



# MUGBERIA GANGADHAR MAHAVIDYALAYA

P.O.—BHUPATINAGAR, Dist.—PURBA MEDINIPUR, PIN.—721425, WEST BENGAL, INDIA

NAAC Re-Accredited B+Level Govt. aided College

CPE (Under UGC XII Plan) & NCTE Approved Institutions

DBT Star College Scheme Award Recipient

E-mail : mugberia\_college@rediffmail.com // www.mugberiangangadharmahavidyalaya.ac.in

## PROGRAMME OUTCOME (PO), COURSE OUTCOME (CO) AND PROGRAMME SPECIFIC OUTCOME (PSO) FOR END SEMESTER STUDENTS UNDERGRADUATE COURSE: 2019- 2020

MUGBERIA GANGADHAR MAHAVIDYALAYA

DEPARTMENT OF ZOOLOGY



Principal  
Mugberia Gangadhar Mahavidyalaya

## PROGRAMME OUTCOME:

- **PO1 – KNOWLEDGE ENRICHMENT:** Students gain knowledge and skill in the fundamentals of animal sciences, understands the complex interactions among various living organisms.
- **PO2 – FUNDAMENTAL KNOWLEDGE ABOUT ANIMAL:** Analyze complex interactions among the various animals of different phyla, their distribution and their relationship with the environment
- **PO3 –SELF AWARENESS SKILL:** Apply the knowledge of internal structure of cell, its functions in control of various metabolic functions of organisms.
- **PO4 – ETHOLOGICAL PROFICIENCY:** Understands the complex evolutionary processes and behaviour of animals
- **PO5 – PHYSIOLOGICAL LEARNING:** Correlates the physiological processes of animals and relationship of organ systems
- **PO6 – ENVIRONMENTAL KNOWLEDGE:** Understanding of environmental conservation processes and its importance, pollution control and biodiversity and protection of endangered species
- **PO7 – EMPLOYABILITY OPTIONS:** Gain knowledge of Agro based Small Scale industries like sericulture, fish farming, butterfly farming and vermicompost preparation.
- **PO8 –CRITICAL ANALYSIS:** Understands about various concepts of genetics and its importance in human health
- **PO9 –ETHICAL COMPREHENSION:** Apply ethical principles and commit to professional ethics and responsibilities in delivering his duties
- **PO10 –SELF DIRECTED KNOWLEDGE:** Apply the knowledge and understanding of Zoology to one's own life and work
- **PO11 –EMPATHY DEVELOPMENT:** Develops empathy and love towards the animals
- **PO12 – CAREER DEVELOPMENT SKILL:** After completion of this course, they have the option to go for higher studies like M.Sc /Integrated M.Sc., PhD and then do research work for the welfare of mankind.
- **PO13- EXPERIMENTAL AND RESEARCH DEVELOPMENT SKILL:** Gains knowledge about research methodologies, effective communication and skills of problem solving methods.

## COGNITIVE LEVELS:

R= Remembering, U= Understanding, AP= Applying, AN= Analysing, E= Evaluating, C= Creating



## PROGRAMME SPECIFIC OUTCOME:

- **PSO1:** Demonstrate a fundamental understanding of the academic field of Zoology, its different learning areas and applications, and its link with related disciplinary areas/subjects; provides awareness on the divisions in Animal Kingdom, their distribution, relationship among them and with the environment.
- **PSO2:** Show Procedural knowledge in various professions related to the subject in different fields inclusive of research and development, teaching, government and public services with the help of practical tests in different branches; Use it to analyse complex interactions among the various animals of different phyla, their distribution and their relationship with the environment.
- **PSO3:** Exhibit Skills in areas related to their individual specialization like genetic engineering, in relation to current developments and related fields in the domain; helps to apply the knowledge of internal structure of cell, its functions in control of various metabolic functions of organisms.
- **PSO4:** Able to communicate the concepts, constructs and techniques involved in with ease and in a clear manner based on the animal evolution, animal behaviour, animal development and animal ecology topics.
- **PSO5:** Techniques and Methodologies discussed in the vital topics like Cell Biology, Genetics, Molecular Biology manifest the knowledge in research specific areas and studies by correlating the physiological processes of animals and relationship with cellular structure.
- **PSO6:** Understand the environmental conservation processes and its importance, pollution control, protection of endangered species, Wildlife Management, Climatic changes and Global Management are discussed as a paper to improvise the subject knowledge for identifying any problems related and in helping the impacted environment and biodiversity.
- **PSO7:** Helps advancement in job, trades, and employment with the help of knowledge about of Agro-based Small Scale industries like sericulture, fish farming, butterfly farming and vermicompost preparation and helps create various opportunities in the educational, research and developmental, social entrepreneurial sectors related to the same.
- **PSO8:** Should be able to create a contextual contents and examples in the real time world based on the applications and discussions carried out in all the subjects like combining clinical laboratory techniques studied as part of Medical Parasitology and behaviours of the microbes studied as part of the Microbiology.
- **PSO9:** Improve the observational, computational, and analytical ethical skills required for the research and development fields discussed for evolving trends in Genetics, molecular biology, micro-biology, cell biology, etc.



<p style="text-align: center;"><u>Abbreviation Used</u>  <b>CC= Core Course</b>  <b>GE= Generic Elective</b>  <b>SEC = Skill Enhancement Course</b>  <b>AECC- Ability Enhancement Compulsory Course</b>  <b>DSE: Discipline Specific Elective.</b></p>		
Core Course	List of Core Courses (14 Papers for the Student of Zoology)	Semester
UGZOOCC 01	Non-Chordates I	I
UGZOOCC 02	Ecology	
UGZOOCC 03	Non-Chordates II	II
UGZOOCC 04	Cell Biology	
UGZOOCC 05	Chordates	III
UGZOOCC 06	Animal Physiology: Controlling & Coordinating Systems	
UGZOOCC 07	Fundamentals of Biochemistry	
UGZOOCC 08	Comparative Anatomy of Vertebrates	
UGZOOCC 09	Animal Physiology: Life Sustaining Systems	IV
UGZOOCC 10	Immunology	
UGZOOCC 11	Molecular Biology	V
UGZOOCC 12	Genetics	
UGZOOCC 13	Developmental Biology	VI
UGZOOCC 14	Evolutionary Biology	
<b>GE</b>		
UGZOOGE03	Aquatic Biology	III
UGZOOGE04	Environment and Public Health	IV
<b>SEC</b>		
UGZOOSEC 01	Apiculture	III
UGZOOESC 02	Sericulture	IV
<b>DSE</b>		
UGZOODEC 01	Fish and Fisheries	V
UGZOODEC02	Animal Biotechnology	
UGZOODEC03	Parasitology	VI
UGZOODEC04	Wild Life Conservation and Management	



