

DEPARTMENT OF ZOOLOGY
NORTH LAKHIMPUR COLLEGE
 (AUTONOMOUS)
UG SYLLABUS UNDER SEMESTER SYSTEM
ZOOLOGY ELECTIVE PROGRAMME

TOTAL CREDIT: 30

There shall be 12 (twelve) papers; 6 (six) each of theory and practical papers in zoology. The distribution of courses and marks will be as follows:

Semester-I Credit: 5

ET – 3 – Zoo – 101: Animal diversity-I, Systematics & Evolution Credit: 3

EP – 2 – Zoo – 102: Based on Paper - 101 Credit: 2

Semester-II Credit: 5

ET – 3 – Zoo – 201: Animal diversity-II and Developmental Biology Credit: 3

EP – 2 – Zoo – 202: Based on Paper 201 Credit: 2

Semester-III Credit: 5

ET – 3 – Zoo – 301: Cell Biology and Biochemistry Credit: 3

EP – 2 – Zoo – 302: Based on Paper 301 Credit: 2

Semester-IV Credit: 5

ET – 3 – Zoo – 401: Animal Physiology and Endocrinology Credit: 3

EP – 2 – Zoo – 402: Based on Paper 401 Credit: 2

Semester-V Credit: 5

ET – 3 – Zoo – 501: Genetics and Molecular Biology Credit: 5

EP – 2 – Zoo – 502: Based on Paper 501 Credit: 2

Semester-VI Credit: 5

ET – 3 – Zoo – 601: Animal Ecology and Biostatistics Credit: 5

EP – 2 – Zoo – 602: Based on Paper 601 Credit: 2

Grand Total=Semester (I+II+III+IV+V+VI) = Credit 30

NB: ELECTIVE PROGRAMME is the new nomenclature for the CORE COURSE of the recent

syllabus of the Dibrugarh University.

SEMESTER-I

ET – 3 – ZOO - 101

Animal diversity-I, Systematics & Evolution

Paper: 101

Credit: 3

L-2, T-1, P-0

Objective of the course: The main objective of this course is to introduce the students with diverse forms of invertebrate animals, their structural morphology of group level and classification; evolutionary lives and events.

Animal diversity-I (Non-Chordates)

Unit -1: Protozoa: General characters and classification up to class with examples Locomotion, nutrition and reproduction in protozoa. Life cycle of *Plasmodium* and *Entamoeba* 5 classes

Unit-2: Porifera and Coelentrata: General characters and classification up to class with examples
Canal system in porifera, corals and coral reefs in coelenterata. 5 classes

Unit -3: General characters and classification up to class with examples. Platyhelminthes and Nematelminthes: Life cycle of *Ascaris* and *Taenia*, parasitic adaptation. 7 classes

Unit-4: Annelida: General characters and classification up to class with examples Coelome and excretion in Annelida 5 classes

Unit -5: Arthropoda:- General characters and classification up to class with examples Mouth parts and legs in insects, metamorphosis in insects; crustacean larval forms, social life in honey bee. 7 classes

Unit-6: Mollusca: General characters and classification up to class with examples External morphology of Pila; respiration and economic importance of mollusca. 5 classes

Unit-7: Echinodermata:- General characters and classification up to class with examples External morphology, water vascular system and locomotion of starfish. 5 classes

Systematics & Evolution

Unit-1: Systematics- definition, classification and its hierarchy 5 class

Unit -2: Concept of evolution, evolutionary theories. 5 classes

Unit –3: Origin of life on earth. 3 classes

Unit –4: Variation, mutations, recombination, isolation and natural selection. 7 classes

Unit –5: Concept of species and speciation. 5 classes

EP – 2 – Zoo – 102

Practical - based on paper - 101

Paper: 102

Credit: 2

L-0,T-0,P-2

PRACTICAL

1. Dissection: Leech – Digestive, Excretory and reproductive systems,
Prawn – Nervous system;
Grasshopper/ cockroach– Nervous system, digestive system;
Pila – Digestive system.

