DEBRA THANA SAHID KSHUDIRAM SMRITI MAHAVIDYALAYA (AUTONOMOUS)

Chakshyampur , Debra, Paschim Medinipur, West Bengal

Syllabus for the UNDERGRADUATE Programme In

ZOOLOGY

Under NEP 2020

W.e.f. 2025-2026

PROGRMME OUTCOME

Upon completion of B.Sc. Zoology Honours or Honours with Research Programme, the graduates will be able to -

1. Know the fundamental principles in Zoology. Recognize the relationships between structure and functions of biological organization in animals.
2. Analyse the principles, classification, form, and function of animal evolution, and to compare the structure of Prokaryotes and Eukaryotes.
3. Understand the animal diversity which includes animal classification with taxonomy and their diagnostic characteristics.
4. Apply knowledge and understanding the protection and restoration of biological diversity, ecological integrity, and health. Understand a range of conservation management.
5. Understand the evolutionary history and main characteristics of the animal groups.
6. Comprehend and critical analysis of population processes, dynamics and interactions, and associated models.
7. Comprehension of the structure, biogeography, and diversity of ecosystems in relation to climate, geology, soils, paleo-historical and evolutionary factors.
8. Understand the applied biological sciences such as Sericulture, Aquaculture and Apiculture.
9. Collect, record, and analyse data using appropriate ecological, genetic, and physiological techniques in the field and laboratory.
10. Use information technology systems effectively to analyse and interpret data, and the evidence for research.
11. Develop the writing skills required in the programme which includes publishing research articles, oral and poster presentations at conferences.
12. Explain the molecular and cellular basis of physiological functions in animals.
13. Provide innovative skills which will enable to develop the knowledge and skills required for employment such as biochemistry, microbiology, aquaculture, apiculture, and biotechnology on the level of the gene, genome, and their functions.
14. Perform practical skills in the areas of developmental biology, biochemistry, cell and molecular biology, genetics, immunology, and microbiology.

UG ZOOLOGY (MAJOR) SYLLABUS

Sem	Code	Title of the Paper	Credit	Allot. Class		Marks
				Th.	Prc.	
I	ZOOMJ01	CONCEPT OF CLASSIFICATION AND NON-CHORDATE BIOLOGY	4	3	1	75
	ZOOSEC01	VERMITECHNOLOGY	3	-	3	50
II	ZOOMJ02	CLASSIFICATION AND BIOLOGY OF CHORDATES	4	3	1	75
	ZOOSEC02	SERICULTURE	3	-	3	50

UG ZOOLOGY (SEC) SYLLABUS

Sem	Code	Title of the Paper	Credit	Allot. Class		Marks
				Th.	Prc.	
I	ZOOSEC01	SEC01T: VERMITECHNOLOGY	3	-	3	50
II	ZOOSEC02	SEC02T: SERICULTURE	3	-	3	50

UG ZOOLOGY MINOR SYLLABUS

Sem	Code	Title of the Paper	Credit	Allot. Class		Marks
				Th.	Prc.	
I	ZOOMI01 (1A)	CONCEPT OF CLASSIFICATION, BIOLOGY OF NON-CHORDATES & CHORDATES	4	3	1	75
II	ZOOMI02 (2A)	CONCEPT OF CLASSIFICATION, BIOLOGY OF NON-CHORDATES & CHORDATES	4	3	1	75

UG ZOOLOGY IDC/MDC

Sem	Code	Title of the Paper	Credit	Marks
I	IDC-I	ENVIRONMENTAL MANAGEMENT AND SUSTANABLE DEVELOPMENT	3	50
II	IDC-II	CLIMATE CHANGE & DIASTER MANAGEMENT (CCDM)	3	50
III	IDC-III	ARTIFICIAL INTELLIGENCE IN EDUCATION	3	50

UG ZOOLOGY VAC

Sem	Code	Title of the Paper	Credit	Marks
I	VAC-III	UNDERSTANDING INDIA	2	50
	VAC-IV	INDIAN CONSTITUTION & ETHICS	2	50
II	VAC-I	PHYSICAL FITNESS & SOCIAL AWARENESS	2	50
	VAC-II	MENTAL HEALTH & WELLBEING	2	50