## Core Course

### SEMESTER I

**Course Name:** Non-Chordates I

**Course Code:** UGZOOCC 01

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO1.1	Definitions: Classification, Systematics and Taxonomy; Taxonomic Hierarchy, Taxonomic types Codes of Zoological Nomenclature; Principle of priority; Synonymy and Homonymy; Six kingdom concept of classification (Card woose).	PO1, PO2, PO11, PO12, PO13	PSO1, PSO2	R
CO1.2	Protozoa General characteristics and Classification up to phylum (according to Levine et. al., 1981) Locomotion in Euglena, Paramoecium and Amoeba; Conjugation in Paramoecium. Life cycle and pathogenicity of Plasmodium vivax and Entamoeba histolytica.	PO1, PO2, PO11	PSO1, PSO2	AP
CO1.3	Evolution of symmetry and segmentation of Metazoa. General characteristics and Classification up to classes; Canal system and spicules in sponges. General characteristics and Classification up to classes Metagenesis in Obelia & Aurelia Metagenesis in Obelia Polymorphism in Cnidaria Corals and coral reef diversity, function & conservation. Ctenophora General characteristics.	PO1, PO5	PSO1, PSO2	R,U
CO1.4	General characteristics and Classification up to Classes, Life cycle and pathogenicity and control measures of Fasciola hepatica and Taenia solium. Nematoda General characteristics and Classification up to classes Life cycle, and pathogenicity and control measures of Ascaris lumbricoides and Wuchereria bancrofti. Parasitic adaptations in helminthes.	PO10	PSO1, PSO2	U, AP
CO1.5	Study of whole mount of Euglena, Amoeba and Paramoecium Identification of Amoeba, Euglena, Entamoeba, Opalina, Paramecium, Plasmodium vivax and Plasmodium falciparum (from the prepared slides) Identification of Sycon, Neptune's Cup, Obelia, Physalia, Millepora, Aurelia, Tubipora, Corallium, Alcyonium, Gorgonia, Metridium, Pennatula, Fungia, Meandrina, Madrepora..Identification and significance of adult Fasciola hepatica, Taenia solium and Ascaris lumbricoides. Staining/mounting of any protozoa/helminth from gut of cockroach.	PO1, PO10, PO13	PSO1, PSO2	AN, AP



**Course Name:** Ecology

**Course Code:** UGZOOCC 02

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO2.1	History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of Physical factors, The Biosphere. Population, Unitary and Modular populations Unique and group attributes of population: Demographic factors, life tables, fecundity tables.	PO1, PO6	PSO5	R,U
CO2.2	Survivorship curves, dispersal and dispersion. Geometric, exponential and logistic growth, equation and patterns, r and K strategies Population regulation - density-dependent and independent factors. Population Interactions, Gause's Principle with laboratory and field examples, Lotka-Volterra equation for competition Community characteristics: species diversity, abundance, dominance, richness, Vertical stratification, Ecotone and edge effect. Ecological succession with one example.	PO4, PO6	PSO2	U
CO2.3	Ecosystem. Types of ecosystem with an example in detail. Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies Nutrient and biogeochemical cycle with an example of Nitrogen cycle Human modified ecosystem Applied Ecology, Wildlife Conservation (in-situ and ex-situ conservation). Management strategies for tiger conservation; Wild life protection act (1972).	PO6, PO9	PSO2, PSO6	U, AP
CO 2.4	Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided .Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shannon-Weiner diversity index for the same community Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and free CO <sub>2</sub> , Report on a visit to National Park/Biodiversity Park/Wild life sanctuary Note: In field report costal area to be included.	PO6	PSO5, PSO6	AN, AP, E



## SEMESTER II

**Course Name:** Non-Chordates II

**Course Code:** UGZOOCC 03

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO3.1	Evolution of coelom and metamerism. General characteristics and Classification up to classes .Excretion in Annelida through nephridia. Metamerism in Annelida. General characteristics and Classification up to classes Vision in Insecta only. Respiration in Arthropoda (Gills in prawn and trachea in cockroach) Metamorphosis in Lepidopteran Insects.Social life in termite. General characteristics and Evolutionary significance of onychophora.	PO2	PSO1,PSO2	U
CO3.2	General characteristics and Classification up to Classes.Nervous system and torsion in Gastropoda Feeding and respiration in Pila sp. General characteristics and Classification up to classes.Water-vascular system in Asteroidea .Larval forms in Echinodermata .Affinities with Chordates. General characteristics of phylum Hemichordata. <i>Relationship with non-chordates and chordates.</i>	PO5	PSO1	R
CO3.3	Study of following specimens: Annelids - Aphrodite, Nereis, Heteronereis, Sabella, Serpula, Chaetopterus, Pheretima, Hirudinaria, Arthropods - Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, Bombyx, Periplaneta, termites and honey bees Onychophora – Peripatus, Molluscs - Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Pinctada, Sepia, Octopus, Nautilus, Echinodermates - Pentaceros/Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and, Antedon. Study of digestive system, septal nephridia and pharyngeal nephridia of earthworm, T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm.Mount of mouth parts and dissection of digestive system and nervous system of Periplaneta.To submit a Project Report on any related topic to larval forms ( crustacean, mollusc and echinoderm)	PO1, PO2, PO5	PSO1,PSO2	R, U, AP



**Course Name:** Cell Biology

**Course Code:** UGZOOCC 04

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO4.1	Basic structure of Prokaryotic and Eukaryotic cells, Viruses, Viroid, Prion and Mycoplasma. Ultra structure and composition of Plasma membrane: Fluid mosaic model. Transport across membrane: Active and Passive transport, Facilitated transport. Cell junctions: Tight junctions, Gap junctions, Desmosomes. Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes. Protein sorting and mechanisms of vesicular transport. Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis. Mitochondrial Respiratory Chain, Chemi-osmotic hypothesis. Peroxisomes: Structure and Functions. Centrosome: Structure and Functions. Type, structure and functions of cytoskeleton. Accessory proteins of microfilament & microtubule. A brief idea about molecular motors.	PO3, PO8	PSO3, PSO8	R, U
CO4.2	Structure of Nucleus: Nuclear envelope, Nuclear pore complex, Nucleolus. Chromatin: Euchromatin and Hetrochromatin and packaging (nucleosome). Cell cycle and its regulation, Cancer (Concept of oncogenes and tumor suppressor genes with special reference to p53, Retinoblastoma and Ras and APC. Mitosis and Meiosis: Basic process and their significance. Cell signalling transduction pathways; Types of signaling molecules and receptors GPCR and Role of second messenger (cAMP). Extracellular matrix-Cell interactions Apoptosis and Necrosis.	PO3, PO8	PSO3, PSO9	U
CO4.3	Preparation of temporary stained squash of onion root tip to study various stages of mitosis. Study of various stages of meiosis. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells. Preparation of permanent slide to demonstrate: DNA by Feulgen reaction, Cell viability study by Trypan Blue staining, Mitochondria identification through vital staining	PO8	PSO3	AP, AN





## SEMESTER III

**Course Name:** Chordates

**Course Code:** UGZOCC 05

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO5.1	General characteristics and outline classification of Phylum Chordate. <i>General characteristics and classification of sub-phylum Urochordata and Cephalochordate up to Classes. Retrogressive metamorphosis in Ascidia. Chordate Features and Feeding in Branchiostoma.</i>	PO2	PSO1,P SO2	R
CO5.2	Dipleurula concept and the Echinoderm theory of origin of chordates Advanced features of vertebrates over Protochordata. General characteristics and classification of cyclostomes up to order. General characteristics and classification of Chondrichthyes and Osteichthyes up to Subclasses. Accessory respiratory organ, migration and parental care in fishes Swim bladder in fishes. Classification up to Sub-Classes. General characteristics and classification up to living Orders. Metamorphosis and parental care in Amphibia. General characteristics and classification up to living Orders. Poison apparatus and Biting mechanism in Snake. General characteristics and classification up to Sub-Classes Exoskeleton and migration in Birds. Principles and aerodynamics of flight. General characters and classification up to living orders Affinities of <i>Prototheria. Exoskeleton derivatives of mammals. Adaptive radiation in mammals with reference to locomotory appendages Echolocation in Micro chiropterans and Cetaceans.</i>	PO1, PO5, PO6	PSO1,P SO2	R, U
CO5.3	Zoogeographical realms, Plate tectonic and Continental drift theory, distribution of birds and mammals in different realms.	PO6	PSO6	U
CO5.4	Protochordata, Balanoglossus, Herdmania, Branchiostoma, Agnatha, Petromyzon, Myxine Fishes, Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeuis, Anguilla, Hippocampus, Tetradon/ Diodon, Anabas, Flat fish, Amphibia, Necturus, Bufo, Hyla, Alytes, Axolotl, Tylostotriton, Reptilia, Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus. Key for Identification of poisonous and non-poisonous snakes, Mammalia: Bat (Insectivorous and Frugivorous), Funambulus, Pecten from Fowl head, Dissection of brain and pituitary of Tilapia. Power point presentation on study of any two animals from two different classes by students (may be included if dissections not given permission).	PO2		AN, AP



