

SYLLABUS FOR UG COURSE IN ZOOLOGY

B.Sc. FIRST SEMESTER

SESSION – 2013-14



SCHOOL OF BIOLOGICAL SCIENCES (SBS)

**DR. HARI SINGH GOUR UNIVERSITY
SAGAR (M.P.) 470 003**

UG COURSE- SESSION- 2013-14
B.Sc. FIRST SEMESTER, (CORE COURSE) IN ZOOLOGY
Course-1, Code - ZOO C 111

LIFE AND DIVERSITY OF INVERTEBRATE ANIMALS

L	T	P	C
2	0	0	2

Instructor: Prof. Janak Ahi

- Unit-I Classification of invertebrates upto classes
- Protozoa – Type study-*Plasmodium*, parasitic protozoans
- Unit-II Porifera – Type study-*Sycon*
- Coelenterata – Type study-*Obelia*, Polymorphism in Coelentrata,
Corals and coral reefs
- Unit-III Helminthes – Type study-Liverfluke, Helminth parasites
- Annelida – Type study-*Nereis*, Trochophore larva
- Unit-IV Arthropoda – Type study-Prawn
- Mollusca – Type study-Pila
- Unit-V Echinodermata – Type study-Sea star, Echinoderm larvae
- Hemichordata – Type study-Balanoglossus

6 hours/unit

UG COURSE, SESSION – 2013-14
B.Sc. FIRST SEMESTER (CORE COURSE) IN ZOOLOGY

Course-2 Code ZOO - C 112

LIFE AND DIVERSITY OF VERTEBRATE ANIMALS

L	T	P	C
2	0	0	2

Instructor: Dr. Varsha Sharma

- Unit-I Classification of chordates upto classes
- Poisonous and Non-poisonous snakes and biting mechanism.
Brief account of- Flight less Birds.
Egg laying mammals. Aquatic mammals.
- Unit-II Protochordates – Digestive, Respiratory and Reproductive systems of
Hirudinaria and Amphioxus
- Comparative account of Petromyzon and Myxine.
- Unit-III Comparative study in Vertebrates
- (i) Integumentary System
- (ii) Digestive System
- Unit-IV Comparative study in Vertebrates
- (i) Respiratory System
- (ii) Heart and Aortic arches
- Unit-V Comparative study in Vertebrates
- (i) Brain
- (ii) Urinogenital System
- (iii) Parental Care in Fishes and Amphibia

6 hours/unit

List of Recommended Books (All latest editions)

1. Hickman C.P. Jr., F.M. Hickman and L.S. Roberts, Integrated principles of Zoology, Mosby College Publication. St. Louis.
2. Ayyar, E.K. and T.N. Ananthakrishnan, Manual of Zoology, Vol.I (Invertebrata), Parts I & II. S. Vishwanathan (Printers and Publishers) Pvt. Ltd., Madras.
3. Ayyar, E.K. and T.N. Ananthakrishnan, Manual of Zoology, Vol.II (Chordata), S. Vishwanathan (Printers and Publishers) Pvt. Ltd., Madras.
4. Jordan, E.L. and P.S. Verma, Invertebrate Zoology, S. Chand & Co. Ltd., Ram Nagar, New Delhi.
5. Jordan, E.L. and P.S. Verma, Chordate Zoology and Elements of Animal Physiology, S. Chand & Co. Ltd., Ram Nagar, New Delhi.
6. Nigam, H.C., Zoology of Chordates, Vishal Publications, Jalandhar - 144008.
7. Parker and Haswell, Text Book of Zoology, Vol.I, (Invertebrata), A.Z.T.B.S. Publishers and Distributors, New Delhi - 110051.
8. Parker and Haswell, Text Book of Zoology, Vol.II (Chordata), A.Z.T.B.S. Publishers and Distributors, New Delhi - 110051.
9. Waterman, Allyn J. et.al., Chordate Structure and Function, Mac Millian & Co., New York.
10. Ismail, S.A., Vermicology: The Biology of Earthworms, Orient Longman, India.

