

JAMAL MOHAMED COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 20
B.Sc. ZOOLOGY DEGREE COURSE STRUCTURE FROM 2011 – 12

Sem	Subject Code	Part	Course	Subject Title	HRS/Week	Credit	Int. Mark	Ext. Mark	Mark
I	11 U1LT1/LA1/LH1/LU1/LF1	I	Language I		6	3	25	75	100
	11 U1 LE1	II	English I		6	3	25	75	100
	11 UCH 1301	III	Allied I	Allied Chemistry – I	5	4	25	75	100
	11 UCH 1301 : P	III	Allied I P	Allied Chemistry Practical –I	3	2	20	30	50
	11 UZO 1401	III	Core Course I	Biology of Invertebrates	6	4	25	75	100
	11UZO1402:1P	III	Core Course II: 1P	Practical for Core Courses I	2	2	20	30	50
	11 U 19	IV	Envrion. Studies	Environmental Studies	2	2	25	75	100
Total					30	20	165	435	600
II	11 U2LT2/LA2/LH2/LU2/LF2	I	Language II		6	3	25	75	100
	11 U2LE2	II	English II		6	3	25	75	100
	11 UCH 2302	III	Allied II	Allied Chemistry -II	4	4	25	75	100
	11 UCH 2303 : P	III	Allied III P	Allied Chemistry Practical – II	3	2	20	30	50
	11 UZO 2403	III	Core Course III	Bio. of Chordates & Evolution	6	5	25	75	100
	11 UZO 2402: 2P	III	Core Course II: 2P	Practical for CC III	3	2	20	30	50
	11 UZO 2601	IV	Non Major Elect I	Poultry Science	2	2	25	75	100
Total					30	21	165	435	600
III	11 U3LT3/LA3/LH3/LU3/LF3	I	Language III		6	3	25	75	100
	11 U3LE3	II	English III		6	3	25	75	100
	11 UBO 3304	III	Allied IV	Morphology, Taxonomy, Anatomy and Embryology	5	3	15	45	60
	11 UBO 3304 P	III	Allied IV P	Practical for Allied IV	3	2	10	30	40
	11 UZO 3404	III	Core Course IV	Bio Stat., Comp. Appl. & Bioinformatics	6	5	25	75	100
	11 U 310	IV	Value Education	Value Education	2	2	25	75	100
	11 UZO 3602	IV	Non Major Elect II	Health Education	2	2	25	75	100
Total					30	20	170	480	650
IV	11 U4LT4/LA4/LH4/LU4/LF4	I	Language IV		6	3	25	75	100
	11 U4LE4	II	English IV		6	3	25	75	100
	11 UBO 4305	III	Allied V	Thallophytes, Bryophytes, Pteridophytes, Gymnosperms, Plant Physiology, Genetics, Ecology and Evolution	5	3	25	75	100
	11 UBO 4306 P	III	Allied VI P	Allied Botany Practical – II	2	2	40	60	100
	11 UZO 4405	III	Core Course V	Cell & Molecular Biology	5	4	25	75	100
	11 UZO 4406 P	III	Core Course VI	Practical for CC V	2	2	40	60	100
	11 UZO 4701	IV	Skill Based Elec I	Soft skill and perso. Devt.	4	4	25	75	100
11 U 411	V	Extension	NCC, NSS etc.,	-	1	-	-	-	
Total					30	20	18	465	650
V	11 UZO 5407	III	Core Course VII	Biochem. & Bio Physics	5	5	25	75	100
	11 UZO 5408	III	Core Course VIII	Dev. Biol. and Microbiology	5	5	25	75	100
	11 UZO 5409	III	Core Course IX	Genetics	5	5	25	75	100
	11 UZO 5410 P	III	Core Course X P	Practical for CC VII, VIII, IX	6	5	40	60	100
	11 UZO 5501	III	Major Based Elec I	Biotechnology	5	5	25	75	100
	11 UZO 5702	IV	Skill Based Elect II	Vermiculture Technology	4	2	25	75	100
Total					30	29	165	435	600
VI	11 UZO 6411	III	Core Course XI	Animal Physiology	5	5	25	75	100
	11 UZO 6412	III	Core Course XII	Environmental Biology	5	5	25	75	100
	11 UZO 6413 P	III	Core Course XIII P	Practical for CC XI & XII	6	6	40	60	100
	11 UZO 6502	III	Maj Based Elect II	Economic Entomology	5	5	25	75	100
	11 UZO 6503	III	Maj Based Elect III	Immunology	4	4	25	75	100
	11 UZO 6703	IV	Skill Based ElectIII	Aquaculture	4	4	25	75	100
	11 U612		Gender Studies	Gender Studies	1	1	25	75	100
Total					30	30	190	510	700
Grand Total					180	140	1055	2745	3800

Allied Zoology (2011-2012)

Sem	Subject Code	Part	Course	Subject Title	HRS/ Week	Credit	Int. Mark	Ext. Mark	Mark
III	11 UZO 3304	III	Allied IV	Animal structure and function	6	3	25	75	100
	11 UZO 3305 P	III	Allied V P	Practical for Allied – I	2	2	20	30	50
IV	11 UZO 43056	III	Allied VI	Commercial Zoology	5	3	25	75	100
	11 UZO 4305 P	III	Allied V P	Practical for Allied - II	2	2	20	30	50

Semester I
Core course I
Code: 11 UZO 1401

B.Sc., (Zoology)

Hrs. 6
Credits 4
Marks 100

BIOLOGY OF INVERTEBRATES

UNIT: I Protozoa & Porifera

General characters and outline classification upto classes

Type study: *Paramecium* and *Sycon*

General topics: Protozoan diseases in man, Canal system in sponges

UNIT: II **Coelenterata**

General characters and outline classification upto classes

Type study: *Obelia*

General topics: Polymorphism in Coelenterata and Nematocysts & Coral reefs

UNIT: III **Helminthes & Annelida**

General characters and outline classification upto classes

Type study: *Planaria*, *Ascaris* and *Earthworm*

General topics: Parasitic adaptations of helminth parasites, Metamerism in annelids.

