HOLY CROSS COLLEGE (AUTONOMOUS)
Affiliated to Bharathidasan University
Nationally Accredited (3rd Cycle) with 'A' Grade by NAAC
College with Potential for Excellence.
Tiruchirapalli - 620002.

PG & RESEARCH DEPARTMENT OF ZOOLOGY
CHOICE BASED CREDIT SYSTEM

PROGRAMME – B.Sc. ZOOLOGY

PO NO.	PROGRAMME OUTCOMES Upon completion of the B.Sc. Degree programme, the graduate will be able to
PO – 1	Gain knowledge in basic biological principles and understands the interdependence among various organisms and the environment.
PO – 2	Understand the scientific methods, apply the knowledge of internal structure of cells, its functions in control of various metabolic functions
PO – 3	Do systematic investigations in order to establish facts and reach new conclusions
PO – 4	Apply the knowledge and understanding of zoology to one‘s own life and work
PO – 5	Develop responsibility and concern towards the fauna and is conservation

PSO NO.	PROGRAMME SPECIFIC OUTCOMES Upon completion of these courses the student would
PSO – 1	Know the fundamental concepts of zoological sciences and biotechnology
PSO – 2	Be able to comprehend and apply accurately and creatively the principles of taxonomy, cellular and molecular biology, genetics, ecology and evolution.
PSO – 3	Perform experimental procedures and interpret the results in the areas of physiology, ecology, cell biology, genetics, applied zoology, biochemistry, animal biotechnology, immunology and research methodology
PSO – 4	Acquire critical interrogatory skills on various biological and environmental issues and apply the concepts of biochemistry, immunology and developmental biology.
PSO – 5	Acquire knowledge on microbes, biotechnology, bioinformatics and biostatistical tools and implement it in biological and medical fields
PSO – 6	Be prepared to successfully compete in graduate programs, job placement, and become a socially responsible citizen

Course Title	Major Core: 1 Animal Diversity 1: Invertebrata		
Code	**U15ZO1MCT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Outline the Classification and characterize structural organization of Protozoa, Porifera and Coelenterate	PSO 1,2,3,6	U, An
CO-2	Identify and classify the various organisms belonging to Protozoa, Porifera and Coelenterate	PSO 2,3.6	U, An
CO-3	Outline the Classification and characterize the structural organization of Platyhelminthes, Aschelminthes, Nematode and Annelid	PSO 2,3,6	U, An
CO-4	Identify and classify the various organisms belonging to Platyhelminthes, Aschelminthes, Nematode and Annelid	PSO 2,3,6	U, An
CO-5	Outline the Classification and characterize structural organization of Arthropods, Mollusca, Echinodermata and hemichordate	PSO 2,3,6	U, An
CO-6	Identify and classify the various organisms belonging to Arthropods, Mollusca, Echinodermata and hemichordata	PSO 2,3,6	U, An
CO-7	Relate the phylogeny and levels of organization in invertebrates	PSO 1,2,3,6	U, An

Course Title	ALLIED: 1 (Optional) – BASICS IN BIOTECHNOLOGY		
Code	**U15ZO1AOT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Evaluate and discuss the structure of Nucleic acid and proteins.	PSO-1	E
CO-2	List and assess the enzymes and molecular tools involved in rDNA Technology.	PSO-1,5	E
CO-3	Discuss the strategies for developing vaccine and explain the importance of monoclonal antibodies.	PSO-1	C
CO-4	Elaborate and discuss the prospects for developing stem cell and gene therapy against infectious diseases.	PSO-1	C
CO-5	Explain and examine the processes involved in vitro tissue culturing & methods in plant biotechnology industry.	PSO-1,5	An
CO-6	Examine and interpret the environmental issues and new technology in animal pharming.	PSO-1	E
CO-7	Demonstrate the skill to analyze and explain the concepts and principles in biotechnology	PSO-1,5,6	U

Course Title	ALLIED: 2 (Optional) - ENVIRONMENTAL MANAGEMENT		
Code	**U15ZO1AOT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Illustrate the components of ecosystem and relate the impact of man on the ecological balance	PSO 1,2	U
CO-2	Analyze the concept of community and population	PSO 2	An
CO-3	Test for the impact of pollution	PSO 4	An
CO-4	Interpret the importance ofbiodiversity and its conservation	PSO 3	E
CO-5	Justify the causes of disasters	PSO 4	E
CO-6	Recommend the strategies of its management	PSO 4,5	E
CO-7	Demonstrate the skills to define and explain the concepts of environmental management	PSO 6	U

Course Title	ANIMAL DIVERSITY- 2: CHORDATA		
Code	**U15ZO2MCT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Compare era, epoch and period.	PSO 2	U
CO-2	List characters of prochordate.	PSO 1, 2	R
CO-3	List the characters of Pisces.	PSO 1, 2	R
CO-4	Construct a table with the characters of locally available fish to help in its identification.	PSO 2	Ap
CO-5	Explain how Frog belongs to the class Amphibia.	PSO 2	U
CO-6	Defend the given snake is poisonous or non poisonous by analyzing its characters.	PSO 2, 5	E
CO-7	Critically analyze the characters of Archaeopteryx with reptiles and birds.	PSO 2	An
CO-8	Compare and contrast Prototheria, Metatheria and Eutheria.	PSO 2	An

Course Title	MAJOR CORE 3: PRACTICAL I - ANIMAL DIVERSITY I & II		
Code	**U15ZO2MCP03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Demonstrate and illustrate the structural organization of mouth parts in insects	PSO 2,3	R, U
CO-2	Compare, contrast and interpret the organization of mouth parts to their feeding habit	PSO 2,3,6	U, An
CO-3	Dissect and mount the body setae, placoid scales, and mouth parts of insects	PSO 2,3	R, U
CO-4	Compare and examine the structure and function of the different systems in Earthworm, Cockroach and Frog	PSO 2,3,6	U, Ap
CO-5	Identify and utilize the knowledge of classification in the identification of specimens of biological importance	PSO 2,3,6	U, Ap

