मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी مولانا آزاد نیشنل اُردو یونیورسٹی
MAULANA AZAD NATIONAL URDU UNIVERSITY
(A Central University established by an Act of Parliament in the year 1998)
School of Sciences (Zoology)

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-I: Non Chordates (Theory)

Semester: I	Paper: Core Course (Theory)
Credit: 04	Paper Title: **Non Chordates**
Instruction: 2hr/Wk	Paper Code: BSZY101CCT

Block	Unit
1 Basis of Classification and Lower Invertebrates, Protozoa	**1.1: Basis of Animal Classification:** Basis of animal classification. Zoological nomenclature. Concept of taxonomy and Systematic.
	1.2: Phylum protozoa I: General characters and classification up to classes:
	1.3: Phylum protozoa II: Structure, life Cycle and clinical significance of human protozoan and their diseases caused by *Balantidium coli* (Balantidiasis), *Entamoeba* (Amoebiasis), *Giardia* (Giardiasis diseases), *leishmania* (Leishmaniasis), *Plasmodium*(Malaria),*Trichomoas* (Trichomoniasis), Trypanosoma (Sleeping sickness) and *Leishmania* (Chagas disease).
	1.4: Phylum Porifera: General characters and classification upto classes: Canal system in Sponges, Integumentary system in sponges. Skeleton in Sponges
	1.5: Phylum Cnidaria: General characters and classification upto classes: Polymorphism in Coelenterates., Corals and Coral formation with their significance.
2 Phylum Platyhelminthes, Nemathelminthes, & Annelida	**2.1: Phylum Platyhelminthes:** General characters and classification upto classes: life cycle of *Fasciola hepatica* and *Taenia solium*.
	2.2: Phylum Nemathelminthes: General characters and classification upto classes: Life history of *Ascaris lumbricoides* and its parasitic adaptation.
	2.3: Phylum Annelida I: General characters and classification upto classes:
	2.4 : Phylum Annelida II: Metamerism: Metamerism in Annelida, Significance of Hirudin in Leech.
3 Phylum Onychophora, Arthropoda and Mollusca	**3.1: Phylum Onychophora:** General characters and classification up to classes: Taxonomic position of *Peripatus* and its affinities with Annelida and Arthropoda.
	3.2: Phylum Arthropoda I: General characters and classification up to classes.
	3.3: Phylum Arthropoda II: Economically and Medically important Arthropods, Gregarious behavior of Insects. Vision in Arthropoda, Metamorphosis in Insects.
	3.4:Phylum Mollusca: General characters and classification up to classes: Torsion in gastropoda.
4 Phylum Echinodermata and Hemichordata	**4.1: Phylum Echinodermata I:** General characters and classification up to classes:
	4.2: Phylum Echinodermata II: Water vascular system in Asteroidea, Affinities of Echinoderm with Hemichordates and Chordates.
	4.3: Phylum Hemichordata: General characters and Affinities of *Balanoglossus* with Chordates and Non-chordates.

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-I: Non-Chordates (Practical)

Semester: I	Paper: Core Course (Practical)
Credit: 02	Paper Title: **Non-Chordates**
Instruction: 2hr/Wk	Paper Code: BSZY150CCP

Block	Unit
1 Light Microscopy, Classifications and comments on specimens of Phylum Protozoa, Porifera, Cnidaria and Platyhelminthes	**1.1:** Theoretical and practical knowledge of simple and compound microscope
	1.2: Collection, Identification, Classification and comments on the slides/specimens of Protozoa: *Amoeba*, *Euglena, Plasmodium, Paramecium, Trypanosoma, Elphidium, Vorticella*
	1.3: Identification, Classification and comments on the slides/specimens of Porifera: *Sycon*, *Hyalonema*, and *Euplectella*
	1.4: Identification, Classification and comments on the slides/specimens of **Cnideria**: *Hydra, Obelia, Physalia, Aurelia, Tubipora* **Platyhelminthes**: *Fasciola*, *Taenia* and their larvae,
2 Classifications and comments on specimens of Phylum Aschelminthes, Arthropoda, Mollusca and Hemichordata	**2.1:** Identification, Classification and comments on the slides/specimens of *Aschelminthes: Ascaris, Ancylostoma, Wuchereria,* Annelida: *Pheretima*, *Hirudinaria* (Leech), *Nereis*,
	2.2: Identification, Classification and comments on the slides/specimens of **Arthropoda**: *Palaemon* (Prawn), Crab, Palamnaeus (Scorpion) **Mollusca**: *Pila* (Apple snail), *Lamellidens* (Unio), Sepia, Octopus
	2.3: Identification, Classification and comments on the slides/specimens of Echinodermata: *Asterias* (Sea Star), *Echinus* (Sea urchin) **Hemichordata**: *Balanoglossus*
	2.4: Demonstration of earthworm Nerve ring and Ovaries; appendages of arthropods (Prawn).