**Course Name:** Animal Physiology: Controlling & Coordinating Systems

**Course Code:** UGZOCC 06

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO6.1	Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue and, fixation and staining of tissues.	PO10	PSO3	U
CO6.2	Structure and types of bones and cartilages, Ossification. Structure of neuron, resting membrane potential, Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers; Types of synapse, Synaptic transmission and Neuromuscular junction; Reflex action and its types. Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle fibre. Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle fibre. Histology of testis and ovary Physiology of Reproduction. Histology and function of pituitary, thyroid, pancreas and adrenal Classification of hormones; Mechanism of Hormone action. Signal transduction pathways for Steroidal and Non steroidal hormones. Hypothalamus (neuroendocrine gland) - principal nuclei involved in neuroendocrine control of anterior pituitary and endocrine system. Placental hormones.	PO3, PO12	PSO3, PSO9	U,R
CO6.3	Recording of simple muscle twitch with electrical stimulation (or Virtual). Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex), Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells, Study of permanent slides of Mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid, Microtomy: Preparation of permanent slide of any five mammalian (Goat/white rat) tissues.	PO3	PSO3	AP,AN



**Course Name:** Fundamentals of Biochemistry

**Course Code:** UGZOOCC 07

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO7.1	Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides; Derivatives of Monosachharides .Carbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis. Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Triacylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpinoids. Lipid metabolism: $\beta$ -oxidation of fatty acids; Fatty acid biosynthesis. Amino acids Structure, Classification, General and Electro chemical properties of $\alpha$ -amino acids; Physiological importance of essential and non-essential amino acids Proteins. Bonds stabilizing protein structure; Levels of organization.Protein metabolism: Transamination, Deamination, Urea cycle, Fate of C-skeleton of Glucogenic and Ketogenic amino acids. Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids.Types of DNA and RNA, Complementarity of DNA, Hpyo- Hyperchromaticity of DNA Basic concept of nucleotide metabolism.	PO1, PO2, PO5, PO8	PSO3,PSO9	R,U
CO7.2	Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Derivation of Michaelis-Menten equation, Lineweaver-Burk plot; Factors affecting rate of enzyme-catalyzed reactions; Enzyme inhibition; Allosteric enzymes and their kinetics; Strategy of enzyme action- Catalytic and Regulatory (Basic concept with one example each) Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System.	PO12, PO13	PSO5,PSO9	U,R
CO7.3	Qualitative tests of functional groups in carbohydrates, proteins and lipids.Paper chromatography of amino acids. Quantitative estimation of Lowry Methods.Demonstration of proteins separation by SDS-PAGE.To study the enzymatic activity of Trypsin and Lipase.To perform the Acid and Alkaline phosphatase assay from serum/ tissue.	PO13	PSO5,PSO9	AP,AN,E,C



## SEMESTER IV

**Course Name:** Comparative Anatomy of Vertebrates

**Course Code:** UGZOOCC 08

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO9.1	Structure, function and derivatives of integument in amphibian, birds and mammals. Overview of axial and appendicular skeleton; Jaw suspension; Visceral arches. Comparative anatomy of stomach; dentition in mammals. Respiratory organs in fish, amphibian, birds and mammals. General plan of circulation, Comparative account of heart and aortic arches. General plan of circulation, Comparative account of heart and aortic arches. Comparative account of brain, Cranial nerves in mammals. Classification of receptors, Brief account of olfactory and auditory receptors in vertebrate.	PO1,PO2,PO5	PSO1	R,U
CO9.2	Study of placoid, cycloid and ctenoid scales through permanent slides/photographs. Study of disarticulated skeleton of Toad, Pigeon and Guinea pig. Demonstration of Carapace and plastron of turtle. Identification of mammalian skulls: One herbivorous (Guinea pig) and one carnivorous (Dog) animal. Dissection of Tilapia: Circulatory system, Brain, pituitary, urinogenital system.	PO2, PO6	PSO1	R,U



**Course Name:** Animal Physiology: Life Sustaining Systems

**Course Code:** UGZOOCC 09

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO9.1	Structural organisation and functions of Gastrointestinal tract and Associated glands; Mechanical and chemical digestion of food, absorption of Carbohydrates, Lipids, Proteins and Nucleic Acids; Digestive enzymes. Mechanism of Respiration, Respiratory volumes and capacities, transport of Oxygen and Carbon dioxide in blood, Dissociation curves and the factors influencing it, respiratory pigments; Carbon monoxide poisoning.	PO3,PO5,PO10	PSO3,PSO 7	U
CO9.2	Components of Blood and their functions; Structure and functions of haemoglobin Haemostasis; Blood clotting system, Fibrinolytic system Haemopoiesis; Basic steps and its regulation Blood groups; ABO and Rh factor. Structure of mammalian heart, Coronary Circulation, Structure and working of conducting myocardial fibres, Origin and conduction of cardiac impulses Cardiac Cycle and cardiac output Blood pressure and its regulation.Physiological classification based on thermal biology.	PO1,PO5, PO10	PSO3,PSO9	U
CO9.3	Thermal biology of endotherms Osmoregulation in aquatic vertebrates. Extrarenal osmoregulatory organs in vertebrates. Structure of Kidney and its functional unit, Mechanism of urine formation, Regulation of acid- base balance.	PO1,PO5, PO10	PSO3	U
CO9.4	Determination of ABO Blood group.Enumeration of red blood cells and white blood cells using haemocytometer.Estimation of haemoglobin using Sahli's haemoglobinometer.Preparation of haemin and haemochromogen crystals.Recording of blood pressure using a sphygmomanometer.	PO1, PO2, PO5, PO10, PO13	PSO3	AN, AP



**Course Name:** Immunology

**Course Code:** UGZOOCC 10

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO10.1	Basic concepts of health and diseases, Historical perspective of Immunology, Cells and organs of the Immune system. Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral).	PO1, PO5, PO10	PSO3	R, U
CO10.2	Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T-Cell epitopes Structure and functions of different classes of immunoglobulins, Antigen- antibody interactions, Immunoassays (ELISA and RIA), Hybridoma technology, Monoclonal antibody production. Structure and functions of MHC molecules. Structure of T cell Receptor and its signalling, T cell development & selection.	PO2, PO5, PO10	PSO3, PSO5	R, U
CO10.3	Types, properties and functions of cytokines. Components and pathways of complement activation. Gell and Coombs' classification and brief description of various types of hypersensitivities. Malaria, Filariasis, Dengue and Tuberculosis. Various types of vaccines. Active & passive immunization (Artificial and natural).	PO2, PO5, PO10	PSO5, PSO8	U
CO10.4	Demonstration of lymphoid organs. Histological study of spleen, thymus and lymph nodes through slides/ photographs. Preparation of stained blood film to study various types of blood cells. ABO blood group determination. Demonstration of ELISA.	PO5, PO10, PO12, PO13	PSO5	AN, AP