UNIT: IV **Arthropoda**

General characters and outline classification upto classes

Type study: Cockroach

General topics: Crustacean larvae and their significance ; Mouth parts of Insects ; Metamorphosis in insects.

UNIT: V **Mollusca & Echinodermata**

General characters and outline classification upto classes

Type study: Freshwater mussel, Starfish

General topics: Water vascular system; Economic importance of Molluscs

Text Books:

1. Ekambaranatha Ayyar, 1993. Outlines of Zoology. Vols. I & II S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai.
2. Chand & co
2. Leelavathy. S. Nair, Revised enlarged edition (2001). A Text book of Invertebrates, Saras Publications.

Reference Books:

1. Kotpal, R.L. 2000. Invertebrata, Rastogi Publication, Meerut.
2. Jordan, E.L. and P.S.Verma (1995). Invertebrate Zoology, 12th Edition, S.Chand & Co.

Semester I
Core course II P
Code: 11 UZO 1402 : 1 P

B.Sc., (Zoology)- Practical - I

Hrs. 2
Credits 2
Marks 50

BIOLOGY OF INVERTEBRATES

Dissections:

Cockroach: Digestive, Nervous system and Reproductive systems.
Earthworm: Nervous system

Mountings:

Earthworm - Body setae & Penial setae
Mouthparts of Mosquito, Housefly, Honey bee and Cockroach

Spotters:

Entamoeba, Paramecium, Euglena, Sycon, Hydra, Aurelia, Sea anemone, Ephyra larva, Physalia, Planaria, Fasciola hepatica, Taenia solium, Ascaris, Nereis, Leech, Trochophore larva, Peripatus, Prawn - Nauplius, Crab, Spider, Butterfly, Rhinoceros beetle, Pila, Freshwater mussel, Chiton, Dentalium, Sepia, Starfish, Sea urchin and Sea cucumber.

* A record of lab work should be maintained and submitted at the time of Practical examination for valuation.

Semester I
Core course II
Code: 11 UZO 2403

B.Sc., (Zoology)

Hrs. 5
Credits 4
Marks 100

BIOLOGY OF CHORDATES & EVOLUTION

UNIT: I

General Characters and outline classification of Phylum Chordata upto classes -
Type study : Amphioxus.

General Topic: Origin of Chordates, Retrogressive metamorphosis

UNIT: II

Type study : Shark and Frog

General Topics: Economic importance of fishes; Accessory Respiratory
Organs in fishes; Parental care in Amphibia

UNIT: III

Type Study : Calotes & Pigeon.

General Topics : Poisonous and non-poisonous snakes of South India ; Flight
adaptations in birds; Migration of birds

UNIT: IV:

Type study: Rabbit

General Topics: Dentition in mammals; Adaptations in aquatic mammals

UNIT V

Theories of evolution : - Lamarckism – Darwinism – De Vries Theory of Mutation
and Modern Synthetic Theory of evolution; Mimicry – Colouration – Speciation –
Factors affecting Speciation – Isolating mechanisms - Evolution of Man as seen
in the fossil record – Future evolution of man.

References:

1. Kent G.C. 1976. Comparative anatomy of the vertebrates, McGraw Hill Book Co., Inc., New York.
2. Ayyar E.K., and Ananthakrishnan, 1992. A Manual of Zoology, Vol. II (Chordata).
- 3 . Arumugham, N. 2006, Organic Evolution, Saras Publications, Nagercoil.

Semester II
Core course II P
Code: 11 UZO 2402: 2 P

B.Sc., (Zoology)- Practical - I I

Hrs. 2
Credits 2
Marks 50

BIOLOGY OF CHORDATES AND EVOLUTION

Dissections

Virtual laboratory by using video clipping of Arterial system, Venous system, Digestive and Reproductive system of Frog,

Demonstration of dissection of Digestive system of fish

Mounting

Placoid scales – Shark

Ctenoid and cycloid scale – Teleost fish

Spotters

Amphioxus, Balanoglossus, Anabas, Clarias, Echenis , Ichthyophis, Rhacophorus , Axolotl, Chamaeleon, Hemidactylus, Viper, Pigeon , Bat, Loris Rabbit and Dog

EVOLUTION

1. Evolutionary significance: Peripatus; Archaeopteryx
2. Homologous organs: Fore limb modification
3. Analogous organs: Wing modifications
4. Mimicry & Coloration: Chameleon, Krait, Leaf insect, Stick insect
5. Fossils : Nautiloid, Ammonoid

* A record of lab work should be maintained and submitted at the time of Practical examination for valuation.

Semester II
Non Major Elective I
Code: 11 UZO 2601

B.Sc., (Zoology)

Hrs. 2
Credits 2
Marks 100

POULTRY SCIENCE

UNIT I

Poultry industry in India : Poultry egg production- composition and nutritive value of egg- poultry manure.

UNIT II

Poultry breeds and classes of fowls – Poultry housing – general principles of building poultry house

UNIT III

Rearing of fowls – methods of rearing chicks, growers, layers and broilers – growth management- summer and winter management

UNIT IV

Poultry nutrition – composition of feeds – nutrient requirements for fowls – nutritional deficiency symptoms.

