

Jan Nayak Chandrashekhar Vishwa vidyalaya, Ballia

Three Years Degree Course Syllabus for

ZOOLOGY

(BASED ON UNIFORM SYLLABUS FOR U.P. STATE UNIVERSITIES)

B.Sc. (FIRST YEAR)

	Max. Marks
PAPER I Lower Non Chordata (Protozoa- Helminths)	50
PAPER II Higher Non Chordata (Annelida- Echinodermata)	50
PAPER III Cell Biology and Genetics	50
PRACTICAL Examination (Based on theory papers)	50
TOTAL	200

Note: Duration of Theory Paper is of Three hours and duration of practical is of Four hours.

There will be three written papers and one practical examination. Question No. 1 in each class will be compulsory & comprehensive based on units I to IV and of short Answer type. This will carry 40% of total marks (i.e. 20 marks in I & II year and 30 marks in III year). There will be two questions from each unit carrying 60% of the marks, of which one question from each unit has to be attempted.

B.Sc. – I Zoology (Paper-I)

Lower Non Chordata (Protozoa to Helminths)

M.M. 50

The habits, morphology, physiology, reproduction, development (in outline) and classification of the following groups of animals including a detailed study of the types given in each:

Unit-I

Protozoa - Euglena, Monocystis and Paramecium.

Unit-II

Porifera - Sycon

Unit-III

Coelenterata - Obelia and Aurelia

Ctenophora - Salient features

Unit-IV

Platyhelminthes - Fasciola (liver fluke) and Taenia (tape worm)

Nematehelminthes - Ancylostoma (hook worm)

Suggested Books: Invertebrates- RL Kotpal, Non chordates- E L Jordan, Biology of non chordates- HC Nigam;

B.Sc. – I Zoology (Paper-II)

Higher Non Chordata (Annelida to Echinodermata)

MM : 50

The habits, morphology, physiology, reproduction, development (in outline) and classification of the following groups of animals including a detailed study of the types given in each:

Unit-I

Annelida - Nereis

Unit-II

Arthropoda - Palaemon (prawn)

Unit-III

Mollusca -Pila (apple-snail)

Unit-IV

Echinodermata -Pentaceros (excluding development)

Suggested Books: Invertebrates- RL Kotpal; Non chordates- E L Jordan, Biology of non chordates- HC Nigam;

B.Sc. – I Zoology (Paper-III)

Cell Biology & Genetics

MM: 50

Unit-I

Cell Biology I: Structure of cell, Ultra structure and function of Plasma membrane . Structure and function of cell organelles with special emphasis on mitochondria, Golgi body, ribosome and endoplasmic reticulum.

Unit-II

Cell Biology II: Structure and function of Nucleus and Chromosomes, Cell cycle and Cell division- mitosis and meiosis.

Unit III

Genetics-I: Mendel's principles of heredity , monohybrid cross, dihybrid cross, back cross and test cross, Co-dominance, Incomplete dominance, Multiple Alleles, Blood group inheritance. Linkage and crossing over,

Unit-IV

Genetics II: Sex determination, Sex-linked characters, Genetic diseases and abnormalities, Chromosomal aberrations, Eugenics.

Suggested Books : Cell Biology and Genetics, P S Verma, Genetics, P K Gupta

B.Sc. – I Zoology (Distribution of Marks for Practical Examination)

1. Dissection (Major)	10 marks
2. Mounting/Preparation	05 Marks
3. Cytology & Genetics Preparation/Prepared slides	05 Marks
4. Identify and Comment upon spots (1-10)	20 Marks
5. Viva-Voce	05 Marks
6- Practical class record	05 Marks
Total	50 Marks

B.Sc. – I (ZOOLOGY) PRACTICAL SYLLABUS

1. Dissection- Nervous system of *Pila*, *Unio* and *Prawn*

2. Mounting/Preparation- Obelia colony, gemmule, spicules of sponges, Nereis parapodia, Unio gill, Radula of Pila, Statocysts of Prawn

3.Cytology and Genetics Preparation- Study of prepared slides of Cell division, Preparation of onion root tip for stages of mitosis.

4. Specimen and slide study- Protozoa- Echinodermata

Suggested Books: Practical Invertebrates, S S Lal; Practical Invertebrates, P S Verma

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ZOOLOGY

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B.Sc. (SECOND YEAR)

Max. Marks

PAPER I	Chordata	50
PAPER II	Animal distribution, Evolution and Developmental Biology	50
PAPER III	Physiology and Biochemistry	50
PRACTICAL EXAMINATION	(Based on Theory Papers)	50
TOTAL		200

There will be three written papers and one practical examination.

Question No. 1 in each class will be compulsory & comprehensive based on units I to IV and of short Answer type. This will carry 40% of total marks (i.e. 20 marks in I & II year and 30 marks in III year).