## SEMESTER V

**Course Name:** Molecular Biology

**Course Code:** UGZOCC 11

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO11.1	Salient features of DNA and RNA. Watson and Crick Model of DNA. Mechanism of DNA Replication in Prokaryotes, Semi-conservative, bidirectional and discontinuous Replication, RNA priming, Replication of telomeres. Mechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription.	PO8	PSO3,PSO9	U
CO11.2	Mechanism of protein synthesis in prokaryotes, Ribosome structure and assembly in prokaryotes, fidelity of protein synthesis, aminoacyl tRNA synthetases and charging of tRNA; Proteins involved in initiation, elongation and termination of polypeptide chain; Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation. Capping and Poly A tail formation in mRNA; Split genes; concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA.	PO8, PO12	PSO3,PSO9	R,U
CO11.3	Regulation of Transcription in prokaryotes: lac operon and trp operon; Regulation of Transcription in eukaryotes: Activators, enhancers, silencer, repressors, miRNA mediated gene silencing, Genetic imprinting. Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair. PCR, Western and Southern blot, Northern Blot, Sanger DNA sequencing.	PO8	PSO3,PSO9	U



**Course Name:** Genetics

**Course Code:** UGZOCC 12

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO12.1	Principles of inheritance, Incomplete dominance and co-dominance, Epistasis Multiple alleles, Lethal alleles, Pleiotropy, Sex-linked, sex- influenced and sex-limited inheritance, Polygenic Inheritance. Linkage and Crossing Over, molecular basis of crossing over, Measuring Recombination frequency and linkage intensity using three factor crosses, Interference and coincidence.	PO8	PSO3,	R, U
CO12.2	Types of gene mutations (Classification), Types of chromosomal aberrations (Classification with one suitable example of each), Non-disjunction and variation in chromosome number; Molecular basis of mutations in relation to UV light and chemical mutagens.	PO8, PO12	PSO5, PSO8	U
CO12.3	Mechanisms of sex determination in Drosophila. Sex determination in mammals. Dosage compensation in Drosophila & Human Criteria for extra chromosomal inheritance, Antibiotic resistance in Chlamydomonas, Kappa particle in Paramecium Shell spiralling in snail. Conjugation, Transformation, Transduction, Complementation test in Bacteriophage. Transposons in bacteria, Ac-Ds elements in maize and P elements in Drosophila, LINE, SINE, Alu elements in humans.	PO5, PO8	PSO3,	U
CO12.4	Chi-square analyses. Linkage maps based on conjugation. Identification of chromosomal aberration in Drosophila and man from photograph. Pedigree analysis of some human inherited traits.	PO12, PO13	PSO5, PSO9	AN, AP, E





## SEMESTER VI

**Course Name:** Developmental Biology

**Course Code:** UGZOOCC 13

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO13.1	Basic concepts: Phases of Development, Cell cell interaction, Differentiation and growth, Differential gene expression. Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal); Changes in gametes, Blocks to polyspermy; Planes and patterns of cleavage; Types of Blastula; Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonic induction and organizers.	PO2, PO5	PSO5	U
CO13.2	Fate of Germ Layers; Extra-embryonic membranes in birds; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta). Development of brain and Eye in Vertebrate. Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each). Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis.	PO5	PSO2, PSO3	U
CO13.3	Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages). Study of the developmental stages and life cycle of Drosophila from stock culture. Study of different sections of placenta (photomicrograph/ slides). Project report on Drosophila culture/chick embryo development.	PO2, PO13	PSO3, PSO5, PSO9	AN, AP



**Course Name:** Evolutionary Biology

**Course Code:** UGZOOCC 14

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO14.1	Life's Beginnings: Chemogeny, RNA world, Biogeny, Origin of photosynthesis, evolution of eukaryotes. Historical review of Evolutionary concepts, Lamarkism, Darwinism and Neo Darwinism.	PO8	PSO2	U
CO14.2	Sources of variations: Heritable variations and their role in evolution. Population genetics: Hardy-Weinberg Law (statement and derivation of equation, application Of law to biallelic Population); Evolutionary forces upsetting H-W equilibrium; Natural selection (concept of fitness, types of selection, selection coefficient, mode of selection heterozygous superiority).Genetic Drift mechanism (founder's effect, bottleneck phenomenon). Role of Migration and Mutation in changing allele frequencies.	PO4, PO5	PSO5	U
CO14.3	Species concept, Isolating mechanisms, modes of speciation. Adaptive radiation /macroevolution (exemplified by Galapagos finches). Extinctions, Back ground and mass extinctions (causes and effects), detailed example of K-T extinction. Origin and Evolution of Man, Unique Hominin characteristics contrasted with primate characteristic Molecular analysis of human origin. Phylogenetic trees, Construction & interpretation of Phylogenetic tree using parsimony, Convergent & Divergent evolution.	PO1, PO6	PSO4,PSO6	U
CO14.4	Study of fossils from models/ pictures. Study of homology and analogy from suitable specimens. Study and verification of Hardy-Weinberg Law by chi square analysis. Graphical representation and interpretation of data of height/ weight of a sample of 100 humans in relation to their age and sex.	PO12, PO13	PSO8	AN



**Generic Elective**

**SEMESTER III**

**Course Name:** Aquatic Biology

**Course Code:** UGZOOGE03

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO1.1	Brief introduction to the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs. Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico- chemical Characteristics: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity, dissolved gases (Oxygen, Carbon dioxide). Nutrient Cycles in Lakes (Nitrogen, Sulphur and Phosphorous). Streams: Different stages of stream development, Physico-chemical environment, Adaptation of hill- stream fishes.	PO1	PSO1	R,U
CO1.2	Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds. Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD.	PO6	PSO1	R,U
CO1.3	Determine the area of a lake using graph metric and gravimetric method. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem. Determine the amount of Turbidity/transparency, Dissolved Oxygen, and Free Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from a nearby lake / water body. Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance. A Project Report on a visit to a Sewage treatment plant/Marine bio-reserve/Fisheries Institute.	PO13	PSO9	AN,AP,E,C



## SEMESTER IV

**Course Name:** Environment and Public Health

**Course Code:** UGZOOGE04

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO2.1	Sources of Environmental hazards, Hazard identification and accounting, Fate of toxic and persistent substances in the environment, Dose response evaluation, Exposure assessment.	PO6	PSO6	U
CO2.2	Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health. Air, water, noise pollution sources and effects, Pollution control.	PO1	PSO6	U
CO2.3	Sources of waste, types and characteristics, Sewage disposal and its management, Solid waste disposal, Biomedical waste handling and disposal, Nuclear waste handling and disposal, Waste from thermal power plants.	PO1,PO6	PSO6	R,E
CO2.4	Causes, symptoms and control of tuberculosis, Asthma, Cholera, Minamata disease, typhoid, filariasis.	PO3, PO10	PSO1, PSO3	R



## Skill Enhancement Course

### SEMESTER III

**Course Name:** Apiculture

**Course Code:** UGZOOSEC 01

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO1.1	History, Classification and Biology of Honey Bees Social Organization of Bee Colony. Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth Bee Pasturage Selection of Bee Species for Apiculture Bee Keeping Equipment Methods of Extraction of Honey (Indigenous and Modern). Bee Diseases and Enemies Control and Preventive measures.	PO7	PSO1,PSO4	R,U
CO1.2	Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc. Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial Beehives for cross pollination in horticultural gardens.	PO7	PSO1,PSO4	U,C



## SEMESTER IV

**Course Name:** Sericulture

**Course Code:** UGZOOSEC 02

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO2.1	Sericulture: Definition, history and present status; Silk route Types of silkworms, Distribution and Races. Exotic and indigenous races. Mulberry and non-mulberry Sericulture. Life cycle of Bombyx mori Structure of silk gland and secretion of silk.	PO1	PSO1,PSO7	U,R
CO2.2	Selection of mulberry variety and establishment of mulberry garden Rearing house and rearing appliances. Disinfectants: Formalin, bleaching powder, RKO Silkworm rearing technology: Early age and Late age rearing Types of mountages. Spinning, harvesting and storage of cocoons.	PO2	PSO2,PSO7	U, R
CO2.3	Pests of silkworm: Uzi fly, dermestid beetles and vertebrates Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial Control and prevention of pests and diseases.	PO12	PSO3,PSO7	AP
CO2.4	Prospectus of Sericulture in India: Sericulture industry in different states, employment, potential in mulberry and non-mulberry sericulture Visit to various sericulture centres.	PO12	PSO1,PSO7	AP