UG ZOOLOGY AEC

Sem	Code	Title of the Paper	Credit	Marks
I	AEC-I	ENG-I	2	50
II	AEC-II	BNG/HIN-I	2	50
III	AEC-III	BNG/HIN-II	2	50
IV	AEC-IV	ENG-II	2	50

Semester-I
Course
Structure

Sl. No.	Name of the Courses	No. of Papers	Credits	Full Marks
1	Major	01	04	75
2	Minor	01	04	75
3	IDC/MDC	01	03	50
4	AEC ENGLISH	01	02	50
5	SEC	01	03	50
6	VAC (Group-C)	02	04(02+02)	100(50+50)
Total		***07***	***20***	***400***

DEBRA THANA SAHID KSHUDIRAM SMRITI MAHAVIDYALAYA (AUTONOMOUS)

Curriculum for Undergraduate in Zoology

[NEP 2020]

Semester-I

Paper Code	Name of the Subject	Nature	Teaching Scheme in hour per week			Credit	Marks
			L	T	P		
ZOOMJ01	**MJ01T:** CONCEPT OF CLASSIFICATION AND NON-CHORDATE BIOLOGY	Major Course	3	0	0	4	75
	MJ01P: CONCEPT OF CLASSIFICATION AND NON-CHORDATE BIOLOGY (Practical)	Major Course	0	0	1		
ZOOMI01	**MI01T:** CONCEPT OF CLASSIFICATION, BIOLOGY OF NON-CHORDATES & CHORDATES	Minor Course	3	0	0	4	75
	MI01P: CONCEPT OF CLASSIFICATION, BIOLOGY OF NON-CHORDATES & CHORDATES	Minor Course [Practical]	0	0	1		
ZOOSEC01						3	50
	SEC01P: Vermicompost (Practical)	SEC (Practical)	0	0	3		

L=Lecture, T=Tutorial, P=Practical

Major01: CONCEPT OF CLASSIFICATION AND NON-CHORDATE BIOLOGY Credits 04
Major 01T- CONCEPT OF CLASSIFICATION AND NON-CHORDATE BIOLOGY Credits 03

Course objectives and expected outcome

This course provides an introduction to the basics of animal classification. It covers various phylum (major and minor) under non-chordates as per the hierarchy. The students will learn about their properties, identifying characters, specialized organ-systems, diversity and the basic scheme of classification. Therefore, this fundamental course of classical Zoology will be helpful for the students to be inclined more into the beauty Animal Kingdom.

Course Contents:

Sl. No.	TOPICS	Allotted Lecture
1.	**Unit1: Basics of Animal Classification** • Concept of classification, Six kingdom classification (Carl Woese)	2
2.	**Unit2: Protozoa** • General characteristics and Classification up to phylum (according to Levine et.al.,1981) Locomotion In *Euglena*, *Paramoecium and Amoeba* • Conjugation in *Paramoecium*	6
3.	**Unit 3: Metazoa** • Evolution of symmetry and segmentation of Metazoa	2
4.	**Unit4: Porifera** • General characteristics and Classification up to classes (Ruppert & Barnes, 1994); • Canal system and spicules in sponges	3
5.	**Unit5: Cnidaria** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994) • Polymorphism in Cnidaria	3
6.	**Unit6: Ctenophora** • General characteristics, Classification up to Classes. (Ruppert & Barnes, 1994)	2
7.	**Unit7: Platyhelminthes** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994) • Life cycle: pathogenicity and control measures of *Fasciola hepatica*	3