2. Identification:

Trypanosoma, Leishmania, Entamoeba histolytica, Euglena, Noctiluca, Volvox, Grantia, Spongila, Gammules of sponge, Spicules of sponge, L.S. and T.S. of Sycon, Madrepora, Porpita, Vallela, Aurelia, Sea-anemone, Corallium, Pennatula, Aleyonium, Obelia colony with medusa, *Fasciola, Taenia, Ascaris*, Bladder-worm, Planaria, Scolex and Proglottid of Taenia, Nereis, Aphordite, Heteronereis, Limulus, Scorpion, Spider, Centipede, Millipede, Squilla, Lobster, Crab, Balanus, Lepas, Peripatus, Locust, Mantis, Beetle, Wasp, Termite, Chiton, Dentallium, Pecten, Pearl Oyster, Loligo, Sepia, one representative from Asteroidea, Holothuroidea and Ophiurioidea.

3. Preparation of permanent slides from suitable materials from invertebrate animals.

SCHEME OF THE PRACTICAL EXAMINATION

Time: 4 hrs.

1. Dissection (Non Chordates)
2. Preparation of permanent slides
3. Spotting including permanent slides
(Invertebrate materials)
4. Practical record book
5. Viva voce

Semester-II
Zoology Elective (General)
ET – 3 – Zoo - 201

Animal diversity-II (Chordates) and Developmental Biology

Paper: 201

Credit: 3

L-2, T-1, P-0

Objective of the course: The main objective of this course is to introduce the students with diverse forms of vertebrate animals and the major events of embryological aspects.

Animal diversity-II (Chordates)

Unit –1: General characters of chordates. 4 classes

Unit –2: Protochordates – Classification upto orders, interrelationships, structural organisation of

Balanoglossus and Ascidian, post-embryonic development of *Amphioxus*. 8 classes

Unit –3: Fishes: Classification up to orders, respiratory organs and migration. 6 classes

Unit –4: Amphibia: Classification up to orders, metamorphosis and parental care. 6 classes

Unit –5: Reptiles: Classification up to orders, extinct reptiles, poisonous snakes of India.

6 classes

Unit –6: Aves: Classification up to super-orders, beaks and claws, perching and flight mechanism, bird migration.

10 classes

Unit –7: Mammals –Classification up to orders, adaptation in mammals.

6 classes

Developmental Biology:

Unit –1: Gametogenesis – spermatogenesis and oogenesis, vitellogenesis, egg membranes.

6 classes

Unit –2: Fertilization –Mechanism of fertilization,; Parthenogenesis.

6 classes

Unit –3: Types of animal eggs; patterns of cleavage; germ layers, gastrulation and fate maps

6 classes

Unit –4: Extra embryonic membranes: types, structure and function of placenta.

4 classes

EP – 2 – Zoo –202
Zoology Elective (General)
Practical: based on Paper 201

Paper: 202**Credit: 2****L-0,T-0,P-2**

1. Dissection:

Scoliodon –Afferent and Efferent branchial system, internal ear.

Goroi fish – Digestive and Efferent branchial system

2. Identification:

Herdmania, Amphioxus, Doliolum, Salpa, Pristis, Chimera, Labeo, Catla, Puntius, Heteropneustes, Wallago, Cirrhinus, Exocoetus, Hippocampus, Hilsa, Electric ray, Protopterus, Lepidosiren, Ichthyophis, Cryptobranchus, Necturus, Ambystoma, Axolotol larva, Hyla, Chameleon, Gecko, Wall lizard, Flying lizard, Mabuiya, Varanus, Typhlops, Hydrophis, Banded Krait, Pit viper, Russel viper, Fowl Duck, Crow, Dove, Cuckoo, Myna, Owl, Parrot, House Sparrow, Vulture, Bulbul, Kite, Squirrel, Rat, Monkey, Hedgehog, Bat, Loris, Langur, Scaly ant-eater, Fox, Cat, Otter, Porcupine, Mouse.

3. Preparation of permanent slides from suitable materials from vertebrate animals.

4. Study of chick embryo development up to 72 hrs. by permanent slides.

SCHEME OF THE PRACTICAL EXAMINATION:**Time: 4 hrs.** 1. Dissection (Chordates)

2. Spotting/Identification including vertebrate slide
3. Preparation of permanent slides using suitable chordates material
4. Practical record book
5. Viva voce

SEMESTER-III

ET – 3 – Zoo - 301

Cell Biology and Biochemistry

Paper: 301

Credit: 3

L-2, T-1, P-0

Objective of the course: The main objective of this course is to introduce the students with structure and function of animal cell and biochemical aspects of macromolecules.