## Discipline Specific Elective

### SEMESTER V

**Course Name:** Fish and Fisheries

**Course Code:** UGZOODEC 01

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO1.1	General description of fish. Feeding habit, habitat and manner of reproduction Classification of fish (up to Subclasses). Types of fins and their modifications; Locomotion in fish; Hydrodynamics; Types of Scales, Use of scales in Classification and determination of age of fish; Gills and gas exchange; Swim Bladder: Types and role in Respiration, buoyancy; Osmoregulation in Elasmobranchs; Reproductive strategies (special reference to Indian fish); Electric organ, Bioluminescence.	PO1,PO2	PSO1,PSO2	R,U
CO1.2	Inland Fisheries; Marine Fisheries; Environmental factors influencing the seasonal variations in fish catches in the Arabian Sea and the Bay of Bengal; Fishing crafts and Gears; Depletion of fisheries resources; Application of remote sensing and GIS in fisheries; Fisheries law and regulations.Sustainable Aquaculture; Extensive, semi-intensive and intensive culture of fish; Pen and cage culture; Polyculture; Composite fish culture; Brood stock management; Induced breeding of fish; Management of finfish hatcheries; Preparation and maintenance of fish aquarium; Preparation of compound diets for fish; Role of water quality in aquaculture; Fish diseases: Bacterial, viral and parasitic; Preservation and processing of harvested fish, Fishery by-products.	PO1,PO2,PO12	PSO1,PSO7	R,U,C
CO1.3	Transgenic fish Zebrafish as a model organism in research.	PO8	PSO5,PSO9	AP,AN,E
CO1.4	Morphometric and meristic characters of fishes.Study of Petromyzon, Myxine, Pristis, Chimaera, Exocoetus, Hippocampus, Gambusia, Labeo, Heteropneustes, Anabas.Study of different types of scales (through permanent slides/ photographs).Study of crafts and gears used in Fisheries.Water quality criteria for Aquaculture: Assessment of pH, conductivity, Total solids, Total dissolved solids.Study of air breathing organs in Channa, Heteropneustes, Anabas and Clarias. Project Report on a visit to any fish farm/ pisciculture unit/Zebrafish rearing Lab.	PO6	PSO1,PSO2	U,AP,AN



**Course Code:** UGZOODEC 02

**Course Name:** Animal Biotechnology

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO2.1	Organization of prokaryotic and eukaryotic genome, Concept of genomics Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC, MAC and Expression vectors (characteristics).Restriction enzymes: Nomenclature, detailed study of Type II. Transformation techniques: Calcium chloride method and electroporation. Construction of genomic and cDNA libraries and screening by colony and plaque hybridization Southern, Northern and Western blotting.DNA sequencing: Sanger method.Polymerase Chain Reaction, DNA Finger Printing and DNA micro array.	PO1,PO8	PSO5	U
CO2.2	Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection. Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knockout mice. Animal cell culture, expressing cloned genes in mammalian cells, Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anemia).	PO8	PSO5	U
CO2.3	Genomic DNA isolation from E. coli.Plasmid DNA isolation (pUC 18/19) from E. coli.Restriction digestion of plasmid DNA.Construction of circular and linear restriction map from the data provided.Calculation of transformation efficiency from the data provided.To study following techniques through photographs.Southern Blotting.Northern Blotting. Western Blotting.DNA Sequencing (Sanger's Method),PCR,DNA fingerprinting.Project report on animal cell culture.	PO8, PO12, PO13	PSO3,PSO5	AN, AP, E





## SEMESTER VI

**Course Name:** Parasitology

**Course Code:** UGZOODEC 03

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO3.1	Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector Host parasite relationship. Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, <i>Diagnosis, Prophylaxis and Treatment of Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani.</i>	PO1, PO2	PSO1,	R,U
CO3.2	Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, <i>Diagnosis, Prophylaxis and Treatment of Schistosoma haematobium, Taenia sajinata. Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Ascaris lumbricoides, Ancylostoma duodenale, Wuchereria bancrofti and Trichinella spiralis, Brugia malayi; Nematode plant interaction; Gall formation. Biology, importance and control of ticks (Soft tick Ornithodoros, Hard tick Ixodes), mites (Sarcoptes), Lice (Pediculus), Flea (Xenopsylla) and Bug (Cimex). Brief account of Cookicutter Shark, Hood Mocking bird, Vampire bat.</i>	PO2, PO5	PSO1,	R,U
CO3.3	Study of life stages of <i>Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani</i> through permanent slides/micro photographs. Study of adult and life stages of <i>Schistosoma haematobium, Taenia sajinata</i> through permanent slides/micro photographs. Study of adult and life stages of <i>Ancylostoma duodenale, Brugia malayi</i> and <i>Trichinella spiralis</i> through permanent slides/micro photographs. Study of plant parasitic root knot nematode, Meloidogyne from the soil sample. Study of <i>Pediculus humanus, Xenopsylla cheopis</i> and <i>Cimex lectularius</i> through permanent slides/ photographs. Study of monogenea from the gills of fresh/marine fish [Gills can be procured from fish market as by product of the industry]. Study of nematode/cestode parasites from the intestines of Poultry bird [Intestine can be procured from poultry/market as a by-product. Submission of a brief report on parasitic vertebrates.	PO2, PO5	PSO1, PSO7	AN, AP



**Course Name:** Wild Life Conservation and Management

**Course Code:** UGZOODEC 04

**Course Outcomes:** After completion of this course the students will be able to

CO No.	Course Outcomes	PO Addressed	POS Addressed	Cognitive Level
CO4.1	Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies.Habitat analysis, Physical parameters: Topography, Geology, Soil and water Biological Parameters: food, cover, forage, browse and cover estimation. Standard evaluation procedures: remote sensing and GIS. Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity Restoration of degraded habitats.	PO6,PO9,PO10	PSO5,PSO6	AP,U
CO4.2	Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores; Pug marks and census method. Wildlife conservation in India – through ages; different approaches of wildlife conservation; modes of conservation; in-situ conservation and ex-situ conservation: necessity for wildlife conservation. Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbation.	PO6,PO9,PO10,PO11	PSO6,PSO9	U,E
CO4.3	Causes and consequences of human-wildlife conflicts; mitigation conflict an overview; Management of excess population. National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve.	PO6, PO9	PSO4, PSO6	U,E
CO4.4	Identification of flora, mammalian fauna, avian fauna, herpeto-fauna..Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses). Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers, etc.Demonstration of different field techniques for flora and fauna.PCQ, ten tree method, Circular, Square & rectangular plots, Parker's 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences).	PO4,PO6,PO9, PO12,PO13	PSO6,PSO8,PSO9	C,AP,AN



**DEPARTMENT OF ZOOLOGY, MUGBERIA GANGADHAR MAHAVIDYALAYA,  
BHUPATINAGAR, PURBA MEDINIPUR-721425  
DEPARTMENT OF ZOOLOGY  
Attainment of Course & Programme Outcomes**

At the beginning of every semester/year, the subject teacher conveys Course Objectives (CO) at the introductory part of respective subject. The copies of the syllabi are kept in the Department. It is distributed beginning the semester/year, and/or write among students. However, the student can download the syllabus from the Website of Vidyasagar University, <http://www.vidyasagar.ac.in>

Further, the faculty of Zoology subject explains the course objectives, evaluation pattern, marking scheme etc. to the students. It is also given in the syllabus of each Semester. The evaluation process of PO, PSO and CO is followed direct methods.