8.	**Unit8: Nematoda** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994) • Life cycle: pathogenicity and control measures of *Wuchereria bancrofti* • Parasitic adaptations in helminthes	3
9.	**Unit8: Annelida** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994) • Excretion in Annelida through nephridia.	3
10.	**Unit 10**: **Arthropoda** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994). • Respiration in Arthropoda (Gills in prawn and trachea in cockroach). • Metamorphosis in Insects. • Social life in termite	5
11.	**Unit12: Mollusca** • General characteristics and Classification upto classes. (Ruppert & Barnes, 1994) • Nervous system and torsion in Gastropoda	4
13.	**Unit 13: Echinodermata** General characteristics and Classification upto classes. (Ruppert & Barnes, 1994) Water-vascular system in Asteroidea. Larval forms in Echinodermata Affinities with Chordates	5
14.	**Unit14: Hemichordata** General characteristics of phylum Hemichordata. Relationship with non-chordates and chordates	4

❖ Classification for metazoans to be followed from: Rupert and Barnes, 1994, 6thEdition.

❖ Classification to be followed from Rupert and Barnes, 1994, 6thEdition

Suggested Readings:

➢ Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.

➢ Invertebrates by Brusca & Brusca. Second edition, 2002.

➢ The Invertebrates: A New Synthesis, III Edition, Blackwell Science

Major 01P CONCEPT OF CLASSIFICATION AND NON-CHORDATE BIOLOGY Credits 01

Course Contents:

1. Identification of *Amoeba, Euglena, Opalina, Paramecium*

2. Identification of Sycon, Neptune's Cup, *Physalia, Aurelia*, *Tubipora, Metridium.*

3. Identification and significance of adult *Fasciola hepatica, Ascaris lumbricoides*.

4. Staining/ mounting of any protozoa/helminth isolated from the gut of cockroach.

5. Study of following specimens:

a. Annelids-*Aphrodite, Nereis*

Pheretima, *Hirudinaria*

~~b.~~ Arthropods - *Carcinoscorpius*, *Palamnaeus, Palaemon, Daphnia*, *Balanus*, *Eupagurus*, *Scolopendra, Julus*, *Bombyx*, *Periplaneta,* termites and honey bees

c. Molluscs-Chiton, *Pila, Unio, Sepia, Loligo*

Octopus,

d. Echinoderms- *Asterias, Ophiura, Echinus, Cucumaria* and *Antedon*

6. Mounting of mouth parts and dissection of digestive system and nervous system of

Periplaneta

SEC 01P: VERMITECHNOLOGY **Credits: 03**

Course objectives and expected outcome

Vermitechnology, also known as vermiculture or vermicomposting, involves the use of earthworms to break down organic waste into nutrient-rich compost. This course will cover the practical aspects of vermitechnology, including setting up and maintaining vermicomposting systems, managing earthworm populations, and utilizing the compost for sustainable agriculture.

Course Contents:

Sl. No.	TOPICS	Allotted Lecture
1.	**Unit 1:** Biology of selected epigeic earthworm species with special reference to their life cycle stages.	5
2.	**Unit 2:** Compost Quality: Source, Comparative efficiency of compost production by epigeic earthworm spices.	5
3.	**Unit 3:** Physiochemical properties of Vermicompost like pH ,Organic Carbon, NPK.	6
4.	**Unit 4:** Cost Benefits Assessment OF Vermicompost	4
5.	**Unit 5:** Identification of predators of earthworms selected for vermicompost and their control measure	4
6.	**Unit 6:** Entrepreneurship of Vermitechnology **:** Prospect of vermitechnolgy in India	6
7.	**Unit: 7** Application of Vermicompost in agriculture, horticulture and floriculture	6
8.	**Unit: 8** Visit to any Vermicompost Unit	9

Suggested Readings:

- "Vermitechnology" by M.V. Christy (1st edition, MJP Publishers)
- "Earthworm Biology" by J.A. Wallwork (Edward Arnold Publishers Ltd.)

Minor 01: CONCEPT OF CLASSIFICATION, BIOLOGY OF NON-CHORDATES & CHORDATES **Credits 04**

Minor 01T- CONCEPT OF CLASSIFICATION, BIOLOGY OF NON-CHORDATES & CHORDATES **Credits 03**

Course objectives and expected outcome

This course provides an introduction to the basics of animal classification. It covers various phylum (major and minor) under non-chordates as per the hierarchy. The students will learn about their properties, identifying characters, specialized organ-systems, diversity and the basic scheme of classification. Therefore, this fundamental course of classical Zoology will be helpful for the students to be inclined more into the beauty Animal Kingdom.