Course Title	ALLIED: 3 (Optional) – BASICS IN BIOINFORMATICS		
Code	**U15ZO2AOT03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Illustrate the structure of biomolecules	PSO 2,4	R, U
CO-2	Interpret the data retrieved from different structural databases	PSO 5	U
CO-3	Interpret the data retrieved proteome databases	PSO 5,6	U
CO-4	Interpret the data retrieved genome databases	PSO 5,6	U
CO-5	Utilize the software and tools in sequence alignment	PSO 5,6	Ap
CO-6	Utilize the software and tools in phylogenetic analysis	PSO 2, 5	Ap

Course Title	MAJOR CORE: 4- CELL AND MOLECULAR BIOLOGY		
Code	**U15ZO3MCT04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO -1	Recall the structure and explain the functions of plasma membrane, mitochondria and lysosomes.	PSO 1,2	R, U
CO -2	Describe and relate the structure and functions of ribosome and endoplasmic reticulum.	PSO 1,2	R, U
CO -3	Recall the structure of Golgi apparatus and explain its importance in cell secretion.	PSO 1,2	R, U
CO -4	Reproduce the ultra structure of centrosome and recognize its role in different applications	PSO 1,2	Ap
CO -5	Recall and explain the detailed structure and functions of nucleus	PSO 1,2	R, U
CO -6	Describe the stages of cell division and distinguish between mitosis and meiosis	PSO 2,5	An
CO -7	Explain the structure of DNA, its replication, RNA structures and Recall the Central Dogma	PSO 2, 5,6	An
CO -8	Restate and interpret the processes and significance of transcription, translation and post – transcriptional and – translational modifications.	PSO 2, 5, 6	E
CO -9	Demonstrate the skills of explaining and appraising the fundamental concepts of cell and molecular biology	PSO 2, 5, 6	Ap

Course Title	MAJOR CORE: 5 – GENETICS		
Code	**U15ZO3MCT05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Examine the inheritance of mendelian traits in man.	PSO 1	U & An
CO-2	Explain the concept of crossing over, linkage and gene map.	PSO 2	U
CO-3	Illustrate the mechanism of sex determination.	PSO 2	U
CO-4	Explain the inheritance of sex linked genes and the role of sex limited and influenced genes in man.	PSO 2	U
CO-5	Analyze the need of prenatal diagnosis and apply it for management of genetic disorders.	PSO 4	An, Ap
CO-6	List the types of mutation and explain its biological effects.	PSO 2	R, U
CO-7	Apply Hardy – Weinberg law to calculate the gene frequency in population genetics.	PSO 6	Ap
CO-8	Explain the concept of bacterial and cancer genetics and make use of it in research.	PSO 2	U, Ap
CO-9	Show the ability to explain and interpret concepts and problems in genetics	PSO 6	U

Course Title	ALLIED ZOOLOGY: 4 (Compulsory for Botany students) BIOLOGY OF INVERTEBRATES AND CHORDATES		
Code	**U15ZO3ACT04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Classify the different levels of organization with respect to its distinguishing characters and specific examples.	PSO-1 & 2	R,U
CO-2	Interpret the organ system of organization and its distinguishing features with specific examples.	PSO-2	U
CO-3	Discuss the salient features of Arthropoda, Mollusca and Echinodermata with one specific example.	PSO-3	U
CO-4	Describe the salient features of prochordates with examples.	PSO-3	U
CO-5	Ilustrate the characeristic features of Aves and Mammals with specific examples.	PSO-3	U

Course Title	SBE – 3 ANIMAL SCIENCE SKILLS FOR PHYSICS STUDENTS (Theory cum Lab)		
Code	**U17ZO3SBT03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Describes the structural adaptation of the organism to continue their mode of living.	PSO 2	R
CO-2	Relates and learns the skill of identifying the cells and its role.	PSO 2	U
CO-3	Identifies the genetic role of the cell.	PSO 1, 2	R
CO-4	Learns the skill of finding the physiology of cells.	PSO 4	E
CO-5	Analyse the genetics and the inheritance pattern.	PSO 2	An

Course Title	SBE 3 – BIOLOGICAL SKILLS FOR PHYSICAL SCIENCES - ADVANCED (Theory cum Lab for Physics Students)		
Code	**U17ZO3SBT03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Identify DNA and proteins at different levels, and interpret protein estimations	PSO 1, 2, 3	Ap
CO-2	Outline the processes involved in rDNA, vector construction and cloning and appraise their significance in production of transgenic animals and plants	PSO 1, 5	U
CO-3	Apply the principles of techniques like IR, NMR, MASS, X-ray diffraction, X-Ray crystallography and 2-D Electrophoresis in structural studies of molecules	PSO 1, 6	Ap
CO-4	Identify and apply bioinformatics tools in gene sequencing & prediction and protein prediction & visualization	PSO 5, 6	Ap
CO-5	Explain the various statistical models, algorithnms and structure prediction methods	PSO 5	U

Course Title	MAJOR CORE 6 – PRACTICAL – II (CELL BIOLOGY, GENETICS AND BIOCHEMISTRY)		
Code	**U15ZO4MCP06**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	contrast and identify different types of cells, cell division and the stages	PSO 1, 2, 3	U, Ap
CO-2	interpret Karyotypes, pedigrees and identify blood groups	PSO 1, 2, 3	Ap, E
CO-3	test for the Hardy-Weinberg equilibrium of a character in a population	PSO 3, 2, 5	An
CO-4	outline the life cycle of Drosophila melanogaster and identify its mutant forms	PSO 3, 2, 4	U, Ap
CO-5	examine and estimate the presence of biomolecules and minerals in biological samples	PSO 3, 4	U, E