Cell Biology:

Unit –1: General structure and function of prokaryotic and eukaryotic cells. 8 classes

Unit –2: Structure and function of cell organelles (plasma, membrane, mitochondria, Golgi bodies; endoplasmic reticulum, nucleus, chromosomes). 10 classes

Unit –3: Cell cycle and cell division (mitosis & meiosis). 10 classes

Biochemistry:

Unit –1: Basic principles of biochemistry, acid, base, pH and buffer; Osmosis, diffusion and active transport. 10 classes

Unit –2: Classification, nature and function of enzymes; Vitamins their sources and functions.
8 classes

Unit –3: Types of carbohydrates, proteins, fats and nucleic acids. 8 classes

Unit –4: Biological oxidation, electron transport system, synthesis of ATP, glycolysis and Krebs cycle.
10 classes

SEMESTER-III

EP – 2 – Zoo –302

Practical - based on Paper- 301

Paper: 302

Credit: 2

L-0,T-0,P-2

1. Study of mitosis and meiosis with the help of permanent slides.
2. Preparation of slide for the study of mitosis and meiosis with suitable materials.
3. Preparation of normal and molar solution
4. Qualitative test of carbohydrate, protein and fat.
5. Qualitative test of salivary amylase.

Scheme of the practical examination

Time: 4 hrs

1. Cell Biology Experiment
2. Biochemical Experiment-I

3. Biochemical Experiment-II
4. Spotting
5. Practical record book
6. Viva voce

SEMESTER- IV
ZOOLOGY (Elective)
ET – 3 – Zoo - 401

Animal Physiology and Endocrinology

Paper: 401

Credit: 3

Total Marks :60

L-2, T-1, P-0

Zoology –VII (Th) Animal Physiology and Endocrinology

Objective of the course: The main objective of this course is to introduce the students with the major events of animal physiology and endocrinology.

Animal Physiology

Unit –1: Digestion and absorption of carbohydrate, proteins and fats; balanced diet. 7 classes

Unit –2: Physiology of respiration and excretion in mammals. 7 classes

Unit –3: Constituents of blood ; blood groups and Rh factor,

7 classes

Unit –4: Neurons and conduction of nerve impulse.	7 classes
Unit –5: Drug addiction and its impact on society.	5 classes
Endocrinology	
Unit –1: A brief outline of the organization of endocrine system in mammals; anatomy of pituitary, thyroid, pancreas and adrenal gland	10 classes
Unit –2: General character of hormones, feedback mechanism.	6 classes
Unit-3: Functions of hormones of pituitary, thyroid, pancreas and adrenal.	8 classes
Unit –4: Neuroendocrine system in insects.	7 classes

**SEMESTER- IV
ZOOLOGY (Elective)
EP – 2 – ZOO –402**

**Paper: 402 Practical - Based on paper - 401
Credit: 2 Total Marks :40 L-0,T-0,P-2**

Practicals

1. Preparation of haemin crystals.
2. R.B.C. and W.B.C. counting by haemocytometer.
3. Kymographic recording of heart beat.
4. Display pituitary and thyroid gland of frog/toad.
5. Study of permanent slides of endocrine glands

Scheme of the practical examination

Time: 4 hrs.

1. Physiological Experiment
2. Endocrinological Experiment
3. Spotting/Identification
4. Preparation of slide
4. Practical record book
5. Viva voce

SEMESTER-V

ET – 5 – Zoo - 501

Genetics and Molecular Biology

Paper: 501

Credit: 3

L-2, T-1, P-0

Objective of the course: The main objective of this course is to introduce the students with the structure, function and transmission of genetic materials from generation to generation and the basic concepts of molecular biology.

Genetics

Unit –1: Principles of heredity; linkage and crossing over; non-chromosomal inheritance. 12 class

Unit –2: Concept of gene, sex chromosome and sex determination; 10class hours

Unit-3: Mutation and mutagenesis. 10 class hours

Molecular Biology

Unit-1: Nucleic acids, DNA as genetic material, structure of DNA, types of RNA 10 class hours

Unit-2: Genetic code, concept of central dogma, basic steps of translation 12 class hours

Unit-3: Cloning and genetic engineering. 10 class hours

EP – 2 – Zoo –502

Practical - based on Paper 501

Paper: 502

Credit: 2

L-0,T-0,P-2

1. Mendelian problems
2. Ball and stick model for nucleotides
3. Theoretical problems in molecular biology
4. Preparation of slides for study of meiosis using suitable material