UNIT V

Poultry diseases: Ranikhet disease, Fowl pox, Birds flu, Fowl typhoid and fowl cholera- Nematode and tapeworm infection- vaccination schedules.

References:

1. Poultry keeping – M.R. Gnaanamani
2. The rearing of pullets – Bulletin No. 54, Her majesty's stationary office, London.
3. Intensive poultry management for egg production. Bulletin No. 152. Her Majesty's stationary office London
4. Nutrition of the chicken – M.L.Scott et al
5. Diseases of poultry – Biester – Oxford & IBH.

Semester III
Core course IV
Code: 11 UZO 3404

B.Sc., (Zoology)

Hrs. 6
Credits 5
Marks :100

BIOSTATISTICS, COMPUTER APPLICATIONS AND BIOINFORMATICS

Unit I

Data Collection – Sources of primary and secondary data – Classification and tabulation. Organization of Data: Individual, discrete frequency series – Types of variables – Diagrammatic & graphical representation of Data – Bar diagram, pie diagram , Histogram, Frequency Polygon, F curve, Pictograph , Scatter diagram.

Unit II

Measurement of Central tendency – Mean, Median and Mode & Measures of dispersion – standard deviation and standard error - Hypothesis testing, students t'test

UNIT: III

Generations of computers – classification of computer – characteristics- applications of computer. Soft ware- types – hard ware – computer languages – low and high level language – Definition and applications of operating system; MS Word - Net working - basic concept

UNIT: IV

Bioinformatics – definition – History and scope – biomolecular structure of protein - Biological database – database types – Primary data bases – secondary data base

UNIT: V

Protein sequence data bases – Swiss prot – PIR – MIPS – nucleic acid sequence database – Gen bank, DDBJ- EMBL – significances of data banks – Bioinformatics tools – BLAST – FASTA – CLUSTALW – RASMOL.

References:

1. Ravikant,T., 1995 PC Software made simple Tat McGraw Publishing Co Ltd.
2. Ram, B., 1995 Computer fundamentals – Architecture and organization – Wiley Eastern Ltd. New Delhi.
3. V.Rajaraman, 1985 Fundamentals of Computer Prentice Hall of India
4. Subramanian.C (2004). A textbook of Bioinformatics. Dominant Publishers and distributions, NewDelhi, India.
5. Murthy, C.S.V(2003) Bioinformatics Himalaya Publishing Horse, Mumbai, India.

Semester III
Non Major Elective II
Code: 11 UZO 3602

B.Sc., (Zoology)

Hrs. 2
Credits 2
Marks 100

HEALTH EDUCATION

Unit I

Health: Definition – dimensions of health – Health education: definition – objectives – principles – Nutrition and health: Balanced diet – food hygiene

Unit II

Environment & Health: Water, Air and Noise pollution -Pollutants, effects, prevention and control – effects of smoking and alcoholism.

Unit III

Concept of disease: Phases of disease – Prepathogenesis and Pathogenesis – concept of prevention and control – common Arthropod borne diseases .

Unit IV

Classification of communicable diseases – agent factors - mode of transmission – symptoms and treatment of Tuberculosis, Typhoid, Hepatitis A & B and AIDS - Family planning: Definition – scope – contraceptive devices

Unit V

Mental health: Definition - characteristics – causes and prevention of mental health - Occupational health & hazards – prevention – Health care services – primary health care – hospitals –Principles of First Aid.

Reference book:

1. E. Park & Park: Textbook of Preventive and Social Medicine (Published by Banarsidos Bhanot, 1278 Napier Town.)

Semester IV
Core course IV
Code: 11 UZO 4405

B.Sc., (Zoology)

Hrs. 5
Credits 4
Marks 100

CELL AND MOLECULAR BIOLOGY

UNIT I:

Cell: Ultra structure and its components, Plasma membrane: Ultra structure and Functions - Unit membrane model and Fluid mosaic model.

UNIT II:

Structure and functions of Golgi complex, Endoplasmic reticulum, Mitochondria, Ribosome and Lysosomes

UNIT III:

Structure and functions of Nucleus, Nucleolus and Chromosomes.
Cell cycle: Phases of cell cycle – Cell division : Mitosis and Meiosis.

UNIT IV:

Nucleic acids: structure and functions of DNA, RNA and DNA replication.
Protein synthesis: Transcription and Translation.

UNIT V:

Gene regulation in prokaryotes and eukaryotes
Cancer cell: characteristics and types, apoptosis, oncogenes and oncoproteins

TEXT BOOKS:

- 1) Powar, C.B. 1997. Essentials of Cytology, Himalayan Publishing House, New Delhi.
- 2) Verma, P.S and Agarwal V.K, 1998. Concepts of Molecular Biology, Chand & Company Ltd., New Delhi.
- 3) Gupta, P.K. 1999. A Text Book of Cell and Molecular Biology, Rastogi Publications, Meerut.

REFERENCE:

- 1) De Robertis, E.D.P. and De Robertis, E.M.F. 1987. Cell and Molecular Biology, VIII Ed., Lea and Febiger, Philadelphia.