Course Title	MAJOR ELECTIVE: 1 – BIOCHEMISTRY AND BIOSTATISTICS		
Code	**U15ZO4MET01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the structure and classification of carbohydrate, proteins and lipids.	PSO 4, 6	R,U
CO-2	Explain the reactions of Glycolysis, TCA cycle, Glycogen metabolism, Gluconeogenesis and HMP Shunt.	PSO 4, 6	U
CO-3	Explain the general reactions in aminoacid metabolism, Urea cycle, Fatty acid synthesis and β oxidation	PSO 4, 6	U
CO-4	Describes the various biologically important nucleotides, explains the classification of enzymes and their mechanism of enzyme action.	PSO 2, 4, 6	U
CO-5	Explain the process of collection, classification, tabulation and presentation of data.	PSO 5, 6	U, An
CO-6	Describe and calculate mean, median, mode, standard deviation and Co-efficient of variance.	PSO 5, 6	U, An
CO-7	Explain and calculate Karl Pearson‘s correlation coefficient and simple linear regression.	PSO 5, 6	An, E
CO-8	Explain the test of significance and calculates Student t test and Chi-square (X2) test to infer on the given data.	PSO 5, 6	An, E
CO-9	Demonstrate the skill to explain biochemical aspects of living systems and biostatistical methods	PSO 6	U

Course Title	MAJOR ELECTIVE 1 – AQUACULTURE		
Code	**U15ZO4MET02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO -1	Evaluate the freshwater and brackish water resources for aquaculture	PSO 1	E
CO -2	Identify the environmental caused by aquaculture	PSO 3 PSO 4	Ap
CO -3	Describe different aquaculture practices	PSO 6	U, Ap
CO -4	Apply the knowledge of aquaculture in composite fish farming	PSO 6	Ap
CO-5	Apply the concept of integrated farming	PSO 6	Ap
CO - 6	Discuss the sewage fed fish culture	PSO 1	C
CO - 7	Identify fish diseases and explain induced breeding techniques	PSO 3 PSO 5	Ap, U
CO - 8	Discuss the economic returns of aquaculture	PSO 6	C
CO-9	Show the ability to become an entrepreneur in prawn, fish, oyster and clam farming	PSO 6	Ap

Course Title	ALLIED ZOOLOGY 5 – ZOOLOGY AND HUMAN WELFARE		
Code	**U15ZO4ACT05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Choose the appropriate culture method for different commercially important animals	PSO 1 & 2	U
CO-2	Identify the causative organism, symptoms and treatment of bacterial, viral, protozoan and helminth diseases of man	PSO 3	U
CO-3	Describe the cells and organs of immune system and evaluate the vaccination schedule of children.	PSO 4	U
CO-4	Discuss the important agricultural pests and methods of their control.	PSO 4	Ap
CO-5	Predict errors in pregnancy and justify the need for genetic counseling.	PSO 5	Ap
CO-6	Demonstrate the skill to explain all concepts pertaining to zoology and human welfare	PSO 6	Ap

Course Title	ALLIED ZOOLOGY 6 – PRACTICAL (Compulsory for Botany students)		
Code	**U15ZO4ACP06**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Identify and distinguish anatomical systems and structures of specific animals and relate them to their functions	PSO 1, 3	Ap, An
CO-2	Interpret pedigrees and identify genetic abnormalities and inheritance patterns	PSO 1,2, 3	Ap, E
CO-3	Examine and identify the Gram positive and negative bacteria, blood groups and interpret qualitative biochemical analyses	PSO 1, 3, 4	An, Ap, E
CO-4	Discover the biological and economic importance of animals belonging to major taxa	PSO 1, 3	An
CO-5	Extend the significance of endo-parasites and distinguish the stages of meiosis	PSO 1, 2, 3	U, An

Course Title	MAJOR CORE-7 DEVELOPMENTAL BIOLOGY & EVOLUTION		
Code	**U15ZO5MCT07**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Illustrate the events that occur during fertilization.	PSO 4	U
CO-2	Outline the types and patterns of cleavage.	PSO 4	U
CO-3	Summarize the ectodermal and mesodermal derivatives.	PSO 4	U
CO-4	Analyse the Spemann‘s embryonic induction.	PSO 4, 6	An
CO-5	Compare the evolutionary thoughts.	PSO 2, 3	U
CO-6	Explain the mutation in evolution.	PSO 2	U
CO-7	Describe human evolution	PSO 2	U
CO-8	Analyse living and extinct fossils.	PSO 2, 6	An
CO-9	Demonstrate the skill of explaining and illustrating the ideas and theories of developmental biology and evolution	PSO 6	U

Course Title	MAJOR CORE: 8 -FUNDAMENTALS OF BIOTECHNOLOGY		
Code	**U15ZO5MCT08**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Apply the basic tools and techniques of gene cloning in new innovative strategies.	PSO 1, 5	Ap
CO-2	Interpret and predict the appropriate vector for a gene transfer	PSO 1, 5	E,C
CO-3	Decide a gene transfer technique, host cell and selection strategy to synthesize a gene clone and to produce multiple copies.	PSO 1, 5	E
CO-4	Relate the principle of blotting, gene sequencing and micro array techniques with genome analysis.	PSO 1, 5	U
CO-5	Explain the DNA finger printing and Gene knockout techniques	PSO 1, 5	E
CO-6	Discuss the concept of bio-safety and IPR	PSO 1, 5	C
CO-7	Demonstrate the plant and animal tissue culture techniques.	PSO 1, 5	C