Direct methods display the student's knowledge and skills from their performance in the class/assignment test, internal assessment tests, assignments, semester examinations, seminars, laboratory assignments/practicals, mini projects and field work etc. These methods provide a sampling of what students know and/or can do and provide strong evidence of student learning.

Following tables show the various methods used in assessment process that periodically documents and demonstrates the degree to which the Course Outcomes are attained. They include information on:

- a) Listing and description of the assessment processes used to gather the data, and
- b) The frequency with which these assessment processes are carried out.

<b>Table 1 : Direct Assessment tool used for CO attainment</b>			
Sr. No.	Direct Assessment Method	Assessment frequency	Description
1.	Internal Assessment Test	Twice in a Semester	The Internal Assessment marks in a theory paper shall be based on two tests generally conducted at the end of 6 <sup>th</sup> and 11 <sup>th</sup> weeks of each semester. It is a metric used to continuously assess the attainment of course outcomes w.r.t course objectives. Average marks of two tests shall be the Internal Assessment Marks for the relevant course.
2.	Lab Assignments /	Twice in a	Lab Assignment/Experiment is a



	experiments	week	qualitative performance assessment tool Designed to assess students' practical knowledge and problem solving skills. Minimum ten experiments need to be conducted for every lab course.
3.	End Semester Examination	Once in a Semester	End Semester examination (theory or practical) are the metric to assess whether all the course outcomes are attained or not framed by the course incharge. End Semester Examination is more focused on attainment of all course outcomes and uses a descriptive questions.
4.	Practical Examination		
5.	Home Assignments	Twice in a Semester	Assignment is a metric used to assess student's analytical and problem solving abilities. Every student is assigned with course related tasks & assessment will be done based on their performance. Grades are assigned depending on their innovation in solving/deriving the problems.
6.	Class / Assignment Test	Twice in a Semester	It is a metric used to continuously assess the student's understanding capabilities.
7.	Preliminary Examination	Once in a semester	Preliminary examination is the metric to assess whether all the course outcomes are attained or not by asking descriptive questions.
8.	Presentations	As per the requirement	Presentation is the metric used to assess student's communication and presentation skills along with depth of the subject knowledge. Seminars topics are given to the students that cover topics of current interest or provide in-depth coverage of selected topics from the core courses.
9.	Class Attendance	As Per Vidyasagar University Guideline	Total 5 Marks allotted for every Course / SEC/ DSE/AECC or others. The marks obtained of every course from Class Attendance by the students is following manner. <ol style="list-style-type: none"> <li>1. 05 Marks if he/ she attained greater than or equal to 95%.</li> <li>2. 04 Marks if he/ she attained greater than or equal to 90%.</li> <li>3. 03 Marks if he/ she attained greater than or equal to 85%.</li> <li>4. 02 Marks if he/ she attained greater than or equal to 80%.</li> <li>5. 01 Marks if he/ she attained greater than or equal to 75%.</li> </ol>



The weightages given for various assessment tools used for the attainment of Course Outcomes are shown in table 2.

**Table 2: List of Course Assessment tools**

			<b>Tools</b>	<b>Frequency</b>	<b>Weightage</b>
<b>Assessment Tools</b>	<b>Direct</b>	<b>Internal Tools</b>	Assignment Tests	Twice in a semester	<b>20%</b>
			Internal Assessment	Twice in a semester	
			Home Assignments	Selecte d Topic	
			Practical	Weekly	
			MOCK Practicals	Once in a semester	
			MCQ		
			Seminar/Presentatio ns		
			Mini Projects/Field visit		
			Preliminar y Examinati on	Once in a semester	
		<b>External Tools</b>	End Semester Examination	Once in a semester	<b>80%</b>
<b>Class Attendance</b>	Counted after completion the EndSemester classes.	Once in a semester	Total 5 Marks allotted for every Course / SEC/DSE/AECC or others. The marks obtained of every course from Class Attendance by the students is following manner. 1. 05 Marks if he/she attained greater than		



					<p>or equal to 95%.</p> <p>2. 04 Marks if he/she attained greater than or equal to 90%.</p> <p>3. 03 Marks if he/she attained greater than or equal to 85%.</p> <p>4. 02 Marks if he/she attained greater than or equal to 80%.</p> <p>5. 01 Marks if he/she attained greater than or equal to 75%.</p>
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### DIRECT METHOD

Academic Session: 2019-2020

### Semester VI

Programme Name: B. SC. HONS (Zoology)

### ATTAINMENT LEVELS FOR

Target Level	Level Description Marksstudent scoring	
1	Below 40%	<b>50 → indicates % and above in the questions in Internal and External tests</b>
2	<b>Below 40%-49%</b>	
3	50% & about	



Marks of Unit test and Quarterly exam are recorded in a register. The Institute provides opportunities to students to exhibit their understanding through the medium of expression i.e. oral or written. The outcome of the entire exercise is that the evaluation method does not become a hurdle while evaluating.

Keeping this view in mind, some extra-curricular activities are subject and topic based, e.g., Instant lecture in given topic, Pre puja celebration , Wall magazine Publication, Lecture competition, Awareness/celebration day, Wild Life day cancer Day, AIDS awareness, Blood checking, Population awareness day, etc. From these practices, a student can optimally express their knowledge and this enhances their confidence.

The examinations and results of University also measure the attainment of CO, PO and PSO.

TABLE 3: Marks Obtain list of Last Semester

Sl.no	Name	Enrollment no	Internal Marks	6 <sup>TH</sup> SEM MARKS
1	Adarsha Jana	193	10	CGPA: 10.00
2	Anuradha Bhunia	189	10	CGPA: 10.00
3	Anuradha Sau	181	10	CGPA: 10.00
4	Abijit Bar	204	10	CGPA: 10.00
5	Bikash Pradhan	199	10	CGPA: 10.00
6	Chaitali Sasmal	192	10	CGPA: 10.00
7	Jayashri Jana	188	10	CGPA: 10.00
8	Narugopal Ghorai	196	10	CGPA: 10.00
9	Nilanjana Mishra	184	10	CGPA: 10.00
10	Priti Sahoo	200	10	CGPA: 10.00
11	Shibsankar Sahoo	182	10	CGPA: 10.00
12	Subhamita Santra	202	10	CGPA: 10.00
13	Suparna Bhunia	195	10	CGPA: 10.00
14	Udichi Sahoo	186	10	CGPA: 10.00



List of out going B.Sc. Zoology (Hons) student for the year 2020 and their higher study details

## Department of Zoology

### Mugberia Gangadhar Mahavidyalaya

- Name :** Adarsa Jana  
**Institute :** Netaji Subhas Primary Teachers Training Institute  
**Academic Programme :** B.Ed  
**Address :** Jararnagar, Heria , Purba Medinipur, 721430  
**Mob :** 7872949764

1945 **RECEIPT** Date: 17.05.22

**Netaji Subhas Primary Teachers' Training Institute**  
**B.ED. SECTION**  
Under Annwesha Social Welfare & Education Society  
RECOGNISED BY NCTE, NEW DELHI & AFFILIATED TO WBUTTEPA, KOLKATA  
VILL - JARARNAGAR, P.O. - HERIA, DIST - PURBA MEDINIPUR, W.B., PIN - 721430

Name: Adarsa Jana  
Period: Session 22-24 Roll: 13

Sl No.	DESCRIPTION	AMOUNT (RS.)
1.	Tuition Fee	20,000/-
2.	Development Fee	
3.	Admission Fee	
4.	Laboratory Fee	
5.	Magazine Fee	
6.	Library Fee	
7.	Sports and Game Fee	
8.	Fans, Electric Charges including Telephone.	
9.	Computer Fee	
10.	Miscellaneous	
<b>TOTAL</b>		<b>20,000/-</b>

Received Rupees: Faculty Housing  
Only D.D.No. \_\_\_\_\_ Drawn on: \_\_\_\_\_  
Signature: \_\_\_\_\_





Name : Anuradha Bhunia

2. Institute : Ranibala College of Teacher Education

Academic Programme : B.Ed.

