Darrang College (Autonomous), Tezpur-784001

Syllabus for FYUGP

B.Sc. Zoology (Major)

Prerequisite

For Major in Zoology, a student must pass in Biology at XII level.

Approved by :

Board of Studies meeting held on 31-07-2025

&

Academic Council vide Resolution no. 04, dated- 12-08-2025

FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP) IN ZOOLOGY, Darrang College (Autonomous)

Introduction:

The Zoology syllabus at Darrang College (Autonomous) has been developed in accordance with the visionary framework of the National Education Policy (NEP) 2020, which advocates for a holistic, multidisciplinary and adaptable education system grounded in Indian values and aimed at cultivating globally competent individuals.

This curriculum is designed to equip students with a solid understanding of the principles and applications of Zoology, while encouraging scientific thinking, critical analysis, creativity and problem-solving skills. In line with NEP 2020, it incorporates flexible entry and exit points, skill-based learning, interdisciplinary connections and continuous formative assessments.

The programme follows a learner-centric structure that integrates core theoretical concepts, hands-on laboratory training, environmental and ethical awareness, and the enhancement of communication and research capabilities. It ensures students not only acquire zoological knowledge but also learn to apply it responsibly in real-life situations, thereby supporting sustainable development and societal well-being.

Darrang College (Autonomous) remains committed to academic excellence, innovation and contributing to nation-building by preparing students to tackle the scientific and technological demands of the modern world.

The Four-Year Undergraduate Programme (FYUGP) in Zoology is crafted to foster comprehensive and in-depth understanding of biological sciences, while encouraging interdisciplinary engagement, research orientation and employability. It aims to develop students' foundational knowledge, technical proficiency and ethical consciousness, preparing them for roles in academia, industry and society.

Aims of the Four-Year Undergraduate Programme (FYUGP) in Zoology:

The FYUGP in Zoology is designed with the following core objectives:

1. To build a solid foundation in the fundamental principles of Zoology and their applications across various branches, including Cell and Molecular Biology, Animal Physiology, Biochemistry, Fish Biology and Fishery Science, Animal Ecology, Wildlife Biology, Immunology, Entomology and Animal Biotechnology.
2. To cultivate critical thinking, scientific reasoning and analytical abilities, enabling students to address scientific challenges with both creativity and systematic approaches.
3. To promote hands-on learning through laboratory experiments, fieldwork and research activities, fostering innovation, curiosity and practical competence.
4. To encourage interdisciplinary learning and curricular flexibility, in line with NEP 2020, by facilitating connections between Zoology and other disciplines such as Botany, Biotechnology, Physics, Chemistry, Environmental Science, Materials science and computational fields.
5. To strengthen communication abilities and ethical awareness, empowering students to share scientific knowledge effectively and apply it responsibly for societal and environmental benefit.
6. To prepare students for a variety of career opportunities—including higher education, research, teaching, industry, entrepreneurship and public service—through skill-based training and value-added courses.
7. To nurture a mindset of lifelong learning and intellectual curiosity aligned with the broader goal of developing capable, compassionate and self-reliant individuals who can contribute meaningfully to national and global progress.

Through these aims, the FYUGP in Zoology at Darrang College seeks to develop graduates who are not only proficient in the Zoology, but also engaged citizens dedicated to sustainable and inclusive development.

Programme Outcome (PO) of (FYUGP) in Zoology:

- **PO1**- Students gain knowledge and skills in the fundamentals of animal sciences and are able to analyze the complex interactions among various animals across different phyla, their distribution and their relationships with the environment.

- **PO2**- Apply knowledge of the internal structure and functions of the cell in regulating various metabolic processes, along with its molecular aspects and understand key concepts of genetics and their significance in human health.

- **PO3**- Demonstrates an understanding of complex evolutionary processes and animal behaviour, along with the principles of environmental conservation, pollution control, biodiversity and the protection of endangered species, while fostering empathy and compassion toward animals.

- **PO4**-Correlates the physiological processes of animals and relationship of organ systems.