Course Title	MAJOR CORE 9 – BIOLOGICAL TECHNIQUES		
Code	**U15ZO5MCT09**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Experiment with different types of solutions.	PSO 4	Ap
CO-2	Classify and compare the types of microscopes and pH meters.	PSO 4	An, E
CO-3	Explain the principle and applications of spectrophotometer and also discover on radioactivity.	PSO 4	U
CO-4	Illustrate the process of centrifugation and chromatography	PSO 4	U
CO-5	Classify and distinguish the types of electrophoresis	PSO 4	An
CO-6	Discover nanobiology and its applications in various fields	PSO 5	An
CO-7	Show the skill to analyze and explain the principles and applications of various biological techniques	PSO 6	An

Course Title	MAJOR CORE 10: PRACTICAL III: DEVELOPMENTAL BIOLOGY, EVOLUTION, MICROBIOLOGY, BIOTECHNOLOGY & BIOINFORMATICS		
Code	**U15ZO5MCP10**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Differentiate healthy, abnormal sperm, identify various developmental stages in frog,chick, regeneration.	PSO 2, 3,6	An
CO-2	Differentiate homologous analogous organs and examine the biological importance in variation,mimicry and adaptive radiation.	PSO 2, 3,6	An
CO-3	Differentiate gram positive and gram negative bacteria,identify the sensitivity of a microbe to given antibiotic ,examine the quality of milk and examine with grapes for fermentation.	PSO 3, 4,6	An
CO-4	Isolate DNA and immobilize enzyme.	PSO 3,6	E
CO-5	Retrieve and examine sequence using various bioinformatics tools.	PSO 3,6	An
CO-6	Demonstrate practical skills to interpret and infer results and apply the techniques	PSO 6	E

Course Title	MAJOR ELECTIVE 2: MICROBIOLOGY AND BIOINFORMATICS		
Code	**U15ZO5MET03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Outline, classify and asses the structure, growth requirements and maintenance of different microorganisms.	PSO 5	U
CO-2	Explain and identify the role of pathogen in water and food spoilage and to assess various food preservation methods.	PSO 5,6	U
CO-3	Acquire, design and apply the principles of fermenter in fermented food and industrial products.	PSO 4,5	Ap
CO-4	Explain, examine and discuss the etiological agent causing infectious diseases and its clinical manifestations.	PSO 4	U
CO-5	Apply, analyze and determine the different sequence databases, finally construct and organize the gene structure according to its functions.	PSO 5	An
CO-6	Organize and examine the protein prediction and its alignment to formulate drug designing tools.	PSO 5,6	C
CO-7	Show the skills of explaining and summarizing the topics under microbiology and bioinformatics	PSO 6	U

Course Title	MAJOR ELECTIVE 2: APPLIED ENTOMOLOGY		
Code	**U15ZO5MET04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	List and summarize the various fields of application of entomology	PSO 5	R,U
CO-2	Define the general structure of insects and classify them up to orders	PSO 5,6	R,U
CO-3	Identify and examine the benefits of insects to man	PSO 4,5	R, Ap
CO-4	Identify and examine the insect pests	PSO 4	R,U
CO-5	List the species of honeybees, silkworms and lac insects and their diseases	PSO-5	Ap, An
CO-6	Outline and model the life cycle of honeybees, silkworms and lac insects and list their products and the uses	PSO5,6	An,C
CO-7	Summarize and criticize the control measures	PSO 4	E

Course Title	NON-MAJOR ELECTIVE: 1 - ORNAMENTAL FISH CULTURE		
Code	**U15ZO5NMT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Construct an aquarium and organize the interior of aquarium with equipments.	PSO 2, 6	E, Ap
CO-2	Evaluate the compatible group of fishes for home aquarium.	PSO 2, 6	E, Ap
CO-3	Develop different methods to prepare artificial fish feed.	PSO 6	Ap
CO-4	Categorize the diseases of ornamental fishes and its treatment methods.	PSO 2, 6	An, Ap
CO-5	Plan new methods for breeding of aquarium fishes for commercial purposes.	PSO 6	C
CO-6	Demonstrate the skill to construct and maintain aquariums and breed aquarium fish for commercial purposes	PSO 6	C

Course Title	SBE – 4 ANIMAL SCIENCE SKILLS FOR CHEMISTRY STUDENTS (Theory cum Lab)		
Code	**U17ZO5SBT04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Describes the structural adaptation of the organism to continue their mode of living.	PSO 2	R
CO-2	Learns the skill of identifying the cells and its role	PSO 1, 2	U
CO-3	Identifies the genetic role of the cell.	PSO 1, 2,4	R
CO-4	Learns the skill of finding the physiology of cells.	PSO 1, 4	E
CO-5	Analyse the genetics and the inheritance pattern.	PSO 2, 4	An

Course Title	SBE- 4: BIOLOGICAL SKILLS FOR CHEMICAL SCIENCES-ADVANCED **(Theory cum Lab. - For Chemistry Students)**		
Code	**U17ZO5SBT04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain and identify operons, its components and functions	PSO 1, 2	U
CO-2	Outline the construction of vectors and discover the applications of Recombinant DNA technology in cloning experiments	PSO 2, 4	Ap
CO-3	Utilize in silico tools and databases and design molecules with relevance to the pharmaceutical industry	PSO 1, 2, 3	C
CO-4	Identify genes and proteins with similarity and utilize them in research and analysis	PSO 1, 3	Ap
CO-5	Utilize databases and tools to identify chemical structures	PSO 1, 3	Ap

Course Title	MAJOR CORE-11 : ANIMAL PHYSIOLOGY		
Code	**U15ZO6MCT11**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the principles of homeostasis.	PSO 1, 3	U
CO-2	Describe the digestion and absorption of food.	PSO 3	U
CO-3	Summarize the clotting mechanism and cardiac cycle.	PSO1, 3	U
CO-4	Analyze the transport of respiratory gases.	PSO 3, 6	An
CO-5	Explain the mechanism of muscle contraction and its energetics.	PSO 3	U
CO-6	Evaluate neural conduction and receptor mechanisms.	PSO 3, 6	E
CO-7	Explain the endocrine glands and hormones.	PSO 3	U
CO-8	Enumerate the various assisted reproductive technologies.	PSO 3, 6	R
CO-9	Demonstrate the skill of explaining and illustrating the physiology of animals	PSO 6	U