UG COURSE SESSION – 2013-14
B.Sc. FIRST SEMESTER (CORE COURSE) IN ZOOLOGY
Course Code - ZOO C 113

PRACTICALS

L	T	P	C
0	0	6	2

List of Suggested Practicals

1. Study of Museum specimens and slides relevant to the types studied in theory
2. Dissection of Earthworm
3. Dissection of Prawn
4. Dissection of Scoliodon or any other fish
5. Setae of Earthworm
6. Appendages of Prawn
7. Salivary glands of Cockroach
8. Mouth parts of any 4 insects (Mosquito, Housefly, Bedbug, Plant bug, Cockroach and Honeybee)
9. Study of different types of skeletons. i.e. Amphibia, Reptilia, Aves and Mammals

SYLLABUS FOR UG COURSE IN ZOOLOGY

B.Sc. SECOND SEMESTER

SESSION, 2013-14



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U.G. COURSE, SESSION: 2013-14
B.Sc. SECOND SEMESTER, (CORE COURSE) IN ZOOLOGY
Paper Code - ZOO C 211

CELL BIOLOGY

L	T	P	C
2	0	0	2

Instructor: Prof. Janak Ahi

- Unit-I
1. Cell Structure: Prokaryotic and Eukaryotic cells.
 2. Structure and function of cell organelles:
 - (a) Cell membrane, mitochondria, ER
 - (b) Golgi bodies, Lysosomes, Ribosomes
- Unit-II
1. Structure and Function of nuclear membrane, Chromosomes
 2. Structure Of DNA and RNA
- Unit-III
1. Methods in Cell Biology: Instruments and principle in brief
Microscopy;(Light, simple and compound; Electron, TEM and SEM)
Centrifugation and spectrophotometry.
 2. Cell division: Amitosis, mitosis, endomitosis, meiosis and Cell cycle.
 3. Apoptosis
- Unit-IV
1. An elementary idea of cell transformation: Cancer
 2. An elementary idea of cellular basis of immunity
- Unit-V
1. Gametogenesis
 2. Fertilization, post fertilization events in brief

6 hours/unit

U.G. COURSE, SESSION: 2013-14
B.Sc. SECOND SEMESTER, (CORE COURSE) IN ZOOLOGY
Paper Code - ZOO C 212
DEVELOPMENTAL BIOLOGY

L	T	P	C
2	0	0	2

Instructor: Prof. Smita Banerjee

- Unit-I
1. Structure and types of eggs.
 2. Types and Pattern of Cleavage
 3. Development of Amphioxus
- Unit-II
1. Process of blastulation, types of blastula, construction of fate maps in Frog and Chick.
- Unit-III
1. Gastrulation in Frog and Chick up to the formation of three germinal layers.
 2. Post embryonic development in Frog.
- Unit-IV
1. Elementary knowledge of primary organizer.
 2. Elementary knowledge of extra embryonic membranes.
- Unit-V
1. Concept of competence, determination and differentiation

6 hours/unit

LIST OF RECOMMENDED BOOKS

1. Alberts, Bray, Lewis, Raff, Roberts & Watson, Molecular Biology of the Cell (Garland).
2. Balinsky, An Introduction to Embryology (CBS College Publishers)
3. Grant: Biology of Developing systems (Holt, Reinhart and Winston)
4. Gilbert: Developmental Biology (Sinauer)
5. Alberts, B., et al., Molecular Biology of the Cell (Garland)
6. Lodish, H., et al., Molecular Cell Biology (Freeman)

U.G. COURSE, SESSION : 2013-14
B.Sc. SECOND SEMESTER, (CORE COURSE) IN ZOOLOGY
Paper Code - ZOO C 213

L	T	P	C
0	0	6	2

LIST OF SUGGESTED PRACTICALS

1. Observation of live sperm in physiological saline using phase contrast optics.
2. Demonstration of use of fluorescence microscope (DNA, RNA Fluorescence) and familiarity with Cytophotometry.
3. Familiarity with Cytophotometry.
4. Familiarity of tissue culture (Visit to plant and animal tissue culture labs).
5. Exposure to gel electrophoresis through photographs or in research laboratory.
6. Preparation of polytene chromosomes in *Drosophila* larva.
7. Use of colchicine in arresting anaphase movement (onion root tips).
8. Metaphase chromosome preparations from cornea of mouse.
9. Meiosis in grasshopper testis.
10. Study of permanent slides to understand the following:
 - 10.1 Constitutive heterochromatin (C-bands)
 - 10.2 Semiconservative DNA replication (Brd U-labelling)
 - 10.3 Estimation of S phase cells in a random population (Autoradiography)
 - 10.4 Transcription in polytene chromosome puffs (Autoradiography).
11. Frog embryology:
 - 1.1 Collection of spawn