There will be two questions from each unit carrying 60% of the marks, of which one question from each unit has to be attempted.

B.Sc. – II Zoology (Paper-I)

Chordata

MM : 50

Unit- I

General characters and classification of chordates

Cephalochordata: Classification and detailed study (habit, morphology, anatomy and physiology) of Branchiostoma (Amphioxus).

Unit –II

Urochordata: Classification and detailed study (habit, morphology, anatomy, physiology and post embryonic development) of *Herdmania*

Unit-III

Classification of three classes of vertebrates- **Pisces, Amphibia and Reptilia**, up to order with characters and examples. Poisonous and non poisonous snakes, biting mechanism of snakes. Neoteny

Unit-IV

Classification of different classes of vertebrates (**Aves and Mammalia**) up to order with characters and examples. Dentition in mammals.

Suggested Book: Vertebrates, R L Kotpal; Chordates, E L Jordan; Biology of Chordates, HC Nigam

B.Sc. – II Zoology (Paper-II)

Animal distribution, Evolution and Developmental Biology

MM: 50

Unit-I

Animal distribution: Geological and geographical distribution with their characteristic fauna; fossils.

Unit-II

Origin of Life, concept of species (classical & modern concept)

Evolution: Evidences of evolution; Theories of evolution (including Neo-Lamarckism, Darwin-Wallace theory of natural selection, Neo-Darwinism, Modern Synthetic theory). Evolution of Man.

Unit-III

Developmental Biology I: Aims and scope of Developmental Biology. Gametogenesis, Fertilization, Egg: structure and types. Types & patterns of cleavage

Unit-IV

Developmental Biology II: Process of Blastulation & Gastrulation. Fate Map. Development of Chick up to formation of Primitive streak . Extra embryonic membranes of chick. Placentation and types of Placenta.

Suggested Books : Animal distribution, evolution and developmental biology, Sastry and Nigam; Chordate Embryology , P S Verma;

B.Sc. – II Zoology (Paper-III)

Physiology and Biochemistry MM: 50

General physiology (in outline) with special reference to mammals

Unit-I

Physiology of digestion, respiration, and blood and circulation

Unit-II

Physiology of excretion and osmoregulation, neural transmission, muscles

Unit-III

Physiology of endocrine system, thermoregulation

Unit-IV

General chemistry and classification of carbohydrates, lipids and proteins; Enzymes

Suggested Books: Animal Physiology and Biochemistry, KV Sastry and HC Nigam; Animal Physiology and Biochemistry, Srivastava and Agrawal

B.Sc. – II Zoology (Distribution of Marks for Practical Examination)

1- Dissection (Major)	10 Marks
2- Permanent Mount/Preparation	05 Marks
3- Physiology experiment	05 Marks
4- Identify and Comment upon spots (1-10)	20 Marks
5. Viva-Voce	05 Marks
8- Practical class record /collection/chart	05 Marks
Total	50 Marks

B.Sc. – II (ZOOLOGY) PRACTICAL SYLLABUS

1. Dissection major- Cranial nerves of Scoliodon, frog

2. Permanent mount/preparation- (i) Striped or unstriped muscles (ii) Chromatophores (iii) Placoid scales (iv) blood film

3. Physiology experiments-

(i) Estimation of Haemoglobin

(ii) Suitable preparation of Haemin crystals from the blood

(iii) Detection of Sugar /albumin from urine sample

4. Specimen and slide study- Protochordata – Mammalia, Developmental stages of chick embryo

Suggested Books : Practical Vertebrates, S S Lal, Practical vertebrates, P S Verma

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B.Sc. (THIRD YEAR)

Max. Marks

PAPER I	Applied and Economic Zoology	75
PAPER II	Molecular Biology, Immunology , Biological Tools & Techniques and Biostatistics	75
PAPER III	Ecology, Microbiology, Animal Behavior, Pollution And Toxicology	75
PRACTICAL EXAMINATION	(Based on Theory Papers)	75
TOTAL		300

Note: There will be three written papers and one practical examination.

Question No. 1 in each class will be compulsory & comprehensive based on units I to IV and of short Answer type. This will carry 40% of total marks (i.e. 20 marks in I & II year and 30 marks in III year).

There will be two questions from each unit carrying 60% of the marks, of which one question from each unit has to be attempted.

B.Sc. – III Zoology (Paper-I)

Applied and Economic Zoology

MM: 75

Unit I

Biotechnology : Genetic Engineering (concept and recombinant DNA technology) and its

application in agriculture & medical areas Biotechnology of food processing, pharmaceuticals (e.g. use of microbes in insulin production) and fermentation.