- **PO5**- Gain knowledge of small-scale industries such as sericulture, fish farming, beekeeping, aquaculture, animal husbandry and poultry farming, while promoting practical competencies through field visits and hands-on training in operational vermicomposting units; empower students with vocational skills in vermitechnology and organic agriculture to enhance employability and entrepreneurial potential.

- **PO6**- Apply ethical principles and establish a commitment to professional responsibilities and encourage awareness of laboratory ethics and safety standards to prepare students for advanced research environments.

- **PO7**- Apply zoological knowledge and understanding to personal and professional contexts, contributing to national initiatives such as Swachh Bharat, sustainable agriculture and Atmanirbhar Bharat through skill-based biological education.

Teaching-Learning Process:

The Four-Year Undergraduate Programme (FYUGP) in Zoology adopts a diverse range of pedagogical methods to enhance student engagement and understanding, both in classroom settings and laboratory environments. These include:

- Traditional lectures
- Tutorials for concept clarification
- PowerPoint presentations for visual learning
- Project work and dissertations to encourage independent research
- Participation in seminars, workshops, and conferences for academic exposure
- Industry visits and field trips to connect theoretical knowledge with real-world applications

Teaching-Learning Tools:

To support effective delivery of the curriculum, a variety of instructional tools are utilized:

- Whiteboard/Green board/Blackboard
- LCD projectors and monitors
- Smart boards for interactive teaching
- Demonstration models
- Laboratory experiments to reinforce practical learning
- Industry and field visits for experiential learning

Assessment Methods:

Student progress is continuously evaluated through a combination of formative and summative assessment techniques, including:

- Home assignments
- Reports based on projects, industry visits, or fieldwork
- Seminar presentations to develop communication skills
- In-semester/Sessional examinations (both theory and practical)
- End-semester examinations (theory and practical)

CURRICULUM COMPONENTS

Distribution of Credits in first 3 years

Serial No.	Type	Credit
1	Major (15 x 4)	60
2	Minor (6 x 4)	24
3	AEC (4+4)	08
4	SEC (3+3+3)	09
5	MDC (3+3+3)	09
6	VAC (2+2+2)	06
7	Internship	04
	Total	120

1 CREDIT = 15 hours (one hour of classroom instruction per week)

B.Sc. Course distribution for first year

Semester-1			Semester-2		
Type	Course	Credit	Type	Course	Credit
Major	Major-1	4	Major	Major-2	4
Minor	Minor-1	4	Minor	Minor-2	4
SEC	SEC-1 (Major oriented) *	3	SEC	SEC-2 (Major oriented) *	3
AEC	AEC-1 (Languages/Alt. English)	4	AEC	AEC-2 (English Communication)	4
MDC	MDC-1	3	MDC	MDC-2	3
VAC	VAC-1	2	VAC	VAC-2	2
	Total	20		Total	20

NEP-FYUGP Course Distribution for Honours in Zoology

Year	Semester	Course Title	Paper Code	Credit
Year 01	1st Semester	Zoology-1	ZOO-MJ-01014 (Level-100)	4
		Zoology-1	ZOO-MN-01014 (Level-100)	4
		SEC-1	ZOO-SEC-01023 (Level-100)	3
	2nd Semester	Zoology-2	ZOO-MJ-02014 (Level-100)	4
		Zoology-2	ZOO-MN-02014 (Level-100)	4
		SEC-2	ZOO-SEC-02023 (Level-100)	3

Major discipline:

Major subject is the main focus and the degree will be awarded in that discipline. Students should secure the prescribed number of credits (about 50% of total credits) through the core courses in major discipline.

Awarding UG Certificate and UG Diploma:

UG Certificate: Students who opt to exit after completion of the first year and have secured 40 credits will be awarded a UG Certificate . In addition, they have to complete one vocational course of 4 credits during summer vacation of the first year. These students are allowed to re-enter the degree programme within three years and complete the degree programme within the stipulated maximum period of seven years.

UG Diploma: Students who opt to exit after completion of the second year and have secured 80 credits will be awarded a UG Diploma, if , in addition , they complete one vocational course of 4 credits during the summer vacation of the second year. These students are allowed to re-enter

within a period of three years and complete the degree programme within a period of seven years.