Course Title	MAJOR CORE12- APPLIED BIOTECHNOLOGY		
Code	**U15ZO6MCT12**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Interpret and apply the principle of transgenic plants in the production of new transgenic plant.	PSO 1, 5	U,AP
CO-2	Describe sericulture techniques, transgenic fishes	PSO 1, 5	E
CO-3	Spell out the ethics on GMO‘s and policies of ELSI.	PSO 1	R
CO-4	Determine the role of a microorganism in health care and environmental protection	PSO 1, 5	E
CO-5	Explain the role of Biotechnology in diagnosis, vaccine production	PSO 1, 5	E
CO-6	List the disorders and select specific therapy for specific disorders	PSO 1, 5	An
CO-7	Apply the strategies of biodegradation of the wastes and pollutants using microbes to evolve a new strategy	PSO 1, 5	Ap
CO-8	Construct a new bioremediation using microbes	PSO 1, 5	C
CO-9	Show the skill to explain the concepts and principles involved in applied biotechnology.	PSO 6	U

Course Title	MAJOR CORE 13 – PRACTICAL IV- ANIMAL PHYSIOLOGY, ENVIRONMENTAL BIOLOGY AND IMMUNOLOGY		
Code	**U15ZO6MCP13**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO 1	Experiment on oxygen consumption and Q10 in fishes.	PSO 3, 4	Ap
CO 2	Analyze and compare different types of excretory products in animals of different habitats, ECG recording and blood composition of human.	PSO 3	An
CO 3	Assess the haemoglobin content, measure the blood pressure	PSO 3	E
CO 4	Construct ecological pyramid of different trophic levels; analyze the marine and fresh water planktons; animal association and adaptations of different fauna	PSO 2, 3	E
CO 5	Estimate primary productivity of a pond and analyse of water samples for pH, O2, salinity, carbonates and bicarbonates.	PSO 3, 4	An
CO 6	Compare immune system and histology of different organs	PSO 3, 4	An
CO 7	Evaluate haemagglutination and immunodiffusion test	PSO 3, 4	E

Course Title	MAJOR ELECTIVE: 3 –IMMUNOLOGY		
Code	**U15ZO6MET05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the scope of Immunology, types of Immunity and structure and function of lymphoid organs and Lymphoid Cells.	PSO 4, 6	U
CO-2	Explain the structures, types and properties of antigens and immunoglobulins.	PSO 4, 6	U
CO-3	Compares the types of vaccine & Vaccination schedule.	PSO 4, 6	U
CO-4	Explain Humoral, Cell mediated immune response and Complement pathway.	PSO 4, 6	U
CO-5	Describe the structure and function of MHC	PSO1, 4, 6	An
CO-6	Explain and analysethe immune reactions in Organ transplantation and autoimmunity.	PSO 4, 6	An
CO-7	Describe the types of hypersensitivity reaction with suitable examples.	PSO 4, 6	An
CO-8	Explain antigen – antibody reactions and its clinical application.	PSO 1, 4, 6	E
CO-9	Show the kill of explaining the basic and advanced immunological concepts	PSO 6	U

Course Title	MAJOR ELECTIVE: 3 – ENVIRONMENTAL SCIENCE		
Code	**U15ZO6MET06**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Compare the different zones in marine environment.	PSO 2	An
CO-2	Distinguish Biome and Ecosystem.	PSO 2	An
CO-3	List out the characters of population.	PSO 2	R, U
CO-4	Distinguish symbiosis and Commensalism.	PSO 2	R, U
CO-5	Evaluate the effect of water pollution in environment.	PSO 4, 6	E, Ap
CO-6	Analyze the effect of Tsunami on the environment.	PSO 4, 6	An, Ap
CO-7	Analyze and Appraise the effects of Chipko movement and Silent Valley movement.	PSO 4, 6	An, E
CO-8	List out the environmental laws in India for conservation of environment.	PSO 2, 6	R, Ap

Course Title	NON-MAJOR ELECTIVE: 2 – FIRSTS AID AND HOME NURSING		
Code	**U15ZO6NMT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO 1	Analyze the principles of first aid	PSO 4, 5	An
CO 2	Explain the structures of human anatomy	PSO 3	U
CO 3	Demonstrate different types of first aid given for emergency	PSO 4, 5, 6	U
CO 4	Apply the home remedies for daily life	PSO 5	Ap
CO 5	Analyze and categorize the first aid techniques for child and adult illness	PSO 5	An
CO 6	Show the skills of administering first aid at basic and advanced stages	PSO 6	Ap

Course Title	SKILL BASED ELECTIVE: 5- ANIMAL CELL CULTURE TECHNIQUES (THEORY CUM LAB)		
Code	**U15ZO6SBT05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Develop and classify the media constituents, its formulation in establishment of cell lines and their maintenance.	PSO-1,2	U,C
CO-2	Demonstrate and measure the cell viability and toxicity through in vitro models.	PSO-2,4,5	R, U
CO-3	Explain and analyze how stem cells are specified and maintained to provide regenerative therapies.	PSO-4,5,6	U, E
CO-4	Identify and explain the major signaling pathways that coordinate the cellular response.	PSO-4,6	Ap