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-II: Chordates (Theory)

Semester: II	Paper: Core Course (Theory)
Credit: 04	Paper Title: **Chordates**
Instruction: 2hr/Wk	Paper Code: BSZY201CCT

Block	Unit
1. Introduction to Chordates, Protochordates & Pisces.	**1.1:** Chordates: Introduction and origin; Protochordates - General features and Phylogeny of Hemichordates, Urochordates and Cephalochordates.
	1.2: Retrogressive metamorphosis; Agnatha - General features of Agnatha and classification of cyclostomes up to classes.
	1.3: Pisces - General features and Classification up to orders.
	1.4: Osmoregulation in Fishes; Migration and Parental care in fishes.
2. Amphibians, Reptiles, Aves & Mammals	**2.1:** Amphibians: General Characters, Classification upto orders, Parental care.
	2.2: Reptiles - General Characters, Classification upto orders. Poisonous and non- poisonous snakes in India, Biting mechanism in snakes.
	2.3: Aves -General Characters, Classification upto orders, Types of feathers, flight adaptations, Mechanism of flight and Migration.
	2.4: Mammals - General Characters, Classification upto orders. Origin of Mammals.
3. Comparative anatomy of chordates -I	**3.1:** Integumentary System - Derivatives of integument w.r.t. glands and digital tips.
	3.2: Skeletal System, Evolution of visceral arches.
	3.3: Digestive System -Brief account of alimentary canal and digestive glands.
	3.4: Respiratory System -Brief account of Gills, lungs, air sacs and swim bladder.
4. Comparative anatomy of Chordates -II	**4.1.** Circulatory System - Evolution of heart and aortic arches
	4.2. Urino-genital system- Succession of kidney, Evolution of Urino-genital ducts
	4.3. Nervous System -Comparative account of brain.
	4.4. Sensory organs -Types of receptors.

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-II: Chordates (Practical)

Semester: II	Paper: Core Course (Practical)
Credit: 02	Paper Title: **Chordates**
Instruction: 2hr/Wk	Paper Code: BSZY250CCP

Block	**Unit**
1 General account of Chordates	**1.1:** Identification, Classification and comments on the specimens of **Protochordates**: *Herdmania; Amphioxus;* **Pices**: *Labeo, Branchiostoma, Petromyzon, Sphyrna, Pristis, TorpedoExocoetus*, Anguilla; **Amphibia**: *Ichthyophis/Ureotyphlus,Salamandra, Bufo, Hyla*
	1.2: Isolation of Placoid/Ctenoid Scales and Estimation of age of fishes through Scales
	1.3: Isolation of Weberian Ossicles/Accessory respiratory organ/cranial nerve from fishes.
	1.4: Report submission on the identification, Classification and characters of Reptiles, Aves, and Mammals species seen during the visit of Zoological Park and the Campus.
2 Comparative anatomy	**2.1:** Types of scales in fishes; Feathers in birds; Integumentary organs in mammals
	2.2: Collection and characterization of various kinds of feathers and submission of file records.
	2.3: Skeleton of fowl and rabbit
	2.4: Mammalian skulls and Dentition: One herbivorous and one carnivorous animal.

मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी مولانا آزاد نیشنل اُردو یونیورسٹی
MAULANA AZAD NATIONAL URDU UNIVERSITY
(A Central University established by an Act of Parliament in the year 1998)
School of Sciences (Zoology)

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-III: Physiology & Biochemistry (Theory)

Semester: III	Paper: Core Course (Theory)
Credit: 04	Paper Title: **Physiology & Biochemistry**
Instruction: 4hr/Wk	Paper Code: BSZY301CCT

Block	Unit
1. Biomolecules	**1.1: Biomolecules and Metabolism:** Carbohydrates: Classification and function of Carbohydrates, Carbohydrate metabolism - Glycolysis, Krebs cycle, Electron transport and oxidative, phosphorylation.
	1.2: Proteins & Enzymes: Proteins: Amino acid structure, classification; Proteins structure, classification and functions a, Protein Metabolism - Transamination, Deamination and Urea Cycle. Enzymes-classification, mechanism of action, enzyme inhibition, feedback inhibition-regulation of enzyme reactions,
	1.3: NucleicAcid: Nucleic acids- Deoxyribose nucleic acid (DNA) and Ribose Nucleic Acid (RNA) structure (Primary and secondary) and functions. Coding and Non-coding RNA.
	1.4: Lipids: Lipids: Classification of Lipids, Lipid Metabolism - Fatty acid synthesis and Fatty acid oxidation.
2. Physiology of Digestion, Respiration & Circulation	**2.1: Physiology of Digestion:** Extra and intracellular digestion, Digestion of Carbohydrates, Proteins, Lipids and Cellulose,
	2.2: Absorption and Assimilation of digested food; role of Gastrointestinal hormones indigestion.
	2.3: Physiology of Respiration- External, Internal and cellular Respiration; Respiratory Pigments; Transport of oxygen, Oxygen dissociation curves. Bohr's effect, Transport of CO_2 – Chloride shift; Nervous and Chemical Regulation of respiration.
	2.4: Circulatory system -Types of circulation - Open and Closed circulation; Structure of Mammalian Heart, Types of hearts – Neurogenic and Myogenic; Heart function –Conduction and regulation of heart beat, Regulation of Heart rate – Tachycardia and Bradycardia; Blood Clotting mechanism.
3. Physiology of Excretion, Muscle Contraction and Nerve impulse transmission	**3.1: Physiology of Excretion**: Classification of Animals on the basis of excretory products- Ammonotelic, Uricotelic, Ureotelic, Structure and function of Nephron; Urine formation, Counter current mechanism.
	3.2: Osmoregulation: Water and ionic regulation by freshwater, brackish water and marine animals
	3.3: Muscles: Muscle Contraction, Ultra structure of skeletal muscle fibre, Sliding Filament theory, muscle contraction mechanism and energetics.
	3.4: Structure of Neuron: Nerve impulse - Resting potential and Action potential and Conduction of Nerve impulse, Synapse, types of synapses and Synaptic transmission.
4. Endocrine & Reproductive Physiology	**4.1:** Reproduction and Endocrine System- Endocrine glands - Structure, secretions and functions of Pituitary, Thyroid, Parathyroid, Adrenal glands and Pancreas,
	4.2: Hormone action and concept of Secondary messengers,
	4.3: Male and Female Hormones, Hormonal control of Menstrual cycle in humans.
	4.4: Concept of Homeostasis, Mechanism of Homeostasis,

मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी مولانا آزاد نیشنل اُردو یونیورسٹی
MAULANA AZAD NATIONAL URDU UNIVERSITY
(A Central University established by an Act of Parliament in the year 1998)
School of Sciences (Zoology)

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-III: Physiology & Biochemistry Practical

Semester: III	Paper: Core Course (Practical)
Credit: 02	Paper Title: **Physiology & Biochemistry**
Instruction: 2hr/Wk	Paper Code: BSZY350CCP

Block	Unit
1 Estimation and Identification of macromolecules	**1.1:** Qualitative tests to identify functional groups of carbohydrates in given solutions (Glucose, Fructose, Sucrose, Lactose)
	1.2: Separation of Amino acids by paper chromatography
	1.3: Estimation of total protein in given solutions by Lowry's method.
	1.4: Estimation of nucleic acids (DNA/RNA)
2 Mammalian histology and Physiology	**2.1:** Preparation of hemin crystals
	2.2: Blood clotting and coagulation time
	2.3: Study of permanent histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland
	2.4: Study of activity of salivary amylase under optimum conditions

मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी مولانا آزاد نیشنل اُردو یونیورسٹی
MAULANA AZAD NATIONAL URDU UNIVERSITY
(A Central University established by an Act of Parliament in the year 1998)
School of Sciences (Zoology)

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)
Semester-IV: Genetics & Evolutionary Biology (Theory)

Semester: IV	Paper: Core Course (Theory)
Credit: 04	Paper Title: **Genetics & Evolutionary Biology**
Instruction: 4hr/Wk	Paper Code: BSZY401CCT