FYUGP in Zoology
Detailed Syllabus of 1st Semester Major

Title of the Course	**Zoology –I/ DIVERSITY OF NON-CHORDATES -MAJOR**
Paper Code	**ZOO-MJ-01014**
Teaching method	**L-T-P**
Total Credits	**04 (Theory: 03, Practical: 01)**
Distribution of Marks	45 (End Semester Theory) + 25 (End Semester Practical) + 30 (Internal) [Sessional Exam: 15 marks, Home Assignment: 6 marks, Class Test/ Group discussion/ Seminar presentation: 5 marks, Attendance: 4 marks]
Course Outcomes	By the end of this course/module, students will be able to: • CO1. Learn about the importance of systematics, taxonomy and structural organization of animals. • CO2. Describe general taxonomic rules on animal classification. • CO3. Classify Phylum Protozoa to Echinodermata with taxonomic keys. • CO4. Critically analyze the organization, complexity and characteristic features of non-chordates making them familiarize with the morphology and anatomy of representatives of various animal phyla. • CO5. Imparts conceptual knowledge of non-chordates, their adaptations and associations in relation to their environment.
Contact hours	**45 (Theory) + 30 (Practical)**

DIVERSITY OF NON-CHORDATES
Code: ZOO-MJ-01014
Credit: 3 (T) + 1 (P)

THEORY **Credit- 3/ Hours- 45**

UNIT	CONTENT	HOURS
Unit 1	• Basis of Classification- Levels of organization (cellular, tissue, organ and organ system), symmetry, body wall, coelom types and its definition, segmentation and notochord. • Phylum Protista- General Characteristics, classification upto class; locomotion, nutrition and reproduction in Protozoa.	7
Unit 2	• Phylum Porifera- General Characteristics, classification upto class; Canal system in Porifera; Spicules in Sponges. • Phylum Cnidaria- General Characteristics, classification upto class; Corals and coral reef formation. • Phylum Ctenophora- General Characteristics, classification upto class	7
Unit 3	• Phylum Platyhelminthes- General Characteristics, classification upto class; Life cycle of *Fasciola hepatica* and *Wuchereria bancrofti*, Parasitic adaptation. • Phylum Nemathelminthes- General Characteristics, classification upto class; Life cycle of *Ascaris lumbricoides.* • Phylum Annelida- General Characteristics, classification upto class; Metamerism and excretion in Annelida	14
Unit 4	Phylum Arthropoda- General Characteristics, classification upto class; Vision and respiration in Arthropoda; Evolutionary significance of Onychophora.	7
Unit 5	Phylum Mollusca- General Characteristics, classification upto class; Torsion and Detorsion in Gastropoda.	5
Unit 6	Phylum Echinodermata- General Characteristics, classification upto class; Water Vascular System in Echinodermata.	5

PRACTICALS	Hours
1. Study of minimum of four representative (specimen/slide/model) of each phylum of non-chordates. 2. Study of larval forms of Arthropoda. 3. T.S through crop and gizzard of Leech; Pharynx, gizzard and typhlosolar intestine of earthworm. 4. Dissection and display of digestive and nervous system of nervous system of cockroach. 5. To prepare an album of GPS photographs of at least ten locally available invertebrate species.	30

Suggested Readings:

1. Ruppert, E.E. and Barnes, R.D. (2006). Invertebrate Zoology, 8th Edition. Holt Saunders International Edition.
2. Pechenik, J. (2015). Biology of the Invertebrates. 7th Edition, McGraw Hill
3. Schierwater, B. & DeSalle, R. (2021). Invertebrate Zoology: A Tree of Life Approach. 1st edition, CRC Press
4. Jordan, K. and P. S. Verma (2019). Invertebrate Zoology, S. Chand and Co. Ltd.
5. Kotpal, R. L. (2020). Modern text book of Zoology, Invertebrates, 12th Edition, Rastogi Publications.