Unit-I I

Pests and Parasites

- (a) Biology and control of Gundhi bug and termite
- (b) Life cycle, pathogenicity and control of *Trypanosoma*, *Giardia* and *Wuchereria*,

Unit-III

Animal Breeding and Culture

Pisciculture, Sericulture, Apiculture, Pearl culture

Unit-IV

Wild Life of India: Endangered species. Important sanctuaries; national parks of India; in-situ and ex-situ conservation of wild life.

Suggested Books: Economic Zoology, Shukla and Upadhyaya; Biotechnology, B D Singh;

B.Sc. – III Zoology (Paper-II)

Molecular Biology, Immunology, Biological Tools and Techniques and Biostatistics MM: 75

Unit-I

Molecular Biology: Double helix model of DNA, DNA replication, Types of RNA, Transcription and Translation

Unit-II

Immunology: Concepts of immunity, types of immunity, Antigen and Antibodies, vaccines of different diseases

Unit-III

Biological Tools and Techniques: Principles and uses of instruments: pH Meter, Colorimeter, Centrifuge. Principles and construction of light and Electron Microscope
Chromatography and Electrophoresis

Unit-IV

Biostatistics: Sampling, Measures of central tendency (mean, median and mode) and dispersion (variance, standard deviation and standard error)

Suggested Books: Biostatistics, Methods in Biostatistics, BK Mahajan; Molecular Biology, PK Gupta ; Essentials of Immunology, S K Gupta; Immunology , N Arumugan; Immunology and Microbiology, Arumugan, Mani, Narayanan;

B.Sc. – III Zoology (Paper-III)

Ecology, Microbiology Animal Behavior and Pollution and Toxicology MM: 75

Unit- I

Ecology: Ecosystem: Concept, components, energy flow, food-chain, food webs and trophic levels, ecological niche, abiotic and biotic factors; Concepts of Population; Ecological succession. Adaptation: Aquatic, terrestrial, aerial

Unit-II

Microbiology: Structure of bacteria and viruses. Bacterial and viral diseases.

Unit-III

Animal Behavior: Patterns of behavior (taxes, reflexes, instinct); Innate and learning behavior; Migration of fishes & birds.

Unit-IV

Pollution and Toxicology: Air, water, soil, and noise pollution and their control; Effects of toxicants, dose -response relationship, LC50, LD50

Suggested Books : Ecology, Odum; Microbiology, Gerard Tortora, Burdell Funke; Animal Behaviour, V K Agrawal; Textbook of Animal Behaviour, F B Mandal ; Toxicology, PD Sharma ; Ecology and Environmental Biology, K A Siddiqui

B.Sc. – III Zoology (Distribution of Marks for Practical Examination)

1- Dissection (Major)	15 Marks
2. Dissection (Minor)	05 Marks
3- Mounting	05 Marks
4. Identify and Comment upon Spots (1-10)	20 Marks
5- Economic Zoology	05 Marks
6. Biological Tools	05 Marks
7. Biostat/ Behaviour exercise	05 Marks
8. Ecology/Toxicology exercise	05 Marks
9.Viva voce	05 Marks
10. Practical Class record / Project / Collection	05 Marks
Total-	75 Marks

B.Sc. – III (ZOOLOGY) PRACTICAL SYLLABUS

1. Dissection (Major)- Cockroach (central nervous system, digestive system), Wallago (Afferent and efferent branchial vessels)

2. Dissection (Minor)- Mouth parts of cockroach, mosquitoes and house flies

3. Mounting- Wigs of cockroach, mosquitoes, and house flies; Nereis parapodia and larvae of Arthropods

4.Prepared slide/ Specimen study: Euglena, Paramecium , Opalina, Entamoeba, Giardia, Leishmania, Trypanosoma, Plasmodium, Fasciola, Taenia, Schistosoma, Echinococcus, Ascaris and Ancylostoma; Cimex (bed bug)/ Pediculus (Louse), , fresh water annelids, arthropods, Larval stages of helminths and arthropods.

5. Economic Zoology: Life history of silk worm and honey bee; Food fishes of India

6. Biological Tools- Haemoglobinometer, hemocytometer, pH meter, colorimeter, light microscope

7. Biostat / Animal Behaviour: Mean , median, mode of given biological data,; Geotaxis, phototaxis

8. Ecology and Toxicology-

(i). Ecological adaptations of certain animals- *Physalia*, *Sacculina*, *Echeinis*, Hammer headed fish, *Exocoetus*, *Hippocampus* male, *Rhacophorus*, *Draco*, *Chamaeleon*, Bat

(ii). Estimation of O₂ and CO₂ in sample water

(iii) Qualitative study of Plankton

(iv). Effects of a pesticide on fish

Suggested Books: Advanced Practical Zoology, P S Verma