Block	Unit
1. Classical & Molecular Genetics	**1.1: Introduction to Genetics:** Inheritance and variation, Brief explanation on Mendel's work on transmission of traits (selection of experimental material and traits, hybridization, pure line, reciprocal crosses, maintenance of statistical records etc.
	1.2: Molecular basis of Genetic Information: DNA and chromosome structure, replication, concept of gene, Importance of model organisms in the study of genetics.
	1.3: Mendelian Genetics: Mendelian Principles of Inheritance and its extensions: Law of segregation, Law of Independent Assortment, test cross (3:1; 9:3:3:1; 1:1), chromosome theory of inheritance (mitosis and meiosis) Incomplete dominance and co dominance (1:2:1), Multiple alleles (ABO blood groups), Lethal alleles (2:1), Epistasis (12:3: 1; 9:7; 15:1), Pleiotropy (sickle cell anaemia);
	1.4: Inheritance patterns: Autosomal inheritance Vs Sex linked Inheritance (pedigree construction of various mode of inheritance, dominant eg., achandroplasia, recessive-eg., albinism, X- linked-eg.,haemophilia and Y Linked eg., hypertrichosis), extra chromosomal inheritance (mitochondrial inheritance in human).
2. Recombination & Chromosomal Anomalies	**2.1: Linkage & Recombination:** Linkage Crossing over and gene mapping: Linkage and crossing over, Bateson and Punnet's experiment, Recombination frequency as a measure of linkage intensity, two factor and three factor crosses, Interference and coincidence, Somatic cell genetics - an alternative approach to gene mapping.
	2.2: Sex determination: Chromosomal mechanisms of Sex Determination (grasshopper, birds, human), dosage compensation (Lyonization and Barr body)
	2.3: Chromosome Structural Mutations: Chromosome Structural Mutations: Standard Karyotype, Deletion, Duplication, Inversion, Translocation,
	2.4: Chromosome numerical mutations: Chromosome numerical mutations: Non-disjuction, Aneuploidy (eg., trisomy 13,18 and 21; monosomy for X chromosome) and Polyploidy; Induced versus Spontaneous gene mutations (mutagen, somatic and germline mutations, substitution and frameshift mutations), Back versus Suppressor mutations.
3. Theories and Evidences of Evolution	**3.1: History of Life:** Major Events in History of Life, Introduction to Evolutionary theories.
	3.2: Darwinism: Lamarckism, Darwinism, Neo-Darwinism
	3.3: Evidences of Evolution: Direct Evidences of Evolution, Types of fossils, Incompleteness of fossil record, Dating of fossils, Phylogeny of horse.
	3.4: Evolutionary Change and natural selection: Processes of Evolutionary Change, Organic variations; Isolating Mechanisms; Natural selection (Example: Industrial melanism); Types of natural selection (Directional, Stabilizing, Disruptive), Artificial selection.
4. Speciation	**4.1: Species Concept:** Species Concept- Biological species concept (Advantages and Limitations)
	4.2: speciation: Modes of speciation (Allopatric, Sympatric)
	4.3: Macro-evolution: Macro-evolution, Macro-evolutionary Principles (example: Darwin's Finches)
	4.4: Extinction: Extinction- Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail), Role of extinction in evolution.

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-IV: Genetics & Evolutionary Biology (Practical)

Semester: IV	Paper: Core Course (Practical)
Credit: 02	Paper Title: **Genetics & Evolutionary Biology Practical**
Instruction: 2hr/Wk	Paper Code: BSZY450CCP

Block	Unit
1 Genetics	**1.1:** Study of Mendelian Inheritance and gene interactions (Non Mendelian Inheritance) using suitable examples. Verify the results using Chi-square test.
	1.2: Study of Linkage, recombination, gene mapping using the data.
	1.3: Study of Human Karyotypes (normal and abnormal)
	1.4: Demonstration of inactive x-chromosome in buccal epithelial cells of human female
2 Evolutionary Biology	**2.1:** Study of fossil evidences from plaster cast models and pictures
	2.2: Study of homology and analogy from suitable specimens/ pictures
	2.3: Chart: a) Phylogeny of horse with diagrams/ cut outs of limbs and teeth of horse ancestors Chart: b) Darwin's Finches with diagrams/ cut outs of beaks of different species
	2.4: Visit to Natural History Museum and submission of report

मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी مولانا آزاد نیشنل اُردو یونیورسٹی
MAULANA AZAD NATIONAL URDU UNIVERSITY
(A Central University established by an Act of Parliament in the year 1998)
School of Sciences (Zoology)

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-V: Applied Zoology & Developmental Biology (Theory)

Semester: V	Paper: Discipline Specific Course-1 (Theory)
Credit: 04	Paper Title: **Applied Zoology & Developmental Biology**
Instruction: 4hr/Wk	Paper Code: BSZY501DST

Block	Unit
1 Host parasite interactions, Insect pest management	**1.1: Host-parasite Relationship:** Introduction to Host-parasite Relationship Host, Definitive host, Intermediate host, Parasitism, Reservoir,
	1.2: Zoonosis: Zoonosis, Symbiosis, Commensalism. Examples of bacterial diseases, protozoan and helminth diseases
	1.3: Insects of Economic importance-I: Pests : Biology, Control and damage caused by *Helicoverpa armigera, Pyrilla perpusilla* and *Papilio demoleus, Callosobruchus chinensis, Sitophilus oryzae* and *Tribolium castaneum;*
	1.4: Insects of Economic importance-II: *Pediculus humanus corporis, Anopheles, Culex, Aedes, Xenopsylla cheopis*
	1.5: Useful Insects: Honey bee : social organization, importance of apiculture, bee products. Silk worm and lac insect: Economic importance
2 Animal, Poultry and Pisiculture Management	**2.1: Animal Husbandry:** Animal Husbandry- Preservation and artificial insemination in cattle; Induction of early puberty and synchronization of estrus in cattle
	2.2: Poultry Farming: Poultry Farming- Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation of eggs
	2.3: Pisciculture: Introduction to Pisciculture, Genetic improvements in aquaculture industry; Induced breeding and transportation of fish seed
3 Embryology and Developmental biology of lower vertebrates: Amphibians	**3.1: Historical Perspective:** Introduction - Historical Perspective, Theories of Preformation, Epigenesis, Recapitulationand Germplasm, Determinate and Indeterminate types of development, Germ layers and Derivatives.
	3.2: Types of eggs: Classification of eggs based on: the amount, distribution of yolk and presence or absence of shell; the development (determinate & indeterminate); egg membranes;
	3.3: Cleavage and cell lineage: Types of cleavage with examples: based on planes ; based on amount of yolk ; based on development ; basedon Pattern (Radial & Spiral); Cell lineage studies in Planocera; Different types of blastulae.
	3.4: - Development of Frog: Fertilization, Cleavage, Blastulation & fate map, Gastrulation, (Morphogenetic movements) and formation of germ layers, neurulation &notochord formation, mesoderm and coelom formation; organogeny of brain and eye; hormonal control of amphibian metamorphosis.
4 Developmental biology: Aves and Mammals	**4.1: Development of Chick:** Fertilization, Structure of egg; cleavage, blastulation, gastrulation and formation of germ layers; Salient features of chick embryo at primitive streak stage, 24 & 33, 48 hours stage; Development and functions of extra-embryonic membranes.
	4.2:Development of Man: Cleavage and formation of morula, development of blastocyst, implantation, gastrulation up to the formation of germ layers. Cell Differentiation and Gene action during development, Cell differentiation,
	4.3: Potency: totipotency, pluripotency, Dedifferentiaton and Redifferentiation; controlled gene expression during development, Homeoticgenes, Mention Hoxgenes; Stem cells, their significance and applications .
	4.4: Experimental Embryology: Construction of fate map, Vital staining, Marking with carbon particles &radio active tracing.

मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी مولانا آزاد نیشنل اُردو یونیورسٹی
MAULANA AZAD NATIONAL URDU UNIVERSITY
(A Central University established by an Act of Parliament in the year 1998)
School of Sciences (Zoology)

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-V: Applied Zoology & Developmental Biology (Practical)

Semester: V	Paper: Core Course (Practical)
Credit: 02	Paper Title: **Applied Zoology & Developmental Biology**
Instruction: 2hr/Wk	Paper Code: BSZY550DSP