PROGRAMME – M.Sc. Zoology

PO NO.	PROGRAMME OUTCOMES **Upon completion of the M.Sc. Degree programme, the graduate will be able to**
PO – 1	Acquire a comprehensive knowledge of biology in a diversity of organisms encompassing different ecosystem levels
PO – 2	Demonstrate the ability to connect and apply biological knowledge to other disciplines and to integrate knowledge into their personal and professional lives
PO – 3	Demonstrate the ability to engage in critical, independent, and creative thinking
PO – 4	Understand how scientific knowledge grows, and is organized, evaluated and disseminated
PO – 5	Acquire the practical skills and ability to perform experiments and analyses to obtain accurate results and thus gain the ability to solve problems

PSO NO.	PROGRAMME SPECIFIC OUTCOMES **Upon completion of these courses the student would**
PSO – 1	Acquire cognitive and hands-on skills in advanced scientific methods and their uses in applied and advanced zoological sciences
PSO – 2	Be able to connect, comprehend and apply the value of the diversity and complexity of animal life as revealed through studies on morphology, physiology, cellular and molecular biology and biochemistry.
PSO – 3	Apply statistical tools, bioinformatics softwares and technologies integrated with biology to solve problems in biology and create solutions for pharmaceutical and therapeutical issues.
PSO – 4	Acquire knowledge and critical analytical skills on different scientific arenas such as immunology, endocrinology, microbiology and genetics
PSO – 5	Be proficient at critical thinking, annotation and communication of scientific information and able to succeed in competitive examinations and interviews.

Course Title	MAJOR CORE 1: FUNCTIONAL MORPHOLOGY OF INVERTEBRATES AND CHORDATES		
Code	**P16ZO1MCT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Describe the nutrition and digestive system of organisms.	PSO 2	R
CO-2	Relate the structure and function of respiration and excretion of the organisms.	PSO 2	U
CO-3	Compare the circulatory system of organisms.	PSO 1, 2	E
CO-4	Explain the nervous system in organisms.	PSO 2	U
CO-5	Compare the function of chemical coordination and its role in reproduction	PSO 2	E
CO-6	Acquire skills in teaching the structural and functional features of invertebrate and vertebrate life forms	PSO 5	Ap

Course Title	MAJOR CORE 2: MOLECULAR AND HUMAN GENETICS		
Code	**P16ZO1MCT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the concept of Bacterial recombination.	PSO 2, 4	U
CO-2	List and explain the types of mutation and its biological effects.	PSO 2, 4	U
CO-3	Apply tests for detection of mutation.	PSO 4	Ap
CO-4	Illustrate the mechanism of gene regulation in eukaryotes with operon models.	PSO 4	U
CO-5	Find out the genes related to cancer and make use of it in research.	PSO 3, 4, 5	Ap
CO-6	Explain the techniques for human genome analysis.	PSO 3, 4, 5	Ap
CO-7	Find out the various metabolic disorders and identify the therapies for its management.	PSO 3, 4, 5	Ap
CO-8	Develop the tools in genetic counseling.	PSO 5	Ap
CO-9	Demonstrate the ability to teach the basic and advanced concepts of molecular and human genetics	PSO 5	Ap

Course Title	MAJOR CORE 3:MOLECULAR BIOLOGY		
Code	**P16ZO1MCT03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Relate the process of DNA replication with the structure of DNA.	PSO2	U
CO-2	Compare transcription in prokaryotes and eukaryotes.	PSO2	U
CO-3	Construct a flowchart for the steps involved in translation.	PSO2	Ap
CO-4	Outline the structure of ribosome	PSO2	U
CO-5	Demonstrate the application of antisense RNA.	PSO2, 3	U
CO-6	Compare active and passive transport.	PSO2	U
CO-7	Acquire the skills to analyze and explain the concepts in molecular biology	PSO 5	An

Course Title	MAJOR CORE 4: BIOSTATISTICS AND STATISTICAL PACKAGE FOR SOCIAL SCIENCES (SPSS) (THEORY CUM LAB)		
Code	**P16ZO1MCT04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Describe and discuss the basic statistical concepts.	PSO 1,3	R,U
CO-2	Analyze and choose the variable data and formulate it in SPSS.	PSO 5	An, Ap
CO-3	Demonstrates, analyze and measure the descriptive statistics and construct their skills in diagrammatic representations.	PSO 5	U, Ap, C
CO-4	Relate, organize and examine the correlation and regression analyses among various data.	PSO 3,4	U, Ap
CO-5	Analyze the importance of probability and student – t Test to apply statistics in solving their research problems	PSO 3,4	An
CO-6	Evaluate and find solution to statistical problem using chi- square and F – test.	PSO 3,5	E
CO-7	Gain the skill to utilize biostatistics and SPSS in solving problems and scientific data analysis	PSO 5	Ap

Course Title	MAJOR CORE 5: PRACTICAL I: INVERTEBRATA, CHORDATA, GENETICS, MICROBIOLOGY AND MOLECULAR BIOLOGY		
Code	**P16ZO1MCP05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Correlate the invertebrates based on their general characters.	PSO 2, 3	U
CO-2	Utilize the knowledge on mounting and dissection of Invertebrates.	PSO 1, 3	Ap
CO-3	Correlate the mammals based on their skin derivatives, skull and dentition.	PSO 2, 3	U
CO-4	Examine the Mendelian traits, pedigree, syndromes and Barr body of human.	PSO 3, 4	An & Ap
CO-5	Identify the salivary gland chromosomes and polyploidy in onion root tip.	PSO 1, 3	Ap
CO-6	Utilize the knowledge on isolation and staining of bacteria to study its characteristic features.	PSO 1	Ap
CO-7	Exhibit mutagenesis and DNA repair mechanism	PSO 3, 4	An & Ap
CO-8	Design models for DNA replication, transcription and translation.	PSO 1, 3, 4	C