Address : Ikshupatrika ,Jukhia Bazar ,Purba Medinipur 721430.

Mob : 8695454561

Date : 12.11.20

**RECEIPT**  
**Ranibala College of Teacher Education (B.Ed.)**  
UNDER IKSHUPATRIKA SOCIAL WELFARE & EDUCATION ORGANISATION  
RECOGNISED BY NATIONAL COUNCIL FOR TEACHER EDUCATION (N.C.T.E.) 'NEW DELHI'  
AFFILIATED TO VIDYASAGAR UNIVERSITY, PASCHIM MEDINIPUR  
VIII-Ikshupatrika, P.O.-Jukhia Bazar, Dist.-Purba Medinipur, PIN-721430

Name : Anuradha Bhunia 20

Period : 2020-2022 Session : 2020-21 Roll No. \_\_\_\_\_

S.No.	Description	Amount (Rs.)
1.	Tuition Fee	
2.	Development Fee	
3.	Admission Fee	
4.	Laboratory Fee	
5.	Magazine Fee	
6.	Library Fee	
7.	Sports & Game Fee	
8.	Fun. Electric Charge Including Telephone	
9.	Computer Fee	
10.	Miscellaneous	
<b>TOTAL</b>		5000/-

Received Rupees Five Thousand Only  
D.D. No. \_\_\_\_\_ Date: 12.11.20

Signature of the Cashier  
Rasmita Das  
12.11.20

3.

Name : Anuradha Sau

Institute : Tamralipta Mahavidyalaya

Academic Programme: B.Ed

Address : Tamluk, Purba Medinipur ,721636

Mob: 8250020387

**TAMRALIPTA MAHAVIDYALAYA**  
Department of B.Ed. :: Session:2022-24  
**Admission Receipt (Candidate's Copy)**

Name : ANURADHA SAU Date of admission: 22.09.2022

Application No.: FVE/SCIBHON/PG/OBC-B/360 Course : Bachelor of Education (B.Ed.)

Mobile No. 8250020387 1<sup>st</sup> Year Admission fees : Rs.30000/-  
(Rupees Thirty Thousand Only)

Admission status: **Admitted**

Signature of Cashier \_\_\_\_\_

Important Note: Second year Admission fee Rs. 24000/- to be deposited in 2023 as per notice



4.

**Name : Abhijit Bar**  
**Institute : Netaji Subhas Primary Teachers Training Institute**  
**Academic Programme : B.Ed.**  
**Address : Jararnagar ,Heria ,Purba Medinipur,721430**  
**Mob: 8250092467**

No. **1982** RECEIPT Date **30.08.21**  
**Netaji Subhas Primary Teachers' Training Institute**  
**B.ED. SECTION**  
 Under Annwasha Social Welfare & Education Society  
 RECOGNISED BY NCTE, NEW DELHI & AFFILIATED TO WBUTTEPA, KOLKATA  
 VILL - JARARNAGAR, P.O. - HERIA, DIST. - PURBA MEDINIPUR, W.B., PIN - 721430

Name: **Abhijit Bar**  
 Period: **2020-21** Roll No: **46**

Sl No	DESCRIPTION	AMOUNT (RS.)
1	Tuition Fee	20,000/-
2	Development Fee	
3	Admission Fee	
4	Laboratory Fee	
5	Magazine Fee	
6	Library Fee	
7	Sports and Game Fee	
8	Fare, Electric charges including Telephone	
9	Computer Fee	
10	Miscellaneous	
<b>TOTAL</b>		<b>20,000/-</b>

Received Rupees **Twenty thousand**  
 Date, D.D. No. \_\_\_\_\_ Drawn on \_\_\_\_\_ Signature of the Cashier \_\_\_\_\_

5.

**Name : Bikash Pradhan**  
**Institute : Ranibala College of Teacher Education**  
**Academic Programme: B.Ed.**  
**Address : Ikshupatrika ,Jukhia Bazar,Purba Medinipur ,721430**  
**Mob : 6295452497**

Date **24/08/2022**  
**Ranibala College of Teacher Education (B.Ed.)**  
 UNDER IKSHUPATRIKA SOCIAL WELFARE & EDUCATION ORGANISATION  
 RECOGNISED BY NATIONAL COUNCIL FOR TEACHER EDUCATION (N.C.T.E.), NEW DELHI  
 AFFILIATED TO VIDYASAGAR UNIVERSITY, PASCHIM MEDINIPUR  
 Vill-Ikshupatrika, P.O.-Jukhia Bazar, Dist.-Purba Medinipur, PIN-721430

Name: **Bikash Pradhan** Roll No: **307**  
 Period: **2022-2024** Session: **2022-2024**

Sl No	Description	Amount (Rs.)
1	Tuition Fee	5,000/-
2	Development Fee	
3	Admission Fee	
4	Laboratory Fee	
5	Magazine Fee	
6	Library Fee	
7	Sports & Game Fee	
8	Fare, Electric Charges Including Telephone	
9	Computer Fee	
10	Miscellaneous	
<b>TOTAL</b>		<b>5,000</b>

Received Rupees **Five thousand**  
 Date, D.D. No. **UPI-23188** Drawn On \_\_\_\_\_ Signature of the Cashier \_\_\_\_\_



6. **Name : Chaitali Sasmal**  
**Institute : State Medical Faculty of West Bengal**  
**Academic Programme : DCCT**  
**Address : 14-C Balighata Main Road ,Kolkata :700085**  
**Mob : 9064445057**

**State Medical Faculty of West Bengal**  
 14-C, Balighata Main Road, Kolkata - 700085  
 Faculty's Registration Certificate for  
 BACHELOR IN WEST BENGAL DENTAL TECHNOLOGY (DCCT) COURSE

Admn: CHAITALI SASMAL  
 Father's Name: BABU SASMAL  
 Date of Birth: 10-11-2001  
 Permanent: WEL - JARANBAGAR  
 Address: PO - HERA P.S. - KHEJURA  
 PURBA MEDINIPUR, WEST BENGAL, 721430  
 Institute: CITY MEDICAL COLLEGE, DURGAPUR

  
  
 Signature of Candidate (V)

For use by the State Medical Faculty of West Bengal

Academy's Registration No: 201405/2019/DCCT COURSE/430  
 Date: 16-05-2022

B.K. Ghosh  
 Secretary, SIFWS

7. **Name : Jayashree Jana**  
**Institute : Ranibala College of Teacher Education**  
**Academic Programme : B.Ed.**  
**Address : Ikshupatrika ,Jukhia Bazar ,Purba Medinipur,721430**  
**Mob: 6294457843**



Date: 02/05/2022

**Ranibala College of Teacher Education (B.Ed.)**  
 UNDER IKSHUPATRIKA SOCIAL WELFARE & EDUCATION ORGANISATION  
 RECOGNISED BY NATIONAL COUNCIL FOR TEACHER EDUCATION (N.C.T.E.), NEW DELHI  
 AFFILIATED TO VIDYASAGAR UNIVERSITY, PASCHIM MEDINIPUR  
 VII, Ikshupatrika, P.O.-Jukhia Bazar, Dist.-Purba Medinipur, PIN-721430