1.2 Identification of stages and preservation

1.3 Preparation of permanent/temporary slide of representative developmental stages.

12. Demonstration of early developmental stages of a freshwater snail (*Limnaea*).
13. Permanent preparation of whole mounts of chick embryo of
 - 13 to 18 hrs
 - 24 to 33 hrs
 - 36 to 48 hrs
 - 48 to 72 hrs
14. Window preparation and identification of stages of development in chick egg.
15. Study of development of frog and chick embryos from permanent slides.
 - 5.1 Slides of cleavage and tadpole larva of frog
 - 5.2 Slides of sections of chick embryo through
 - 5.2.1 Pharynx
 - 5.2.2 Heart
 - 5.2.3 Trunk

SYLLABUS FOR UG COURSE IN ZOOLOGY

B.Sc. THIRD SEMESTER

SESSION, 2013-14



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UG COURSE
B.Sc. III SEMESTER (CORE COURSE) IN ZOOLOGY
PAPER I, GENETICS
COURSE CODE ZOO C 311

L	T	P	C
2	0	0	2

Instructor: Prof. D.K Saraf

Unit – I

Chromosome – physical basis of heredity and transmitters of heredity
Types of chromosomes – lamp brush, salivary gland and Beta chromosome
Heredity and variations – Environmental Variations (elementary idea)
Nucleocytoplasmic interactions

Unit – II

Sources of variations – Genotype and Phenotype
Gene linkage: Theories of linkage, significance of linkage
Crossing over: Mechanism of genetic recombination
Linkage Maps

Unit – III

Sex chromosome system: chromosome theory & sex determination
Sex linked inheritance (Hemophilia, color blindness)
Types of mutations
Causes of mutations, mutagens, classification, types and effects

Unit – IV

Structural changes in chromosome
Numerical changes in chromosome
Human chromosome & maps
Common genetic disease in man – sickle cell anemia, albinism & alkaptonuria

Unit – V

Multiple factors & Blood groups
Twins, physical traits, mental traits
Cytoplasmic Inheritance – Maternal effects in Limnaea shell coiling
Carbon dioxide sensitivity in Drosophila & kappa particles in paramecium

6 hours/unit

UG COURSE
B.Sc. III SEMESTER (CORE COURSE) IN ZOOLOGY
PAPER II, GENETICS
COURSE CODE ZOO C 312

L	T	P	C
2	0	0	2

Instructor: Dr. Malvika Sikdar

Unit – I

Gene: Introduction and chemistry of gene
Nucleic acids: Structure of DNA and RNA
Concept of DNA replication

Unit – II

Gene expression – Regulation of protein synthesis, transcription in prokaryotes
Gene expression – Translation in prokaryote. Operon Model
Transcription and translation in Eukaryotes

Unit – III

Genetic code
Nucleosome concept (Solenoid Model)
Split genes, overlapping genes, pseudogenes

Unit – IV

Techniques used in recombinant DNA technology
Uses of vectors, linkers, adaptors and genetic library
Gene cloning and its significance

Unit – V

Polymerase chain reaction (PCR)
Gene therapy
DNA Fingerprinting

6 hours/unit

UG COURSE
B.Sc. III SEMESTER (CORE COURSE) IN ZOOLOGY
GENETICS PRACTICALS
COURSE CODE ZOO C 313

L	T	P	C
0	0	6	2

1. Identifications of spots related with theory.
2. Squash preparation of onion root tips, Chironomous salivary gland & grass hopper testis.
3. Demonstration of mitochondria in the cells of buccal epithelium.
4. Study of blood groups.
5. Problems on genetics.

Scheme of practical

1. Spotting (5 spots): 10
2. Squash preparation: 05
3. Blood groups: 05
4. Problems on genetics: 10
5. Viva voce: 10
6. Practical record & Collection: 10

TOTAL	50
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SYLLABUS FOR UG COURSE IN ZOOLOGY

B.Sc. FOURTH SEMESTER

SESSION, 2013-14



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UG COURSE
B.Sc. IV SEMESTER (CORE COURSE) IN ZOOLOGY
PAPER I, ANIMAL PHYSIOLOGY
COURSE CODE ZOO C 411