Semester IV
Core course VI
Code: 11 UZO 4406 P

B.Sc., (Zoology) - Practical

Hrs. 2
Credits 2
Marks 100

CELL AND MOLECULAR BIOLOGY

1. Study of compound microscope: Setting and Handling Procedure
2. Squash preparation of Onion root tip for mitotic stages
3. Squash preparation of grasshopper testis for meiotic stages
4. Smear preparation of human blood for RBC and WBC
5. Squash preparation of salivary gland of Chironomous larva for polytene chromosome study
6. Models of DNA, tRNA and DNA replication
7. Spotters: Epithelial, Muscular, Vascular tissue, Micrometers

Semester V
Core course VII
Code: 11 UZO 5407

B.Sc., (Zoology)

Hrs. 5
Credits 5
Marks 100

BIOCHEMISTRY AND BIOPHYSICS

Unit I

Introduction to Biochemistry – Scope of Biochemistry – Atomic structure, chemical bands – Ionic, Covalent and Hydrogen band – Vandervalls force – acid basic concept – oxidation – reduction reaction – redox potential of living system - Water and its functions – Dissolved gases and their properties – pH and buffer.

Unit II

Mono, Di and Polysaccharides – Structure, properties and Functions – with two examples each. Proteins and Lipids - Classification and function. Vitamins – water and fat soluble vitamins ; Sources, functions and deficiency diseases.

Unit III

Metabolism: Glycogenesis and Glycolysis, Citric Acid Cycle, Oxidative Phosphorylation.

Enzymes: Classification, nomenclature, characteristic and mechanism of enzyme action, factors affecting enzyme activity, coenzymes and isoenzymes.

Unit IV

Scope of Biophysics in Biology – Colloids – Description, Types, Electrokinetic properties - Donnan Equilibrium, Tyndall effect, Brownian movement, Surface Tension, Filtration, Osmosis, Dialysis, Adsorption.

Unit V

Principles, Types and Applications – Spectrophotometer & Centrifuge.

Principles and applications of Chromatography – Paper & TLC.

Principles and applications of Electrophoresis (PAGE).

Reference:

1. Frunton J.S. & S. Simmonds, G.General and R.H.Dol. 1987. Outlines of Biochemistry John Wiley & Sons.
2. Lehninger,L., 1990. Biochemistry W.H. Freeman & Co.,
3. Nagabushnam,R., 1991. Animal physiology.S. Chand & Co.,
4. Martin, D.W., P.A. Mayes and W.W. Rodwell. 1983., Harper's Review of Biochemistry Lange Medical Publications.
5. Prosser, C.L. and F.A. Brown 1985 Comparative Animal Physiology W.B. Saunders.
6. Rama Rao, A.V.S.S., Biochemistry UBSPD.
7. Stryer,L., 1992. Biochemistry Wiley International.
8. Ackerman, E., 1962, Biophysical Science, Prentice Hall, New Delhi.
9. Daniel, M., 1992 Basic Biophysics for Biologists, Wiley International, New Delhi.
10. Das.D., 1996, Biophysics and Biological Chemistry, Academic Publishers, Calcutta.
11. Sahay, K.B. and Saxena, R.K., 1971, Biomechanics. Wiley Eastern, New Delhi.
12. Upadhyay, Upadhyay and Math.K. 1993, Biophysical chemistry, Himalaya Publishing House.

Semester V
Core course VIII
Code: 11 UZO 5408

B.Sc., (Zoology)

Hrs.5
Credits 5
Marks 100

DEVELOPMENTAL BIOLOGY AND MICROBIOLOGY

UNIT I:

Origin of germ cells – process of spermatogenesis and Oogenesis.
Structure of mammalian sperm and ovum. Types of Eggs – Egg membranes.

UNIT II

Fertilization – Theories of fertilization - Mechanism and Physiology of Fertilization – Cleavage – planes and patterns – Blastulation and Gastrulation in Frog and Chick – Fate map of Frog.

UNIT III

Organogenesis - Frog – Development of brain and Eye and Fetal membranes in Chick – Placentation in Mammals.
Hormonal control of development: Control of metamorphosis in amphibians; Test tube babies - Invitro fertilization (IVF) and Embryo Transfer.

UNIT IV

History-scope-outline classification of microbes-Contribution of Louis Pasteur – Robert Hoach - Alexander Flemming – Prokaryotes – Eukaryotes - Basic structure and salient features of Virus - Bacteria-fungi.

UNIT V

Gram Staining: Gram Negative, Positive; bacteria - fermentation-biofertilizer - biopesticides – biocontrol agents - Microbiology of food-preservation of food - food spoilage - food poisoning - Microbial disease of man-TB-AIDS.

References

1. Huettner, 1949, Fundamentals of Comparative embryology, Macmillan, New York,
2. Fundamentals of Embryology – Patten, 1961 Mc.Graw Hill Book Co., New York.
3. Balinsky, 1981, W.B Saunders, Philadelphia, 3rd Edn., An Introduction to Embryology
4. Dubey R.C. and Maheswari D.K. A text book of Microbiology. S.Chand&Co.

5. Jayaram Panicker, 1990. Text book of Microbiology.

Semester V
Core course IX
Code: 11 UZO 5409

B.Sc., (Zoology)

Hrs. 5
Credits 5
Marks 100

GENETICS

UNIT - I

Mendelian laws – Monohybrid, Dihybrid, Trihybrid crosses – Linkage, Crossing over, Chromosome mapping with example to *Drosophila* – Multiple alleles – blood group inheritance – ABO & Rh factors.

UNIT - II

Mechanisms of sex determination – Chromosomal - Gynandromorphism - hormonal factors. Sex linked inheritance - Sex-limited and Sex influenced inheritance – Cytoplasmic inheritance ; Kappa particles and shell coiling

UNIT - III.

Identification of genetic material – Griffith experiments and Hershey – Chase experiment - Fine structure of gene: Cistron, recon, muton – Mutation : Gene mutation – molecular basis of mutation- Hardy Weinberg principle.

UNIT - IV.

Recombination in bacteria: Transformation, Conjugation, Transduction, Recombination in phages – lytic and lysogenic cycles.