Block	Unit
1 Applied Zoology	**1.1:** Study of arthropod vectors associated with human diseases: *Pediculus, Culex, Anopheles, Aedes* and *Xenopsylla.*
	1.2: Study of insect damage to different plant parts/stored grains through damaged products/ photographs. Identifying feature and economic importance of *Helicoverpa (Heliothis) armigera, Papilio demoleus, Pyrilla perpusilla, Callosobruchus chinensis, Sitophilus oryzae* and *Tribolium castaneum*
	1.3: Visit to poultry farm or animal breeding centre. Submission of visit report
	1.4: Maintenance of freshwater aquarium
2 Developmental Biology	**2.1:** Frog - Study of developmental stages - whole mounts and sections through permanent slides – cleavage stages, blastula, gastrula, neurula, tail bud stage, tadpole external and internal gill stages.
	2.2: Study of the different types of placenta- histological sections through permanent slides or photomicrographs.
	2.3: Study of placental development in humans by ultrasound scans.
	2.4: Examination of gametes - frog/rat - sperm and ova through permanent slides or photomicrographs.

मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी مولانا آزاد نیشنل اُردو یونیورسٹی
MAULANA AZAD NATIONAL URDU UNIVERSITY
(A Central University established by an Act of Parliament in the year 1998)
School of Sciences (Zoology)

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-V: SEC: Sericulture (Theory)

Semester: V	Paper: Skill Enhancement Course SEC (Theory)
Credit: 04	Paper Title: **Sericulture**
Instruction: 4hr/Wk	Paper Code: UGZY501SET

Block	Unit	
1 Introduction to Sericulture and Biology of *Bombyx mori*	1.1:	Sericulture: Definition, Prospectus of Sericulture in India: Sericulture industry in different states, employment.
	1.2:	Sericulture and its components, varieties of silkworms: mulberry silk worm; Tasar, Muga and Eri silkworm in India;
	1.3:	Distribution and Races of silkworms; Exotic and indigenous races of silkworms.
	1.4:	Biology of silkworms: Life cycle of Mulberry silkworm-*Bombyx mori*; Structure of silk gland and secretion of silk.
2 Principles of Moriculture	2.1:	Mulberry and non-mulberry Sericulture (Tasar culture; Muga culture; Eri culture)
	2.2:	Rearing of Mulberry silkworm: Moriculture: Selection of mulberry variety and cultivation of mulberry garden;
	2.3:	Rearing house and Rearing appliances or equipments and their maintenance,
	2.4:	Precautions and Disinfectants (Formalin, bleaching powder, RKO etc); environmental factors
3 Pest Management in Sericulture and economic importance of silk	3.1:	Seeds procurement & brushing; Preparation of feed bed (cleaning, spacing) and feeding.
	3.2:	Silkworm rearing technology: Early age and Late age rearing.
	3.3:	Mounting: Types of mountages.
	3.4:	Cocoons harvesting, processing (stifling, spinning, reeling) and storage; Difference between Raw and Spun silk.
4 Pathology of silk worm diseases	4.1:	Pests and Diseases of silkworm: Uzi fly, dermestid beetles and vertebrates,
	4.2:	Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial,
	4.3:	Control and prevention of pests and diseases.
	4.4:	Properties of silk and their uses

मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी مولانا آزاد نیشنل اُردو یونیورسٹی
MAULANA AZAD NATIONAL URDU UNIVERSITY
(A Central University established by an Act of Parliament in the year 1998)
School of Sciences (Zoology)

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-VI: Animal Biotechnology (Theory)

Semester: VI	Paper: Discipline Specific Course (Theory)
Credit: 04	Paper Title: **Animal Biotechnology**
Instruction: 4hr/Wk	Paper Code: BSZY601DST