Course Contents:

Sl. No.	TOPICS	Allotted Lecture
1.	**Unit1: Basics of Animal Classification** • Concept of classification, Six kingdom classification (Carl Woese)	2
2.	**Unit2: Protozoa** • General characteristics and Classification up to phylum (according to Levineet.al.,1981)	2
4.	**Unit4: Porifera** • General characteristics and Classification up to classes (Ruppert & Barnes, 1994); • Canal system in sponges	4
5.	**Unit5: Cnidaria** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994)	2
6.	**Unit6: Ctenophora** • General characteristics, Classification up to Classes. (Ruppert & Barnes, 1994)	2
7.	**Unit7: Platyhelminthes** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994)	2
8.	**Unit8: Nematoda** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994)	2

9.	**Unit8: Annelida** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994)	2
10.	**Unit 10**: **Arthropoda** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994).	2
12.	**Unit12: Mollusca** • General characteristics and Classification upto classes. (Ruppert & Barnes, 1994)	2
13.	**Unit 13: Echinodermata** General characteristics and Classification upto classes. (Ruppert & Barnes, 1994)	2
14.	**Unit14: Hemichordata** General characteristics of phylum Hemichordata. Relationship with non-chordates and chordates	2
15.	**Unit 15: Introduction to Chordates** General characteristics and outline classification of Phylum Chordata.	**2**
16.	**Unit 16 : Protochordata** General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes. Retrogressive metamorphosis in Ascidia.	**4**
17.	**Unit 17: Origin of Chordata** Advanced features of vertebrates over Protochordata.	**2**
18.	**Unit 18: Agnatha** General characteristics and classification of Cyclostomes up to order.	**2**
19.	**Unit 19: Pisces** General characteristics and classification of Chondrichthyes and Osteichthyes. Accessory respiratory	**4**
20.	**Unit 20: Other Chordates** General characteristics and classification up to living Orders of Amphibia, Reptilia, Aves and Mammalia	**5**

❖ Classification for metazoans to be followed from: Rupert and Barnes, 1994, 6thEdition.

❖ Classification to be followed from Rupert and Barnes, 1994, 6thEdition

Suggested Readings:

- Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.
- Invertebrates by Brusca & Brusca. Second edition, 2002.
- The Invertebrates: A New Synthesis, III Edition, Blackwell Science

Minor 01P: CONCEPT OF CLASSIFICATION, BIOLOGY OF NON-CHORDATES & CHORDATES **Credits 01**

Course Contents:

1. Identification of *Amoeba, Euglena,*
2. Identification of *Obelia, Physalia, Tubipora*
3. Identification and significance of adult *Fasciola hepatica, Ascaris lumbricoides.*
4. Staining/ mounting of any protozoa/helminth isolated from the gut of cockroach.
5. Study of following specimens:

a. Annelids-*Aphrodite, Nereis, Pheretima, Hirudinaria*

b. Arthropods- *Palaemon, Eupagurus, Periplaneta*

c. Molluscs- *Chiton, Pila, Unio, Octopus*

d. Echinoderms- *Asterias*

6. Mounting of mouth parts and dissection of digestive system and nervous system of *Periplaneta*
7. Identification of the following animals
   a. Protochordata
      Balanoglossus
   b. Agnatha
      Petromyzon, Myxine
   c. Fishes
      Scoliodon, Labeo rohita, Labeo bata, Labeo calbasu,
      Amphibia
      Duttaphrynus, Hyla
   d. Reptilia
      Chelone, *Vipera, Naja, Crocodylus.*
   e. Mammalia: *Megachiroptera & Microchiroptera*
8. Dissection of brain and pituitary of *Rohu sp.*

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Semester-II
Course
Structure