Unit	Content	Lecture	Tutorial	Practical	Total hours
1	• Basis of Classification- Levels of organization (cellular, tissue, organ and organ system), symmetry, body wall, coelom types and its definition, segmentation and notochord. • Phylum Protista- General Characteristics, classification upto class; locomotion, nutrition and reproduction in Protozoa.	7	2	--	09
2	• Phylum Porifera- General Characteristics, classification upto class; Canal system in Porifera; Spicules in Sponges.	7	2	--	09

	• Phylum Cnidaria- General Characteristics, classification upto class; Corals and coral reef formation. • Phylum Ctenophora- General Characteristics, classification upto class				
3	• Phylum Platyhelminthes- General Characteristics, classification upto class; Life cycle of *Fasciola hepatica* and *Wuchereria bancrofti*, Parasitic adaptation. • Phylum Nemathelminthes- General Characteristics, classification upto class; Life cycle of *Ascaris lumbricoides.* • Phylum Annelida- General Characteristics, classification upto class; Metamerism and excretion in Annelida	**14**	**6**	**--**	**20**
4	• Phylum Arthropoda- General Characteristics, classification upto class; Vision and respiration in Arthropoda; Evolutionary significance of Onychophora.	**7**	**2**	**--**	**09**
5	• Phylum Mollusca- General Characteristics, classification upto class; Torsion and Detorsion in Gastropoda.	**5**	**2**	**--**	**07**
6	• Phylum Echinodermata- General Characteristics, classification upto class; Water Vascular System in Echinodermata.	**5**	**2**	**--**	**07**
7	**1.** Study of minimum of four representative (specimen/slide/model) of each phylum of non-chordates. **2.** Study of larval forms of Arthropoda. **3.** T.S through crop and gizzard of Leech; Pharynx, gizzard and typhlosolar intestine of earthworm. **4.** Dissection and display of digestive and nervous system of nervous system of cockroach. **5.** To prepare an album of GPS photographs of at least ten locally available invertebrate species.	**--**	**--**	**30**	**30**

FYUGP in Zoology
Detailed Syllabus of 2nd Semester Major

Title of the Course	Zoology –II/ DIVERSITY OF CHORDATES -MAJOR
Paper Code	**ZOO-MJ-02014**
Teaching Method	**L-T-P**
Total Credits	**4 (Theory: 03, Practical: 01)**
Distribution of Marks	**45 (End Semester Theory) + 25 (End Semester Practical) + 30 (Internal) [Sessional Exam: 15 marks, Home Assignment: 6 marks, Class Test/ Group discussion/ Seminar presentation: 5 marks, Attendance: 4 marks]**
Course Outcomes	By the end of this course/module, students will be able to: • CO1. Learn about the importance of systematics, taxonomy and structural organization of chordates. • CO2. Describe general taxonomic rules on chordate classification. • CO3. Classify Protochordates to Mammalia with taxonomic keys. • CO4. Critically analyze the organization, complexity and characteristic features of chordates making them familiarize with the morphology and anatomy of representatives of various chordates. • CO5. Imparts conceptual knowledge of chordates, their adaptations and associations in relation to their environment.
Contact hours	**45 (Theory) + 30 (Practical)**

DIVERSITY OF CHORDATES -MAJOR
Code: ZOO-MJ-02014
Credit: 3 (T) + 1 (P)

THEORY **Credit- 3/ Hours- 45**

UNIT	CONTENT	HOURS
Unit 1	• Origin of Chordates- Dipleurula concept and Echinoderm theory. General characteristics and outline classification of Chordates.	12

	• General characteristics of Hemichordata, Urochordata and Cephalochordata. Study of larval forms of protochordates- Tornaria, Ascidian tadpole larva and Amphioxus. Retrogressive Metamorphosis in Ascidia.	
Unit 2	• Advanced features of vertebrate over protochordate. Overview of axial and appendicular skeleton, Jaw suspensorium and visceral arches. • General characteristics and classification of cyclostomes upto class. Distinguishing features of Petromyzon and Myxine.	10
Unit 3	General characteristics of Chondrichthyes and Osteichthyes and classification upto order. Swim Bladder in Fishes. Migration in Fishes	5
Unit 4	• Origin of Tetrapoda • General characteristics and classification of Amphibia upto order; Parental care in Amphibia. • General characteristics and classification of Reptiles upto order. Biting mechanism in snakes.	8
Unit 5	General characteristics and classification of Aves upto order. Archaeopteryx as a connecting link; Aerodynamics of flight in Birds.	5
Unit 6	General characteristics and classification of Mammalia upto order. Affinities in Prototheria; Dentition in Mammals.	5