SCHEME OF THE PRACTICAL EXAMINATION:**Time: 4 hrs.**

1. Mendelian problems
2. Ball and stick model for nucleotides
3. Theoretical problems in molecular biology
4. Preparation of slides for study of meiosis
5. Practical record book
6. Viva voce

SEMESTER- VI**ET – 5 – Zoo - 601****Animal Ecology and Biostatistics****Paper: 601****Credit: 3****L-2, T-1, P-0**

Objective of the course: The main objective of this course is to introduce the students with the structural and functional aspects of animal communities with respect to their environment and the basic concepts of application of statistics in biology.

Animal Ecology

Unit –1: Basic concept of ecosystem; Brief account of abiotic and biotic factors in grassland and aquatic ecosystem 8 classes

Unit-2: Energy flow in an ecosystem, trophic level, food chain and food web. 8 classes

Unit-3: Environmental pollution; Types, sources, causes control and prevention of air and water pollution; biogeochemical cycles (Carbon and Nitrogen) green house effect, Ozone layer depletion and its impact 13classes

Unit-4: Basic concept of wildlife and wildlife habitat, forest types of NE India, endangered fauna of NE India and its conservation. 12 classes

Biostatistics

Unit –1: Sampling of data; graphic presentation of data; histogram, bar diagram and oogive. 12 classes

Unit –2: Mean, median, and mode; Mean deviation and standard deviation. 5 classes

Unit –3: Significance test (Chi-square, students't-test, F-test). 6 classes

EP – 2 – Zoo –602

Practical -based on paper 601

Paper: 602

Credit: 2

L-0,T-0,P-2

1. To find out the abundance and density of soil fauna by quadrate method.
2. Biotic components of a grassland/pond ecosystem and make probable food chain and food web.

3. Simple biostatistical calculation involving mean, median, mode and standard deviation.

SCHEME OF THE PRACTICAL EXAMINATION:

Time: 4 hrs.

1. Ecological Experiment-I
2. Ecological Experiment-II
3. Biostatistical calculation
4. Practical record book
5. Viva voce

BOOKS RECOMMENDED:

A Text book of invertebrate Zoology: S.N. Prasad, Kitab Mahal, Allahabad, 1977.

A Manual of Zoology Part I: B. Ayyar.

Text Book of Zoology Vol. I: A. J. Marshall , S.W.D. Williams.

Fundamentals of Ecology: B.P. Odum., W.R. Saunders, Toflan co. Tokyo, 1971.

Biological Chemistry: H.F. Mahler & B.H. Cords Gapper & Raw, N.Y. 1971.

Cell Biology: B.D. Roberts, W. Newinski & F. Sacz, W.B. Saunders Co. London, 1975.

Cell Physiology: A.C. Giese, Boxwood, 1975.

Principle of Genetics: B.J.Gardener, John Willey N.Y. 1972. .

Genetics: A.M. Winestler, Oxford & IBH, Calcutta 1971.

Introduction of Evolution: P.A. Mody, Harper & Raw, N.Y. 1964.

Evolution, Process & Products: B.O. Dedson, Rginhold Publication, C.N.Y.

Organic Evolution: R.S. Lull, Revised Indian Edn. By Light & Life Publishers, New Delhi, 1976.

Chordate Zoology: S.N. Prasad, Kitab Mahal, Allahabad.

A Manual of Zoology Part II: B. Ayyar.

Text Book of Zoology: T. J. Parker and B.A. Haswell.

Vol. II Vertebrates: English Language Book Society, Madras, Feb. Edn. 1974.

Text Book of Physiology: B.K. Annand and S.K. Manchand, TATA McGraw Hill, New Delhi, 1976.

General Endocrinology: C.D. Turner and J.I. Bangara, W.B. Saunders Co. 1971.

An Introduction to Embryology: B.I. Balinsky, W.B. Saunders Co. 1976.

Histology: Bailey.

Prani Bigyan: Dibrugarh University.

Biochemistry: K. Trehan, Wiley Eastern Ltd. New Delhi.

Statistical Method in Biology: N.T.J. Bailey, REBS Publishers, New Delhi.

Text Book of Vertebrate and Invertebrates: P.L. Ketpal.