) Long answer question - Attempt one question out of two questions 5 marks (Maximum of 100 words)



Govt. College for Women, Parade Ground, Jammu (An Autonomous College)

NAAC Accredited "A" Grade

Note:- Questions shall be set in such a way that the syllabi prescribed for the examination is fully represented

Pattern of External Examination:-

Total marks:- 80

Time allowed:- 3 hours

The paper shall comprise of 3 sections:

- d) Short answer questions - 5 questions of 3 marks each (one question shall be asked from each unit). All questions are compulsory.
- e) Medium answer questions – 5 questions of 7 marks each (one question shall be asked from each unit). All questions are compulsory
- f) Long answer questions:- 5 questions be set from five units, and the students shall be asked to attempt 2 questions only. Each question shall be of 15 marks.
(The word limit shall be same as is the usual practice in external examination of similar weightage).



Govt. College for Women, Parade Ground, Jammu (An Autonomous College)

NAAC Accredited "A" Grade

Programme:- Undergraduate Programme in Zoology (FYUGP)			
Semester:- II	Course type:- <u>MINOR</u> - Practical Course	Course title:- Biodiversity of Chordates	Course code:- UZOMNP-201
Total marks:- 50	Total credits:- 2		

Objectives:-The practical course based on the course Life and Diversity of Animals, shall be helpful in expressing real appreciation for animal diversity that can only be achieved through first-hand study of these preserved animal forms in the laboratory. During the practical classes, the students will examine all the major groups of animals, starting with the most structurally simple and finishing with highly specialized and complex creatures like birds and mammals. The students shall learn and improve the practical skill in preparing permanent slides from the animal tissues. The students shall be able to study the animal tissues from the permanent slides readily available in the laboratory. The course shall enable the student to identify different snakes by using the key for identification of Venomous and non-venomous snakes.

Learning outcomes:- Upon completion of this course, the students will be able to:

- Recognize major animal phyla and their representative types on the basis of their phenotypic characteristics.
- Identify the morphological and anatomical structures from prepared tissues.
- State various adaptations shown by different parasites for their successful existence.
- Make a proficient use of the key for identification of different types of snakes.
- Cultivate a keen interest and curiosity in animal studies.

Total marks:- 50, Total Credits:- 2 and Minimum No. of practicals to be performed:-15

Practical Exercises:-

- Salient features and outline classification of different phyla to be recorded before commencing the type study.
- Characteristic features & classifications of the following:
 - Protochordates: *Balanoglossus*, *Herdmania* and *Branchiostoma*
 - Cyclostomes: *Petromyzon* and *Myxine*
 - Pisces: *Sphyrna*, *Pristis*, *Torpedo*, *Chimaera*, *Protopterus*, *Exocoetus*, *Clarias*, *Heteropneustes*, *Anabas* and *Echineis*
 - Amphibians: *Ichthyophis*, *Bufo*, *Hyla*, *Salamandra* and Axolotl larva
 - Reptiles: *Chelone*, *Kachuga*, *Hemidactylus*, *Chamaeleon*, *Draco*, *Typhlops*, *Python*, *Bungarus*, *Vipera*, *Naja*, *Hydrophis* and *Crocodylus*
 - Aves: Study of Flightless birds (*Struthio* and *Apteryx*) and flying birds (*Psittacula*, *Corvus*, *Columba* and *Bubo*)
 - Mammals: *Echidna*, *Macrophus*, *Macaca*, *Pteropus* and *Funambulus*
- Preparation of permanent stained mounts of Scales of fish (Placoid), Oral hood of *Amphioxus*
- Study of the following through permanent slides:
 - Scales of fish (Placoid, Ctenoid and Cycloid)
 - Oral hood of *Amphioxus*
- Key for the identification of venomous and non-venomous snakes.
- Field visit to an aquatic body to study its fish fauna.
- Field visit to a zoo and to prepare a pictorial report on the same.
- Field visit to record the avian fauna of the area visited.
- 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.
- To observe and record the anthropogenic activities that have a negative impact on the animal diversity.