UNIT- V

Human genetics: Karyotype and pedigree analysis – Syndromes Down's, Turner's, Klinefelters – Inborn errors of metabolism and disorders in man: PKU, alkaptonuria, albinism, thalassemia, sickle cell anemia, Eugenics and Euthenics.

Reference

1. Friefelder, D., 1997. Microbial Genetics. Narosa Publishing, New Delhi
2. Goodenough, U. 1997. Genetics. Saunders College Publishing International, New York
3. Lewin, B. 2005. GENES VIII. Wiley Eastern Ltd., New Delhi
4. Rothwell, N. V. 1979. Human Genetics. Prentice Hall of India, New Delhi
5. Sinnott, E. W., L. C. Dunn and L. C. Dobzhansky, T. 1985. Principles of Genetics. Tata McGraw Hill., New Delhi
6. Verma. P. S. and V. K. Agarwal. 1997. Genetics. S. Chand & Co., New Delhi
7. Verma. P. S. and V. K. Agarwal. 1998. Concept of Genetics, Human Genetics and Eugenics. & . S. Chand & Company Ltd, New Delhi
8. Gardner 1984. Principles of Genetics. Wiley Eastern, Pvt., Ltd.
9. Mitra, S. 1994. Genetics – a Blue print of life. Tata McGraw Hill Pub. Co., Ltd., Delhi

Semester V
Core course X
Code: 11 UZ0 5410 P

B.Sc., (Zoology) - Practical

Hrs. 6
Credits 5
Marks 100

BIOCHEMISTRY, BIO PHYSICS, MICROBIOLOGY, DEVELOPMENTAL BIOLOGY AND GENETICS

BIOCHEMISTRY

pH measurement of various samples
Quantitative estimation of protein and free sugars.

Spotters : Models of Haemoglobin, ATP

BIO PHYSICS

Verification of Beer Lamberts law using colorimeter
Demonstration of paper chromatography

Spotters:Spectrophotometer, Centrifuge, Electrophoresis unit.

MICROBIOLOGY

Culture techniques - Culture of bacteria
- Preparation of culture media
- Culturing of bacterial broth, slants, plating, streaking
- Serial dilution technique & pour plate
- Antibiotic sensitivity –
 Gram Staining +ve and -ve
 Differential staining

Equipments in Microbiology

- Inoculation loop
- Autoclave
- Laminar flow hood
- Spotters related to theory

DEVELOPMENTAL BIOLOGY

Preparation and observation of frog/bull sperm suspension- Induced ovulation in frog tadpole regeneration.

Examination of prepared microslides to study the following:

Frog : Egg – cleavage – blastula – yolk plug stage

Chick : Egg – 24hrs, 48hrs, 72 hrs

GENETICS

Mendelian traits in Man and calculation of gene frequencies

- Drosophila
- Genetic importance
 - Culture
 - Mutants
 - Male and Female identification
 - Human karyotypes - Pedigree analysis – syndromes.

* A record of lab work should be maintained and submitted at the time of Practical examination for valuation.

Semester V
Major Based Elective I
Code: 11 UZO 5501

B.Sc., (Zoology)

Hrs. 5
Credits 5
Marks 100

BIOTECHNOLOGY

UNIT: I

Biotechnology: Definition, Scope and Importance – Biotechnology in Medicine, Agriculture, Animal Husbandry and Environment.

UNIT: II

Genetic Engineering – Gene cloning, cosmids, phages : Methods involved – Tools of Genetic Engineering: Circular DNA, Linear DNA, Super coil, Plasmids, pBR322 - Enzymes, Cloning Vectors, PCR, Transposons – Identification and expression of cloned genes: Molecular probes, Southern blotting and Western blotting – Gene library and Gene bank.

UNIT: III

Genetic manipulation of Eukaryotes: Gene transfer methods in yeast – Application. Gene transfer in animal system: animal cells, eggs – Applications. Gene transfer in plants: Methods – Agrobacterium as a natural genetic engineer – Applications.

UNIT-IV

Industrial Biotechnology: Fermentation : Principle, Process, Scale up and downstream processing. Types of fermenters - Production of Ethanol by fermentation.

UNIT- V

Enzyme Biotechnology: Enzymes – Source – Production in large scale – Extraction & Purification – Immobilization of enzymes and advantages – Applications.

References:

1. Primrose, S.B. 2000. Modern Biotechnology, Blackwell scientific publication
2. Keshav Trehan, 1996. Biotechnology Wiley Eastern Ltd. New Delhi.
3. Balasubranainam, D. 1996. Concepts of Biotechnology, University Ltd. Hyderabad.
4. Trevan, M.D. 1993. Biotechnology: The principles Tata Mc Graw Hill Publishing Co. New Delhi.
5. Old, R.W. and Primrose, S.B. Principles of Gene Manipulation. An introduction to genetic engineering Fourth, Ed.
6. Brown, T.A. Gene Cloning
7. Patel, A.H. 1984, Industrial Microbiology Mac Millan India Ltd.

8. Dubey, R.C. 1995, Text Book of Biotechnology. S. Chand & Co.

Semester IV
Skill Based Elective II
Code: 11 UZO 5702

B. Sc., (ZOOLOGY)

Hrs. 4
Credits 2
Marks 100

VERMICULTURE TECHNOLOGY

UNIT I:

Earthworms; species, systematic position and taxonomy – habitat - Trophic Classification of earthworms, epigeic, anecic and endogeic) – Physical effects and chemical effects of earthworms on soil.