Course Title	MAJOR ELECTIVE 1: GENERAL & APPLIED MICROBIOLOGY		
Code	**P16ZO1MET01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Classify microbes, explains the structure of bacteria and virus, salient features of different group of microorganisms and outlines the important contribution in History of Microbiology	PSO 4	U
CO-2	Discuss and relate the growth characteristics and growth requirements of bacteria and identify microbes based on morphological, cultural, biochemical and molecular methods.	PSO 2,4	R
CO-3	Explain the physical and chemical antimicrobial agents, its application and mode of action of antibiotics.	PSO 2,4	U
CO-4	Outline the microbial diseases in farm animals.	PSO 1,2,4	Ap
CO-5	Describe and distinguish the various concepts of fermentation processes and its products.	PSO 4,5	An
CO-6	Explain and analyze the microbes involved in food spoilage and their beneficial role in food preservation and processing.	PSO 4,5	E
CO-7	Outline the concepts of microbial ecology and discuss its association in biofertilizer production and bioremediation process	PSO 2,3,4	C
CO-8	Explain the bacterial chemotaxis and quorum sensing.	PSO-4	E
CO-9	Acquire the skills to teac the topics under general and applied microbiology	PSO 5	Ap

Course Title	MAJOR ELECTIVE 1 - SERICULTURE		
Code	**P16ZO1MET02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO -1	Explain the structure, life cycle and various species of silkworm	PSO 2	U
CO -2	Describe the cultivation, harvest and preservation of mulberry leaves	PSO 1	U, Ap
CO -3	Outline the genetics in the development of new strains	PSO 2 PSO 4	U
CO -4	Discuss the different pests infecting silkworm and their control	PSO 4	C
CO-5	Relate the strategies learnt in silkworm rearing and silk thread reeling in developing silk farm	PSO 1	An
CO-6	Gain the ability to explain and analyze the concepts of sericulture	PSO 5	Ap

Course Title	MAJOR CORE 6: DEVELOPMENTAL BIOLOGY		
Code	**P16ZO2MCT06**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Demonstrate the basic concepts of development	PSO 1,2,5	R,U
CO-2	Interpret the role of genes in sex determination	PSO 1,2,5	U, An
CO-3	Inspect the molecular perspectives of fertilization	PSO 1,2,5	U, An
CO-4	Outline the gene pattern of Drosophila	PSO 1,2,5	R,U
CO-5	Summarize the basic concepts in stem cells	PSO 1,2,5	U, An
CO-6	Make use of the concept of organizer and induction in assessing metamorphosis and development	PSO 1,2,5	U, Ap
CO-7	Make use of the concept of differentiation in gene knock out	PSO 1,2,4,5	U, Ap
CO-8	Relate abnormal differentiation	PSO 1,2,4,5	R,U
CO-9	Demonstrate the skills to explain the concepts in developmental biology	PSO 5	Ap

Course Title	MAJORCORE 7– BIOCHEMISTRY		
Code	**P16ZO2MCT07**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Describe the colligative properties and derive Handerson Hasselbach‘s equation.	PSO 4, 5	R,U
CO-2	Explain the structure, classification and metabolism of carbohydrates and the hormonal control of carbohydrate metabolism.	PSO 4, 5	U
CO-3	Explain the structure, classification and properties of aminoacids & proteins and metabolism of tyrosine.	PSO 4, 5	R,U
CO-4	Explain the mechanism of enzyme action, enzyme kinetics and identify the role of enzyme inhibitors and coenzymes.	PSO 1, 4, 5	U
CO-5	Explain the structure, classification, properties and metabolism of lipids and analyse the control sites and key junctions of major metabolic pathways.	PSO 4, 5	U, An
CO-6	Explain haemoglobin synthesis, catabolism and its role as a buffer.	PSO 4, 5	R,U
CO-7	Describe the structure and metabolism of Nucleic acid and the process of biological oxidation.	PSO 4, 5	U
CO-8	Explain the types of hormones receptors, mechanism of Signal transduction and interpret the role of second messengers in Signal transduction.	PSO2, 4, 5	U, An
CO-9	Acquire the skills to teach the concepts and pathways in biochemistry	PSO 5	Ap

Course Title	MAJOR CORE 8: STEM CELL BIOLOGY		
Code	**P16ZO2MCT08**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Identify, associate and predict the factor responsible for cell cycle/senescence and their role in embryonic development.	PSO 1,2	Ap , C
CO-2	List and compare the factors responsible for epigenetics and reprogramming, self-renewal and pluri/multipotency.	PSO 2	R, An
CO-3	Discuss and outline the stem cell niche	PSO 2	U,C
CO-4	Identify the genes responsible for repopulating patterns and molecular diversification of hematopoietic stem cells.	PSO 2	Ap
CO-5	Describe the techniques of stem cell banking.	PSO 4,5	R,U
CO-6	Design a signal transduction pathway for an abnormal condition.	PSO 2	U,C
CO-7	Explain the types of stem cell sources and the ethical issues on stem cells.	PSO 2, 5	U,E
CO-8	Gain the ability to analyze and explain the fundamental and advanced theories in stem cell biology	PSO 5	An

Course Title	MAJOR CORE-9: PRACTICAL II DEVELOPMENTAL BIOLOGY, BIOCHEMISTRY, ANIMAL CELL CULTURE TECHNIQUES, EVOLUTION, BIOINFORMATICS & MICROTECHNIQUES		
Code	**P16ZO2MCP09**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	analyse the morphology of sperm through smear preparation, tadpole regeneration and zebra fish development	PSO1, 2, 3	An
CO-2	evaluate the chemical composition of tissues through quantitative estimations.	PSO 3, 4	E
CO-3	apply the concepts of animal cell culture techniques and identify the evidences of evolution.	PSO 3	Ap
CO-4	Analyse and evaluate the protein sequences, phylogenetic analysis through bioinformatic tools.	PSO 3, 5	An, E
CO-5	Analyse and evaluate micrometry and histochemical techniques.	PSO1, 2, 3	An