Sl. No.	Name of the Courses	No. of Papers	Credits	Full Marks
1	Major	01	04	75
2	Minor	01	04	75
3	IDC/MDC	01	03	50
4	AEC MIL (Beng./ Hindi)	01	02	50
5	SEC	01	03	50
6	VAC (Group-C)	02	04(2+2)	100(50+50)
7	CESR	01	02	50
Total		***08***	***22***	***450***

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Curriculum for Undergraduate in Zoology

[NEP 2020]

Semester-II

Paper Code	Name of the Subject	Nature	Teaching Scheme in hour per week			Credit	Marks
			L	T	P		
ZOOMJ 02	**MJ02T:** CLASSIFICATION AND BIOLOGY OF CHORDATES	Major Course- 1	3	0	0	4	75
	MJ02P: CLASSIFICATION AND BIOLOGY OF CHORDATES (Practical)	Major Course1 [Practical]	0	0	1		
ZOOMI 02	**MI02T:** CONCEPT OF CLASSIFICATION, BIOLOGY OF NON-CHORDATES & CHORDATES	Minor Course- 1	3	0	0	4	75
	MI02P: CONCEPT OFCLASSIFICATION, BIOLOGY OF NON-CHORDATES & CHORDATES (Practical)	Minor Course-1 [Practical]	0	0	1		
ZOOSEC 02						3	50
	SEC201P: SERICULTURE (Practical)	SEC (Practical)	0	0	3		

L=Lecture, T=Tutorial, P=Practical

Major02: CLASSIFICATION AND BIOLOGY OF CHORDATES Credits 04

Major 02T CLASSIFICATION AND BIOLOGY OF CHORDATES Credits 03

Course objectives and expected outcome

Course objectives and expected outcome

Identify the chordates and classify them. Develop understanding on the diversity of life regarding chordates. Describe general taxonomic rules on animal classification of chordates. Classify Protochordate to Mammalia with taxonomic keys. Understand Mammals with specific structural adaptations. Understand the origin and evolutionary relationship of different phyla from Protochordate to Mammalia. To identify chordates based on special identifying characters Define the main characteristics of chordates. Recall the classification of Phylum Chordata. Describe the different chordate animals (in lab). Apply the relationship between structure and function of organ-systems, and their adaptation with environment List each class in its taxonomic position according to the modifications of structures of different organs in each taxon. Gain knowledge about zoogeographical realms and distribution of chordates in world

Course Contents:

Sl. No.	Topics	Lectures
1.	**Unit 1: Introduction to Chordates** • General characteristics and outline classification of Phylum Chordata.	4
2.	**Unit 2: Protochordata** • General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes. Retrogressive metamorphosis in Ascidia. Chordate Features and Feeding in Branchiostoma.	5
3.	**Unit 3: Origin of Chordata** • Dipleurula concept and the Echinoderm theory of origin of chordates. • Advanced features of vertebrates over Protochordata.	3
4.	**Unit 4: Agnatha** • General characteristics and classification of Cyclostomes up to order.	2

5.	**Unit 5: Pisces** • General characteristics and classification of Chondrichthyes and Osteichthyes. Accessory respiratory organ, • Swim bladder in fishes. • Lung fishes: Characteristics and their distribution.	**5**
6.	**Unit 6: Amphibia** • General characteristics and classification up to living Orders. • Metamorphosis in Amphibia. • Defence mechanism in Amphibia.	**4**
7.	**Unit 7: Reptilia** • General characteristics and classification up to living Orders. • Poison apparatus and Biting mechanism in Snake.	**5**
8.	**Unit 8: Aves** • General characteristics and classification up to Sub-Classes • Exoskeleton in Birds. • Principles and aerodynamics of flight.	**6**
9.	**Unit 9: Mammals** • General characters and classification up to living orders. Affinities of Prototheria. • Exoskeleton derivatives of mammals. Adaptive radiation in mammals with reference to locomotory appendages. Echolocation in Micro chiropterans and Cetaceans.	**7**
10.	**Unit 10: Zoogeography** • Zoogeographical realms, Plate tectonic and Continental drift theory, distribution of animals in different realms	**4**