UNIT II:

Biology of earthworm: External features, digestive system, excretory system and reproductive system - Life cycle of *Lampito mauritii* and *Perionyx excavatus* (cocoons, juveniles, non-clitellates, clitellates)

UNIT III:

Vermiculture; Worms used for vermiculture - Earthworm Breeding - Preparation of vermibed and its types – Method of harvesting vermicompost - Setting up of a vermiwash unit and its applications.

UNIT IV:

Vermicompost and vermicast - Chemical composition – Application as biofertilizer – Field studies with crops paddy, cotton and bendi and yield improvement.

UNIT V:

Economics of vermiculture -In sustainable agriculture - Organic Farming - Recycling of wastes through vermicomposting - Earthworms as Medicine - Vermicomposting in the world scenario.

TEXT BOOKS:

1. Sultan Ahmed Ismail, 2005. The Earthworm, Others India Press, Mapura 403507, Goa, India.
2. NIIR Board, 2006. The Complete Technology Book on Vermiculture and Vermicompost, NIIR.
3. Edwards, C.A. and Loft, J.R., 1977. Biology of Earthworms, 3rd Edition, Chapman Publications.

Semester VI
Core course XI
Code: 11 UZO 6411

B.Sc., (Zoology)

Hrs. 5
Credits 5
Marks 100

ANIMAL PHYSIOLOGY

UNIT: I

Digestion: Digestion of carbohydrates, proteins & lipids and absorption.
Metabolic pathways of lipids – Beta oxidations – ketosis – protein metabolism – deamination – transamination.

UNIT: II

Respiration: Respiratory pigments – structure of hemoglobin – transport of respiratory gases – oxygen disassociation curve – carbon-di-oxide transport – Hb as a buffer.
Circulation: Composition of blood – blood clotting – heart beat – origin – conduction – cardiac cycle – blood pressure.
Excretion: Nitrogenous waste products – ammonia – biosynthesis of urea – uric acid.

UNIT: III

Muscle contraction: Structure of skeletal muscle and myofibril – molecular organization – mechanisms and chemistry of muscle contraction – Cori cycle
Neural conduction: Resting potential – conduction of nerve impulse – synaptic transmission – neuromuscular junction – reflexes – Receptors : Photo, Phono receptors.

UNIT: IV

Principles of Homeostasis: Osmoregulation – ionic regulation – thermoregulation – temperature compensation in poikilotherms – homeotherms – regulation of body temperature.
Endocrine glands: Structure and functions of hypothalamus – pituitary thyroid – parathyroid – adrenal cortex and medulla – pancreas – testis – ovary.

UNIT: V

Reproduction: Anatomy of reproductive organs in human – reproductive cycles – hormonal control of reproduction.
Animal behaviour: Kinesis – Taxis – Instinctive – behaviour – learned behaviour.

Text book:

Singh, H. R. Animal physiology and related biochemistry. SHOBAN Lal Nagin Chand and co., Educational Publishers, New Delhi.

Reference Books:

1. Rastogi, S. C. 1979, Essentials of Animal physiology. Wiley Eastern Limited. New Delhi.
2. Berry A. K. 1998. A text book of Animal physiology. Emkay publications.
3. Hoar, S.W., 1987. General and comparative physiology. Prentice Hall.
4. Parameswaran R., Anantha Krishnan, T. N. Anantha Subramanian, K. S. 1998. Outlines of Animal physiology, S. Viswanathan PVT Ltd. Chennai.

Semester VI
Core course XII
Code: 11 UZO 6412

B.Sc., (Zoology)

Hrs. 5
Credits 5
Marks 100

ENVIRONMENTAL BIOLOGY

UNIT I

Scope – Branches of Ecology – Abiotic factors – Light, Temperature, Water and Soil

UNIT II

Biotic factors – Animal relationships – Symbiosis, Commensalisms, Mutualism, Antagonism, Predation, Parasitism and Competition – intra specific and inter specific competition. Ecosystem : Fresh water ecosystem – Pond & River ecosystem – Food chain – Food web – Trophic levels – Energy flow – Ecological pyramids – Pyramid of Biomass, Number and Energy.

UNIT III

Population – definition – Natality, Mortality, population fluctuation, dispersal, Age pyramid, population estimation, Population equilibrium, Regulation.
Community ecology – types of Communities – characteristics of community. Stratification – Ecotone – edge effect – Ecological niche – Ecological succession

UNIT IV

Natural Resources - renewable and non-renewable - resources management. Wild life conservation and management. Remote sensing techniques in resources management – water / Land - Space Ecology.
Biodiversity – types – Mega diversity with reference to India – Conservation of Biodiversity.

UNIT V

Pollution – types - Air and Water Pollution - their biological effects and control., Sewage and Solid Waste disposal and management – Green house effect – Ozone layer and its significance, Global warming, Acid rain, Biomagnifications – Eutrophication .

Reference:

1. Clarke, G.L., 1954. Elements of Ecology. John Wiley & Sons, N:y.
2. Kendeigh, S.C. 1961. Animal Ecology. Prentice Hall
3. Odum, E.P. 1971. Fundamentals of Ecology, W.B. Saunder's Co. Philadelphia
4. Rastogi, V.B. and M.S. Jayaraj 1989, Animal Ecology and distribution of animals, Kedarnath Ramnath.
5. Sharma, P.D. 1990. Ecology and Environment. Rastogi Publications. Meerut.
6. Southwick, C.H. 1976. Ecology and the quality of Environment. D.Vas Nostrand Co.
7. Verma, P.S. and V.K. Agarwal, 1996 Principles of Ecology. S.Chand & Co. New Delhi.