L	T	P	C
2	0	0	2

Instructor: Prof. D. K. Saraf

Unit – I

Physiology of Digestion
Hormonal control of digestion & Assimilation

Unit – II

Protein metabolism, Deamination, Transmethylation & Carboxylation
Carbohydrate metabolism: Glycolysis, Krebs cycle & Electron Transport Chain
Fat metabolism: β Oxidation

Unit – III

Types of respiration & respiratory organ in vertebrates
Mechanism of pulmonary respiration
Mechanism of Gill respiration

Unit – IV

Physiology of respiration, Factors effecting the Oxygen dissociation
Circulation of CO₂ & chloride shift mechanism

Unit – V

Osmoregulation
Types of excretory products & physiology of excretion
Thermoregulation

6 hours/unit

UG COURSE
B.Sc. IV SEMESTER (CORE COURSE) IN ZOOLOGY
PAPER II, ANIMAL PHYSIOLOGY
COURSE CODE ZOO C 412

L	T	P	C
2	0	0	2

Instructor: Dr. Malvika Sikdar

Unit – I

Definition, nomenclature and classification of enzymes
Properties of enzymes
Mechanism of enzyme action

Unit – II

Structure of nervous tissue
Properties of nervous tissue
Conduction of nerve impulse

Unit – III

Types of muscles and their properties
Ultra structure of muscle fiber
Theories of muscles contraction and its biochemistry

Unit – IV

Structure and function of thyroid and parathyroid gland
Structure and function of adrenal gland
Structure and function of thymus and islets of langerhans

Unit – V

Structure and function of pituitary gland
Physiology of male reproductive system in mammals
Physiology of female reproductive system in mammals

6 hours/unit

UG COURSE
B. Sc. IV SEMESTER (CORE COURSE) IN ZOOLOGY
ANIMAL PHYSIOLOGY PRACTICAL

COURSE CODE ZOO C 413

L	T	P	C
0	0	6	2

Histological study of various endocrine glands, digestive organs, testis, ovary, kidney, lung, muscles, pancreas and liver

Study of human salivary amylase activity in relation to pH. Concentration of substrate & amylase

pH determination by pH meter / pH paper

Use of Kymograph

Detection of protein, carbohydrate and lipid

Detection of nitrogenous waste products in fish tank water, frog tank water varied excreta, mammalian kidney

Oxygen consumption in fishes

Exercise on hematology – Counting of RBC & WBC in blood samples, estimation of hematocrit value, bleeding time, human blood groups.

Preparation of Haemin crystals

SYLLABUS FOR UG COURSE IN ZOOLOGY

B.Sc. FIFTH SEMESTER

SESSION, 2013-14



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UG COURSE
B. Sc. V SEMESTER (CORE COURSE) IN ZOOLOGY
PAPER I, APPLIED ZOOLOGY
COURSE CODE ZOO C 511

L	T	P	C
2	0	0	2

Instructor: Dr. Deepali Jat

Unit – I

Definition and scope of aquaculture
Prawn culture – culture of fresh water prawn
Methods of prawn fishing, preservation and processing of prawns

Unit – II

Pearl culture and Pearl Industry
Frog culture, Breeding and selection

Unit – III

Edible fresh water fishes
Fish culture – Management of ponds
Composite fish forming

Unit – IV

Preservation and processing of fishes
Transport and marketing of fishes

Unit – V

Planktons and their role in fisheries
Maintenance of aquarium
Economic importance of fishes

6 hours/unit

UG COURSE
B. Sc. V SEMESTER (CORE COURSE) IN ZOOLOGY
PAPER II, APPLIED ZOOLOGY
COURSE CODE ZOO C 512

L	T	P	C
2	0	0	2

Instructor: Dr. U. S. Gupta

Unit – I

Sericulture – species of silkworm, life history of *Bombyx mori*
Sericulture Industry in India

Unit – II

Apiculture – methods of bee keeping
Products of bees, enemies of bee

Unit – III

Lac culture – species of lac insect, life history of *Laccifer lacca*
Lac industry

Unit – IV

Stored grain pests
Pests of vegetables

Unit – V

Biological control of insect pests
Chemical control of insect pests

6 hours/unit

UG COURSE
B. Sc. V SEMESTER (CORE COURSE) IN ZOOLOGY
APPLIED ZOOLOGY PRACTICAL
COURSE CODE ZOO C 513

L	T	P	C
0	0	6	2

1. Sericulture: Life history of silk worm
2. Apiculture: Life history of honey bee
3. Lac culture: Life history of Lac insect.
4. Stored grain pests
5. Pests of vegetables.
6. Biological control of Insect pests.
7. Aquaculture
8. Prawn culture
9. Frog culture
10. Edible fresh water fishes
11. Fish culture
12. Composite fish culture
13. Planktons and their role in fisheries
14. Maintenance of aquarium
15. Economic importance of fishes
16. Mount of prawn gill, unio gill and fish gill, Fish scales.
17. Sting apparatus of honey bee & mouth parts of insects.