Note: Classification from Protochordata, Agnatha, Reptilia, Aves and Mammalian to be Followed from Young (1981), for Pisces to be followed from Nelson, 2016, for Amphibia to be followed from Duellman and Trueb (1986)

Suggested Readings:

1. Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.
2. Pough H. Vertebrate life, VIII Edition, Pearson International.
3. Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub Co.
4. Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc.
5. Parker, T. J. &Haswell, W. (1972). Text Book of Zoology, Volume II: Marshall and Willam (Eds.) 7th Ed. Macmillan Press, London.
6. Kardong, K. V. (2002). Vertebrates: Comparative anatomy, function evolution. Tata McGraw Hill.
7. Kent, G. C. & Carr, R. K. (2001). Comparative anatomy of the Vertebrates. 9th Ed. McGraw Hill.
8. Nelson, J.S., (2006) : Fishes of the World, 4th Edn., Wiley.

Major 02P: CLASSIFICATION AND BIOLOGY OF CHORDATES Credits: 01

List of Practical:

9. Identification of the following animals

a. **Protochordata**
Balanoglossus, Branchiostoma

b. **Agnatha**
Petromyzon, Myxine

c. **Fishes**
Scoliodon, Torpedo, Heteropneustes, Labeo rohita, Labeo calbasu, Exocoetus, Echeneis, Flat fish

d. **Amphibia**
Necturus, Duttaphrynus, Hyla, Axolotl,

e. **Reptilia**
Chelone, Hemidactylus, Varanus,Chamaeleon, Russul's Vipera, Naja,Crocodylus.

f. **Mammalia**: Megachiroptera & Microchiroptera

g. **Aves**: Passer, Pycnonotus, Alcedo, Dinopium

10. Dissection of brain and pituitary of Rohu
11. Dissection of Urinogenital system of *Tilapia sp*
12. Pecten from Fowl head
13. IXth and Xth cranial nerve of *Chana* sp./Rohu

SEC 02P: Sericulture **Credits: 03**

SEC 02P: Sericulture **Credits: 02**

Course objectives and expected outcome

Understand concepts of sericulture industry and demonstrate interdisciplinary skills acquired in mulberry plant cultivation, silkworm rearing, diagnosis of diseases and pest of mulberry and silkworm and their prevention. The course will be useful for providing self-employment to the learner.

Course Contents:

Sl. No.	TOPICS	Allotted Lecture
1.	**Unit 1: Introduction** Sericulture: Definition, Types of silkworms, Distribution and Races, Exotic and indigenous races. Mulberry and non-mulberry Sericulture	4
2.	**Unit 2: Biology of Silkworm** Identification of Life cycle stages of *Bombyx mori* Dissection and mounting of silk gland	6
3.	**Unit 3: Rearing of Silkworms** Selection of mulberry variety and establishment of mulberry garden Rearing house and rearing appliances. Disinfectants: Formalin, bleaching powder, RKO Silkworm rearing technology: Early age and Late age rearing Types of mountages Spinning, harvesting and storage of cocoons	15
4.	**Unit 4: Identification of Pests and Disease management**	6

	Pests of silkworm: Uzi fly, dermestid beetles and vertebrates Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial Control and prevention of pests and diseases	
5.	**Unit 5: Entrepreneurship in Sericulture** Prospectus of Sericulture in India: Sericulture industry in different states, employment, potential in mulberry and non-mulberry sericulture.	**6**
6.	Visit to a sericulture farm and prepare a report.	**8**
Suggested Readings: ➢ Economic Zoology by G. S. Shukla & V. B. Upadhyay		

Minor 02: CONCEPT OF CLASSIFICATION, BIOLOGY OF NON-CHORDATES & CHORDATES **Credits 04**

Minor 02T- CONCEPT OF CLASSIFICATION, BIOLOGY OF NON-CHORDATES & CHORDATES **Credits 03**

Course objectives and expected outcome

This course provides an introduction to the basics of animal classification. It covers various phylum (major and minor) under non-chordates as per the hierarchy. The students will learn about their properties, identifying characters, specialized organ-systems, diversity and the basic scheme of classification. Therefore, this fundamental course of classical Zoology will be helpful for the students to be inclined more into the beauty Animal Kingdom.