PRACTICALS (CREDIT- 1)	**Hours**
1. Study of museum specimens/ Models -Protochordata (*Balanoglossus, Herdmania, Amphioxus*), Agnatha (*Petromyzon, Myxine*), Fishes (*Scoliodon, Torpedo, Mystus, Heteropneustes, Labeo, Hippocampus, Tetraodon*), Amphibia (*Ichthyophis, Necturus, Bufo, Hyla*), Reptilia (*Chelone, Hemidactylus, Varanus, Chamaeleon, Bungarus, Naja*), Aves (Kingfisher , White breasted water hen, Red vented bulbul, Openbilled stork, Common maina, Pied maina, House Sparrow, Water heron, Common tit and Spotted dove), Mammalia (common primates- Lories, Rhesus Macaque), common ungulates- (Sambar Deer, Spotted Deer, Swamp Deer). 2. Identification key of venomous and non-venomous snakes. 3. To study the larval forms (Ascidian Tadpole, Tornaria, *Amphioxus*,	**30**

Ammocoete, *Axolotol* and Frog Tadpole larva through slides/ microphotographs.

4. To submit a project report on any five native Amphibia/ Reptilia/Aves/Mammal with GPS photographs.

Suggested Readings:

1. Young, J. Z. (2004). The Life of Vertebrates. 3rd Edition. Oxford University press.
2. Pough F. H. & Janis, C. M. (2018). Vertebrate Life. 10th Edition, Sinauer Associates
3. Verma, P. S. & Jordan, E. L. (2013). Chordate Zoology. 14th edition, S. Chand
4. Kotpal, R. L. (2019). Modern text book of zoology: Vertebrates (Z-3). 5th edition, Rastogi Publications.

Unit	Content	Lecture	Tutorial	Practical	Total hours
1	• Origin of Chordates- Dipleurula concept and Echinoderm theory. General characteristics and outline classification of Chordates. • General characteristics of Hemichordata, Urochordata and Cephalochordata. Study of larval forms of protochordates- Tornaria, Ascidian tadpole larva and Amphioxus. Retrogressive Metamorphosis in Ascidia.	12	04	--	16
2	• -- Advanced features of vertebrate over protochordate. Overview of axial and appendicular skeleton, Jaw suspensorium and visceral arches. • General characteristics and classification of cyclostomes upto class. Distinguishing features of Petromyzon and Myxine.	10	3	--	13
3	• General characteristics of Chondrichthyes and Osteichthyes and	5	2	--	07

	classification upto order. Swim Bladder in Fishes. Migration in Fishes				
4	• Origin of Tetrapoda • General characteristics and classification of Amphibia upto order; Parental care in Amphibia. • General characteristics and classification of Reptiles upto order. Biting mechanism in snakes.	**8**	**3**	**--**	**11**
5	• General characteristics and classification of Aves upto order. Archaeopteryx as a connecting link; Aerodynamics of flight in Birds.	**5**	**2**	**--**	**07**
6	• General characteristics and classification of Mammalia upto order. Affinities in Prototheria; Dentition in Mammals.	**5**	**2**	**--**	**07**
7	**1.** Study of minimum of four representative (specimen/slide/model) of each phylum of non-chordates. **2.** Study of larval forms of Arthropoda. **3.** T.S through crop and gizzard of Leech; Pharynx, gizzard and typhlosolar intestine of earthworm. **4.** Dissection and display of digestive and nervous system of nervous system of cockroach. **5.** To prepare an album of GPS photographs of at least ten locally available invertebrate species.	**--**	**--**	**30**	**30**