SYLLABUS FOR UG COURSE IN ZOOLOGY

B.Sc. SIXTH SEMESTER

SESSION, 2013-14



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UG COURSE
B. Sc. VI SEMESTER (CORE COURSE) IN ZOOLOGY
PAPER I, ENVIRONMENTAL BIOLOGY
COURSE CODE ZOO C 611

L	T	P	C
2	0	0	2

Instructor: Prof. U.S.Gupta

Unit - I

Basic concept of Ecology

Concept of Ecosystem – Biotic and Abiotic factors, energy flow in eco-system – food chain and food web
Biogeochemical cycles of C, O₂, N and P

Unit –II

Basic concept of Ecology

Population concept – characteristics of population
Community concept – succession, periodicities, indicators

Unit -III

Habitat Ecology

Characteristics of the following habitats

Fresh water
Marine
Estuarine

Unit -IV

Habitat Ecology

Characteristics of the following habitats

Terrestrial
Ecological divisions of India
Natural resources and their conservation

Unit -V

Man and environment

Wild life conservation: National parks and sanctuaries of Madhya Pradesh
Environmental degradation and population

6 hours/unit

UG COURSE
B. Sc. VI SEMESTER (CORE COURSE) IN ZOOLOGY
PAPER II, ENVIRONMENTAL BIOLOGY
COURSE CODE ZOO C 612

L	T	P	C
2	0	0	2

Instructor: Dr. Deepali Jat

Unit – I

Man and environment

Pesticide, metal, thermal and noise pollution
Global warming, green house effect and radiation ecology
Urbanization and effects of human population on environment

Unit –II

Origin of Life and Evolution

Origin of Life – Theories and concepts
History of evolutionary thoughts –
Lamarckism and Darwinism, Neo-Darwinism

Unit –III

Evolution, Natural selection and Adaptation

Concept of micro, macro and mega evolution
Natural selection – Basic concept of variation, mutation, isolation and speciation
Adaptations and mimicry

Unit –IV

Paleontology and Distribution of Animals

Paleontology – Formation of fossils, Determination of age of fossils
Study of extinct forms – Dinosaurs and Archaeopteryx

Unit –V

Evolution and Zoogeographical distribution

Evolution of man
Zoogeographical distribution of animals

6 hours/unit

UG COURSE
B. Sc. VI SEMESTER (CORE COURSE) IN ZOOLOGY
ENVIRONMENTAL BIOLOGY PRACTICAL
COURSE CODE ZOO C 613

L	T	P	C
0	0	6	2

1. Collection & study of local fauna of Insects, Mollusks & Freshwater fishes.
2. Study of adaptation: Aquatic, Desert, Cave, Volant etc.
3. Study of different type of ecosystem.
4. Study of food chains & food webs in ecosystems
5. Pyramids.
6. Non conventional energy resources
7. Wild life conservation: National parks and sanctuaries of Madhya Pradesh
8. Methods for measurement of population density.
9. Study of aquarium.
10. Water analysis: DO, Chloride, CO₂, alkalinity, PH, TDS.
11. Biogeochemical cycle.
12. Pesticides and hazards.
13. Mimicry
14. Adaptation.
15. Microtomy, Microscopy, Spectrophotometry, Centrifugation.

UG COURSE
B. Sc. VI SEMESTER (CORE COURSE) IN ZOOLOGY
ENVIRONMENTAL BIOLOGY PRACTICAL
COURSE CODE ZOO C 613

L	T	P	C
0	0	6	2

SCHEME OF PRACTICAL EXAMINATION

- 1. Spotting (any five): 10**
- 2. Study of animals for adaptation (any three): 06**
- 3. Mounting: 05**
- 4. Water analysis (any one parameter) :05**
- 5. Comments on instrument: 05**
- 6. Exercise on wild life:05**
- 7. Project / collection: 05**
- 8. Viva voce: 04**
- 9. Practical record: 05.**

Total	50
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