Name: Jayashree Jana Roll No: 405  
 Period: 22-29 Session: 22-29

S.No.	Description	Amount (Rs.)
1	Tuition Fee	10000
2	Development Fee	
3	Admission Fee	
4	Laboratory Fee	
5	Magazine Fee	
6	Library Fee	
7	Sports & Game Fee	
8	Fan, Electric Charge Including Telephone	
9	Computer Fee	
10	Miscellaneous	
<b>TOTAL</b>		<b>10000</b>

Received By: Ten thousand only. Drawn On: Kakesh Patra  
 Only D.D. No. Signature of the Cashier

8. **Name : Narugopal Ghorai**  
**Institute : Contai D.Ed College**  
**Academic Programme : B.Ed.**  
**Address : Aurai, Contai ,Purba Medinipur ,721427**  
**Mob : 7365849909**

Date 07/07/2020

**RECEIPT**

**CONTAI D.ED. COLLEGE**  
 B.ED. SECTION

Under Jaramagar Rural & Educational Welfare Society  
 Recognized by NCTE, New Delhi & Affiliated to WBUTTEPA, Kolkata  
 VILL & P.O. - AURAI, P.S. - CONTAI, DIST. - PURBA MEDINIPUR, PIN - 721427

Name: Narugopal Ghorai

Period: 2020 Session: 2020-2021 Roll No:

S.No.	DESCRIPTION	AMOUNT (RS.)
1.	Tuition Fee	10000.00
2.	Development Fee	
3.	Admission Fee	
4.	Laboratory Fee	
5.	Magazine Fee	
6.	Library Fee	
7.	Sports and Game Fee	
8.	Fans, Electric charges including Telephone	
9.	Computer Fee	
10.	Miscellaneous	
<b>TOTAL</b>		<b>10000.00</b>

Received Pursuant to: ten thousand only

Only D.D. No. \_\_\_\_\_ Drawn on \_\_\_\_\_

Signature: \_\_\_\_\_  
 Date: \_\_\_\_\_

9. **Name: Nilanjana Misra**  
**Institute : Gandhari College**  
**Academic Programme: B.Ed**  
**Address : Nazir Bazar ,Purba Medinipur ,721655**  
**Mob : 8597239905**



**Gandhari College**  
 Bhadrachalam, V.B. Gandhari B.D. - Nazir Bazar, Dist. - Purba Medinipur, W.B. - 721655  
 Phone No. : 915418426 / 2662012765  
 Email Id : gandharicollege.org / shakti0517@gnia.135m.005002 : www.gandharicollege.org

**STUDENT COPY**

Student Name	: VIDARVA MISHRA	Roll No.	: 860/2020-2021/72
Father's Name	: SARADIPRAI MISHRA	Course	: B.ED
D.O.B	: 06/07/2000	Session	: 2120-2022
Gender	: Female	Contact No	: +91-8597239905
Payment Date	: 20/06/2020	Ref#	
Paid Amount	: ₹ 10000	Remarks	: Advance Rs. 10000/-date 22.07.21
Payment Mode	: Cash	 000000000720	

In Word Response Ten Thousands Only

Nilanjana Mishra  
 Parent/Student  
 Signature

  
 Authorized signatory with seal

10.

**Name : Shibsankar Sahoo**  
**Institute : Vidyasagar Teachers Training College**  
**Academic Programme : B.Ed**  
**Address : Keranitola ,Midnapore,721101**  
**Mob :8639657830**

online (P)

No: **944** Student Copy  
**Vidyasagar Teachers' Training College**  
 MIDNAPORE  
 Session : 20 22, 20 2 4 (Fresher / Deputed)  
 Name : **Shibsankar Sahoo**  
 Class - B. Ed **1st yr.** Roll No. Sec.

	Rs.	P.
01	Tution Fees	1200 00
02	Session Charge	
03	Dev. Fees	13000 00
04	Registration Fees	
05	University Exam. Fees	
06	College Exam. Fees	300 00
07	Library Fees	1000 00
08	Laboratories Fees	500 00
09	Electric Fees	4000 00
10	Student Activities	2000 00
11	Hostel Admission	
12	Hostel Electricity	
13	Caution Fee	
14	Miscellaneous	2000 00
<b>TOTAL</b>		<b>24000 00</b>

TOTAL (In words) **Twenty four thousand only**  
 Date: **21/9/22**  
 Student's Signature: *Shibsankar Sahoo*

11.

**Name : SUPNAMITA SARA**  
**Institute : Bijupattnaik Nusing Training School ,**  
**Baripada College of B.Sc Nursing and Physiotherapy**  
**College.**  
**Academic Programme: B.Sc. Nursing**  
**Address : Takatpur,Baripada ,Mayurbhanj**  
**Mob : 9593455295**

**BIJUPATNAIK NURSING TRAINING SCHOOL, BARIPADA**  
**COLLEGE OF B.Sc NURSING AND PHYSIOTHERAPY COLLEGE**  
 BARIPADA, MAYURBHANJ DISTRICT, ODISHA

RECORD No. **630** Date: **20-11-20**  
 Name of Candidate: **Supnamita Sarra**  
 Course Name: **B. Sc Nursing** Year: **1000 21** Roll No.

Sl. No.	Name of Fee	AMOUNT	Amount
01	University Registration Fee		
02	Registration of Govt. of India		
03	University Examination Fees		
04	University Registration Fees		
05	Tuition Fees		
06	Library Fees		
07	Examination of Institution Fees		
08	Caution Fee		
09	College Hospital / Hospital (General Practical Fees)		
10	Medical Fees		
11	Attendance & Water Charges		
12	Annual Fee		
13	University Examin. & Preparation Fee		
14	Midwifery Training College Bus Fees		
15	University Examin. Preparation Charges		
16	University Examin. Preparation Charges		
17	University Examin. Preparation Charges		
18	College Hospital / Hospital Fees		
19	College Hospital / Hospital Fees		
20	College Hospital / Hospital Fees		
21	College Hospital / Hospital Fees		
22	College Hospital / Hospital Fees		
23	College Hospital / Hospital Fees		
24	College Hospital / Hospital Fees		
25	College Hospital / Hospital Fees		
26	College Hospital / Hospital Fees		
27	College Hospital / Hospital Fees		
28	College Hospital / Hospital Fees		
29	College Hospital / Hospital Fees		
30	College Hospital / Hospital Fees		
<b>TOTAL</b>		<b>40.000/-</b>	<b>40.000/-</b>

Amount in Words: **Forty thousand only**  
 Student's Signature: *J. Jena*



12. **Name : Udichi Sahoo**  
**Institute : WBUTTEPA-College**  
**Academic Programme : B.Ed**  
**Address: 25/2, Ballygunge Circular Road ,Kol-700019**  
**Mob: 6294705439**



**WBUTTEPA COLLEGE**  
 25/2, BALLYGUNGE CIRCULAR ROAD , KOL-700019 , KOLKATA-700019  
 Date: 09-Sep-2022

← Receipt for State Bank Collect Payment

SBCollect Reference Number	DUE795492
Category	B.Ed Application Fee (GEN/OBG)
APPLICATION ID (i.e. ADMBED03EE-24XXXXX)	ADMBED/2022-24/190000
NAME OF THE APPLICANT	UDICHI SAHOO
MOBILE NO OF THE APPLICANT	6294705439
EMAIL ID OF THE APPLICANT	UDICHISAHOO2@GMAIL.COM
AMOUNT	600
Transaction charge	0.00
Gross Amount (In Figures)	600.00
Total Amount (In Words)	Rupees Six Hundred Only
Remarks	APPLICATION FEES FOR BED 2022-2024
Notification 1	
Notification 2	



*[Signature]*  
**Principal**  
 Mughberia Gangadhar Mahavidyalaya  
 10.12.2020