Semester VI
Core course XIII
Code: 11 UZ0 6413 P

B.Sc., (Zoology) - Practical

Hrs. 6
Credits 5
Marks 100

ANIMAL PHYSIOLOGY AND ENVIRONMENTAL BIOLOGY

ANIMAL PHYSIOLOGY

1. Human salivary amylase activity in relation to temperature and pH
2. Effects of temperature on the ciliary activity of freshwater mussel and calculations of Q₁₀
3. Identification of nitrogenous waste products.
4. Total count of RBC and WBC & differential count of WBC.
5. Quantitative tests of carbohydrates, proteins, and lipids.
6. Simple test for sugar, albumin, and urea in human urine.
7. Estimation of haemoglobin.

SPOTTERS

Haemoglobinometer, haemocytometer, model of aminoacids.

ENVIRONMENTAL BIOLOGY

1. Estimation of pH, dissolved oxygen, salinity and calcium
2. Examination of marine plankton
3. Examination of intertidal fauna – Rocky shore, sandy shore, muddy shore
4. Spotters : Animal association - pH meter, Secchi disc, Turbidity meter (NTU) -
Electrical conductivity meter

* A record of lab work should be maintained and submitted at the time of Practical examination for valuation

Semester VI
Major Based Elective II
Code: 11 UZO 6502

B.Sc., (Zoology)

Hrs. 5
Credits 5
Marks 100

ECONOMIC ENTOMOLOGY

UNIT:I

Classification of insects up to orders and their diagnostic characters with familiar and important examples – Economic classification of insects.

UNIT:II

Bionomics, lifecycle and byproducts of Honey bee, Silkworm and Lac insect.
Helpful insects – Insect pollinators , predators, parasitoids and parasites, weed killers, Soil Builders and scavengers.

UNIT:III

Biology and lifecycle of insects pests of rice, sugarcane, coconut, cotton, vegetables and fruits and pests of stored products.

UNIT:IV

Arthropods as vectors of human diseases – Biology of housefly, mosquito and flea, pests of cattle and poultry.

UNIT:V

Principles of insect control: physical, mechanical, chemical, biological and integrated methods of pest control. Non-conventional methods of pest control.

Reference:

1. Chandler,A.C. and Dead,C.P. 1961. Introduction to parasitology. John Wiley and Sons, New York.
2. David,B.V. and T.Kumarasami. 1998. Elements of Economic Entomology. Popular Book Depot, Chennai.
3. David, B.V. 1992. Pest Management and pesticides Indian Scenario, Namrutha Publications.
4. Krishnan, N.T. 1993. Economic Entomology, J.J. Publications, Madurai.
5. Nayar,K.K, Anathakrishnan, T.N and David, V.D, 1990, General and applied entomology, Taba Mc Grow Hill, New Delhi.

Semester VI
Major Based Elective III
Code: 11 UZO 6503

B.Sc., (Zoology)

Hrs. 4
Credits 5
Marks 100

IMMUNOLOGY

Unit I

Scope of Immunology – Types of Immunity – Innate, Acquired, Active and Passive immunity – Lymphoid organs and cells – Primary and secondary - structure and functions.

Unit II

Antigens – Structure – Properties – Haptens – adjuvants – antigenic determinants – epitope, paratope.

Antibodies – Structure – biological properties and functions – subclasses of immunoglobulins. Vaccines and vaccination schedule.

Unit III

Major Histocompatibility complex in man - Human Leukocyte antigen – types, structure and functions - Complements – classical and alternative pathway of activation – Hypersensitivity – classification – immediate and delayed.

Unit IV

Immune response – Humoral – Primary and Secondary – Role of B cells in antibody production - Cell mediated – Cytokines and Lymphokines – functions. Autoimmune diseases.

Unit V

Immunological Techniques - Agglutination and Precipitation tests, Blood grouping – ABO and Rh - Production of antiserum - Immunodiffusion, Immunoelectrophoresis, Qualitative and Quantitative types – Blotting techniques of Proteins – ELISA.

Text Book

Nandhini Shetty (1994) Immunology, Introductory Text Book, New Age Int. (P) Ltd. Publications, New Delhi.

Dulsy Fatima et al., (2000) Immunology, Saras Publications, Nagercoil, Tamil Nadu.

Reference Books:

1. Roitt, (3rd Edition) Immunology, Crover Medical Publishing Company, London
2. Barret, J. T. (1983) Text Book of Immunology (5th Edition), The C.V. Mosby Company.
3. Richard, H.M. (1992), Immunology (2nd Edition), Williams and Wilkins, Baltimore Maryland.
4. Hidemann, W.H. (1980) Essentials of Immunology, Elsevier Science Publishing Co. Inc.
5. Weinn. D.M. and Steward, L. (1993), Immunology, Singapore Publishers Private Ltd.,

Semester VI
Skill Based Elective - VI
Code: 11 UZO 6703

B.Sc., (Zoology)

Hrs. 4
Credits 4
Marks 100

AQUACULTURE

UNIT – I: FISH FARM CONSTRUCTION AND MANAGEMENT

Aquaculture – Global and Indian scenario, pond construction – Site selection. Soil and water management,.

UNIT – II : CULTURE OF FIN FISHES

Commercial important fishes and their characteristics, Culture of Catla, Rohu and Mrigal
Ornamental fish culture-control of diseases

UNIT – III: CULTURE OF LIVE FEED ORGANISMS

Mass production of Algae and Diatoms;
Culture of Artemia. Formulation of commercial fish feed

UNIT – IV : CULTURE OF SHELL FISHES

Distribution and brief description of taxonomic characters, food and feeding habits and culture of Mud crab (*Scylla serrata*), Pearl oyster, Mytilus, Marine and Fresh water Prawn culture - *Penaeus* and *Macrobrachium*.