Course Contents:

Sl. No.	TOPICS	Allotted Lecture
1.	**Unit1: Basics of Animal Classification** • Concept of classification, Six kingdom classification (Carl Woese)	2
2.	**Unit2:** Protozoa • General characteristics and Classification up to phylum (according to Levineet.al.,1981)	2
4.	**Unit4: Porifera** • General characteristics and Classification up to classes (Ruppert & Barnes, 1994); • Canal system in sponges	4
5.	**Unit5: Cnidaria** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994)	2
6.	**Unit6: Ctenophora** • General characteristics, Classification up to Classes. (Ruppert & Barnes, 1994)	2
7.	**Unit7: Platyhelminthes** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994)	2
8.	**Unit8: Nematoda** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994)	2

9.	**Unit8: Annelida** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994)	2
10.	**Unit 10**: **Arthropoda** • General characteristics and Classification up to classes. (Ruppert & Barnes, 1994).	2
12.	**Unit12: Mollusca** • General characteristics and Classification upto classes. (Ruppert & Barnes, 1994)	2
13.	**Unit 13: Echinodermata** General characteristics and Classification upto classes. (Ruppert & Barnes, 1994)	2
14.	**Unit14: Hemichordata** General characteristics of phylum Hemichordata. Relationship with non-chordates and chordates	2
15.	**Unit 15: Introduction to Chordates** General characteristics and outline classification of Phylum Chordata.	**2**
16.	**Unit 16 : Protochordata** General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes. Retrogressive metamorphosis in Ascidia.	**4**
17.	**Unit 17: Origin of Chordata** Advanced features of vertebrates over Protochordata.	**2**
18.	**Unit 18: Agnatha** General characteristics and classification of Cyclostomes up to order.	**2**
19.	**Unit 19: Pisces** General characteristics and classification of Chondrichthyes and Osteichthyes. Accessory respiratory organs	**4**
20.	**Unit 20: Other Chordates** General characteristics and classification up to living Orders of Amphibia, Reptilia, Aves and Mammalia	**5**

❖ Classification for metazoans to be followed from: Rupert and Barnes, 1994, 6thEdition.

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Suggested Readings:

- Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.
- Invertebrates by Brusca & Brusca. Second edition, 2002.
- The Invertebrates: A New Synthesis, III Edition, Blackwell Science

Minor 02P: CONCEPT OF CLASSIFICATION, BIOLOGY OF NON-CHORDATES & CHORDATES **Credits 01**

Course Contents:

1. Identification of *Amoeba, Euglena,*
2. Identification of *Obelia, Physalia, Tubipora*
3. Identification and significance of adult *Fasciola hepatica, Ascaris lumbricoides.*
4. Staining/ mounting of any protozoa/helminth isolated from the gut of cockroach.
5. Study of following specimens:

e. Annelids-*Aphrodite, Nereis, Pheretima, Hirudinaria*

f. Arthropods- *Palaemon, Eupagurus, Periplaneta*

g. Molluscs- *Chiton, Pila, Unio, Octopus*

h. Echinoderms- *Asterias*

7. Mounting of mouth parts and dissection of digestive system and nervous system of *Periplaneta*

8. Identification of the following animals
   a. Protochordata
      Balanoglossus
   b. Agnatha
      Petromyzon, Myxine
   c. Fishes
      Scoliodon, Labeo rohita, Labeo bata, Labeo calbasu,
      Amphibia
      Duttaphrynus, Hyla
   d. Reptilia
      Chelone, *Vipera, Naja, Crocodylus*.
   e. Mammalia: *Megachiroptera & Microchiroptera*
9. Dissection of brain and pituitary of *Rohu sp.*