Block	Unit
1 Animal Cell and Tissue Culture	**1.1:** Concept and scope of Biotechnology; Introduction to cell and Tissue culture-Sources of cell;
	1.2: Primary culture-Techniques of cells isolation (Mechanical; Enzymatic Disaggregations),
	1.3: Basic requirements and laboratory management for cell/tissue culture, Culture media (Natural and Artificial) composition and preparation; Sterilization; Cryopreservation;
	1.4: Isolation of Cell lines-Large scale culture of cell lines, Types of cultured cells, Application of organ culture and cell culture products.
2 Molecular Techniques in Gene manipulation	**2.1:** Recombinant DNA Technology: Creation of recombinant DNA, Restriction endonucleases, methods of ligation, DNA ligases, ligation of fragment with cohesive and blunt ends;
	2.2: Features of cloning vectors - Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC, MAC. **2.3:** Expression vectors (characteristics) Screening: Colony hybridization and plaque hybridization.
	2.4: Transformation techniques: Calcium chloride method and electroporation. Southern, Northern and Western blotting;
	2.5: DNA sequencing: Sanger method, Polymerase Chain Reaction, DNA Finger Printing and DNA micro array
3 Genetically Modified Animals	**3.1:** Production of cloned and transgenic animals: Methods of Genetic manipulations in animals; Pronuclear Transfer of genes, Microinjection,
	3.2: Use of embryonic stem cells, Retroviral Vectors Transmission of Transgenes in brief;
	3.3: Nuclear Transfer Applications of transgenic Livestock:
	3.4: Production of pharmaceuticals and biomolecules. production of donor organs, knockout mice.
4 Applications in Human Health	**4.1:** Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anaemia), Expressing cloned genes in mammalian cells.
	4.2: Recombinant DNA in medicines: Recombinant insulin and human growth Hormone.
	4.3: An over view on Gene therapy, stem cell therapy, Importance of stem cell. Bio safety and ethical issues.

मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी مولانا آزاد نیشنل اُردو یونیورسٹی
MAULANA AZAD NATIONAL URDU UNIVERSITY
(A Central University established by an Act of Parliament in the year 1998)
School of Sciences (Zoology)

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-VI: Animal Biotechnology Practical Syllabus

Semester: IV	Paper: Core Course (Practical)
Credit: 02	Paper Title: **Animal Biotechnology Practical**
Instruction: 2hr/Wk	Paper Code: BSZY450CCP

Block	Unit
1 Establishment of Primary cell culture, Molecular cloning	**1.1:** Primary cell culture of fish organ
	1.2: Restriction digestion of plasmid DNA/genomic DNA.
	1.3: PCR for cloning a DNA segment
	1.4: Construction of circular and linear restriction map from the data provided.
2 Techniques to characterize nucleotide sequecences in DNA and RNA	**2.1:** Calculation of transformation efficiency from the data provided.
	2.2: To study (a) Southern Blotting (b)Northern Blotting (c)Western Blotting techniques through photographs
	2.3: To study (a) DNA Sequencing (b) Sanger's Method (c) DNA fingerprinting techniques through photographs
	2.4: Good Laboratory Practices (GLP).

मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी مولانا آزاد نیشنل اُردو یونیورسٹی
MAULANA AZAD NATIONAL URDU UNIVERSITY
(A Central University established by an Act of Parliament in the year 1998)
School of Sciences (Zoology)

B.Sc. (Life Sciences)-Zoology Syllabus (DDE format)

Semester-VI: Medical Diagnostics (Theory)

Semester: VI	Paper: Skill Enhancement Course SEC (Theory)
Credit: 04	Paper Title: **Medical Diagnostics**
Instruction: 4hr/Wk	Paper Code: UGZY601SET

Block	Unit
1 Biomedical basis of Diseases	1.1: Infectious diseases (Bacterial, Viral, Protozoan)
	1.2: Inherited/genetic diseases (Diabetes, Hypertension)
	1.3: Immunological diseases; Autoimmune hemolyticanemia (AHA), DiGeorge's Syndrome, Systemic Lupus Erythematosus (SLE)
	1.4: Cancer- Nature/ types; Treatment How pathogenesis relates to symptoms, diagnosis and treatment.
2 Diagnostics Methods Used for Analysis of Blood and urine	2.1: Microbiology: bacterial, protozoan, histology
	2.2: Biochemistry and immunology
	2.3: Haematology: Blood composition, CBP, DLC, E.S.R, P.C.V.
	2.4: Diagnostic Methods Used for Urine Analysis
3 Imaging Technology	3.1: X-ray, Electro Cardiogram
	3.2: Computer Tomography, Magnetic resonance Imaging,
	3.3: PET Scan
	3.4: Ultrasound, Echo
4 Analytical Technology	4.1: Brief and relevant description of the Chromatography
	4.2: Methods- LC, HPLC and GC-MS Nuclear Magnetic Resonance Spectroscopy (NMR)
	4.3: Atomic Force and Scanning Electron Microscopy (AFM and SEM) Electrochemistry
	4.4: Molecular Modeling and Chemical Databases