UNIT – V: HARVESTING AND MARKETING

Harvesting methods: Fishing gears (lines, net) and crafts (canoes, boats, trawler)
Preservation methods – Drying, Dehydration, Smoking, Canning, Freezing, Salt curing.
Marketing: Marketability of byproducts.

TEXT BOOK:

Santhanam, R. 1990. Fisheries Science, Daya Publishing House, New Delhi

References:

1. Agarwal, S.C 1994 A hand book of fish farming . Narendra Publishing House, New Delhi
2. Chakrabarthy, M.N. 1998 Biology, Culture and Production of Indian major carps, Narendra Publishing House, New Delhi
3. Hall, C.B. 1999. Ponds and fish culture . Agrobotanical Publishers India
4. Jhingran, V.G. 1997. Fish and fisheries of India , Hindustan Publishing Co., New Delhi.

Semester III
Allied course IV
Code: 11 UZO 3304

B.Sc., (Zoology)
(For B.Sc. Botany)

Hrs. 6
Credits 3
Marks 100

Paper – I: ANIMAL STRUCTURE & FUNCTION

UNIT:I

Classification of Invertebrates upto phyla with diagnostic features and examples, Cockroach : External morphology, mouth parts, digestive system, respiratory system, circulatory system, nervous system and reproductive system

UNIT: II

General characters of chordates - classification of vertebrata upto classes with suitable examples. Frog – external features, digestive system, respiratory system, circulatory system, nervous system and urino-genital system

UNIT:III

Physiology of digestion and absorption, respiration, transport of oxygen and carbon-dioxide, structure of kidney and nephron, urine formation - in man

UNIT: IV

Structure, composition and functions of blood of man, types of muscle, structure of neuron, nerve impulse conduction - physiology of vision- in man.

UNIT: V

Structure and functions of Pituitary, islets of Langerhans, human reproductive systems – menstrual cycle.

Reference:

1. Ekambaranatha Ayyar, 1993. Outlines of Zoology. Vo. I S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
2. Verma Tyagi and Agarwal (1997) Animal Physiology. S.Chand and Co. Delhi.
3. Leelavathy. S. Nair, Revised enlarged edition (2001). A Text book of Invertebrates, Saras Publications.

Semester III
Allied course VI P
Code: 08 UZO 4305 : 1 P

B.Sc., (Zoology)

Hrs. 2
Credits 2
Marks 50

**B.Sc. (Allied Zoology) Practical – I
(For B.Sc. Botany)**

ALLIED ZOOLOGY PRACTICAL – I

DISSECTION:

Cockroach: Mouth parts, salivary gland, digestive and nervous systems.

Frog – Pro-dissector software: Demonstration

Spotters:

Paramecium, Obelia, Aurelia, Ephyra larva, Fasciola hepatica, Taenia solium, Nereis, Ascaris male and female, Earthworm, Prawn, Butterfly, Freshwater mussel, Starfish.

Shark, Frog, Pigeon, Rabbit.

Semester IV
Allied Course VI
Code: 11 UZO 4305

B.Sc., (Zoology)
(For B.Sc. Botany)

Hours: 5
Credits: 3
Marks: 100

COMMERCIAL ZOOLOGY

UNIT I

Vermiculture: Species of earthworms – life cycle of *Lampito mauritii* – Preparation of Vermicompost – Economic importance.

UNIT II

Apiculture: Species of honey bees – types of bee hives – extraction of honey – nutritive and medicinal value of honey.

Lac culture: Life cycle of Lac insect – extraction of Lac – economic importance of Lac.

UNIT III

Sericulture: Life cycle of *Bombyxmori* – Rearing of silk worm – Reeling of silk – Economic importance.

UNIT IV

Aquaculture: Freshwater fishes – construction of pond – fish feed – Induced breeding – Fish diseases: Furunculosis, Epizootic ulcerative syndrome (EUS) and vibriosis – Fresh water Prawn culture.-Ornamental fish culture.

UNIT V

Poultry farming: Types of fowls – rearing methods of broilers and layers –poultry nutrition – Poultry diseases (NCD, IBV & Fowls).

Reference:

1. Shukla.G.S. and Upadhya.V.B. Economic Zoology (Rastogi publications)
2. Ahsan, J and Sinha, S.P. A handbook on economic zoology, S.Chand & Co
3. Sarder singh – Beeking in India
4. Santhanam - Aquaculture
5. Ullal.S.R. and Narasimhanna, M.N – Central Silk Board, Govt. of India, Bombay.
6. Singh – Livestock and poultry production
7. Jhingran – Fish and fisheries
8. T.V.R. Pillai – Coastal Aquaculture
9. Maine product export development authority – Freshwater fishes, Ornamental fishes, Shrimph culture – MPEDA publication one set.

Semester IV
Allied course V P
Code: 08 UZO 4305 : 2 P

B.Sc., (Zoology)

Hrs. 2
Credits 2
Marks 50

**B.Sc. (Allied Zoology) Practical – II
(For B.Sc. Botany)**

ALLIED ZOOLOGY PRACTICAL – II

Experiments:

1. Effects of temperature on salivary amylase activity.
2. Observation of human blood smear – RBC, WBC
3. Qualitative estimation of excretory products.

Spotters

Species of animals used in Vermiculture- *Lampito mauritii*, *Perionyx excavatus*
Apiculture – *Apis indica*, Sericulture – *Bombyx mori*, Aquaculture – Major carps : Catla,
Rohu and Mirgal - Prawn : *Macrobrachium* – Poultry : layers & broilers.

Animal products: Honey, Bees wax, Lac, Silk, and Hen's egg.

Record Work