Course Title	MAJOR ELECTIVE 2: EVOLUTION AND BIOINFORMATICS		
Code	**P17ZO2MET03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO 1	Explain the basic concepts and theories of Lamarck and Darwin	PSO 2	U
CO 2	List out various mechanisms involved in evolution	PSO 2	U
CO 3	Explain genome and genome sequencing	PSO 2, 5	U
CO 4	Compare the prokaryotic and eukaryotic gene predictions	PSO 2	An
CO 5	Demonstrate the 2D electrophoresis	PSO 1	Ap
CO 6	Analyze the protein sequence using protein analyzing tools	PSO 1	An
CO 7	Gain the skills to teach evolution and bioinformatics	PSO 5	Ap

Course Title	MAJOR ELECTIVE 3: ENDOCRINOLOGY		
Code	**P17ZO2MET04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Define and explain the scope of endocrinology and the endocrine glands in crustaceans, insects and vertebrates	PSO-2, 4	U
CO-2	Explain the structure and list the functions of pancreas and adrenal glands	PSO-2	U
CO-3	Illustrate the endocrine control of moulting and metamorphosis in crustaceans and insects	PSO-4	U
CO-4	Recall the structure of mammalian testis and ovary	PSO-2	R
CO-5	Explain the action of hormones involved in the reproduction	PSO-2, 4	U
CO 6	Acquire the skills to explain the mechanisms involved in endocrinology	PSO 5	Ap

Course Title	MAJOR ELECTIVE 3: ENDOCRINOLOGY		
Code	**P17ZO2MET04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Define and explain the scope of endocrinology and the endocrine glands in crustaceans, insects and vertebrates	PSO-2, 4	U
CO-2	Explain the structure and list the functions of pancreas and adrenal glands	PSO-2	U
CO-3	Illustrate the endocrine control of moulting and metamorphosis in crustaceans and insects	PSO-4	U
CO-4	Recall the structure of mammalian testis and ovary	PSO-2	R
CO-5	Explain the action of hormones involved in the reproduction	PSO-2, 4	U
CO 6	Acquire the skills to explain the mechanisms involved in endocrinology	PSO 5	Ap

Course Title	NON-MAJOR ELECTIVE I: HUMAN GENETICS		
Code	**P16ZO2NMT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Identify the structure of gene, chromosome and the principles of genetics with respect to inheritance.	PSO-2	R,U
CO-2	Relate the syndromes and the abnormalities associated with them.	PSO-3	U
CO-3	Deduce the importance of sex inherited and sex influenced genes.	PSO-4	Ap
CO-4	Interpret the various genetic diseases and the factors responsible for them	PSO-5	Ap
CO-5	Analyze the various techniques in prenatal diagnosis and justify the need for genetic counseling.	PSO-5	Ap

Course Title	MAJOR CORE 10: ANIMAL PHYSIOLOGY		
Code	**P16ZO3MCT10**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the principles of homeostasis.	PSO 2	U
CO-2	Compare the physiology of respiration in relation to different habitats.	PSO 2	U
CO-3	Compare the anatomy of heart structure and summarize the cardiac cycle and blood pressure.	PSO 2, 5	U
CO-4	Analyze the transport of respiratory gases.	PSO 2	An
CO-5	Explain the mechanism of muscle contraction and its energetics.	PSO 2	U
CO-6	Evaluate neural conduction and receptor mechanisms.	PSO 2	E
CO-7	Explain the hormones secreted, functions and disorders of all the endocrine glands.	PSO 2	U
CO-8	List out the various assisted reproductive technologies.	PSO 2, 5	R
CO 9	Acquire the skills to teach the physiology of animals	PSO 5	Ap

Course Title	MAJOR CORE 11: IMMUNOLOGY		
Code	**P16ZO3MCT11**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the structure and functions of lymphoid organs and types of Immunity..	PSO 4, 5	R,U
CO-2	Explain the structure, types and properties of antigens and immunoglobulins and analyse the role of gene rearrangement process in antibody diversity.	PSO 1, 4, 5	U, An
CO-3	Describe the process and mechanism of Humoral and Cell mediated immune response & Complements pathways.	PSO 4, 5	R,U
CO-4	Explain the structure and genetic organization of MHC and its application in Organ transplantation	PSO 4, 5	U, An
CO-5	Relates the process of immune tolerance and autoimmunity.	PSO 1, 4, 5	U
CO-6	Exemplify the types of hypersensitivity and immune response in microbial infection.	PSO 4, 5	R, U
CO-7	Describe Hybridoma technique, its application and tumour immunology.	PSO 4, 5	U, An
CO-8	Explain and analyse antigen –antibody reactions, immunodiffusion techniques, ELISA, RIA, Western Blot, IF, Flow cytometry, FISH and GISH.	PSO 1, 4, 5	U, An
CO-9	Gain the ability to explain the concepts of immunology	PSO 5	U

Course Title	MAJOR CORE 12: APPLIED ECOLOGY		
Code	**P16ZO3MCT12**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Demonstrate the concept of community ecology, succession, species interactions and ecosystem	PSO 2,5	U
CO-2	Illustrate different types of ecosystem	PSO 2,5	U, An
CO-3	Compare the various natural resources	PSO 2,5	U, An
CO-4	Rephrase the applications of biodiversity and renewable resources.	PSO 2,5	U, An
CO-5	Criticize the effects of pollution	PSO 2,5	U, E
CO-6	Appraise the economic importance of vermicomposting	PSO 2,5	U, E
CO-7	Defend the need for disaster management and Laws on environmental protect ion	PSO 1,2,5	U, E
CO-8	Summarize the concept of population dynamics, remote sensing and space travel and its applications	PSO 2,5	U
CO-9	Demonstrate the skills to explain and summarize the concepts of applied ecology	PSO 5	Ap

Course Title	MAJOR CORE 12: APPLIED ECOLOGY		
Code	**P16ZO3MCT12**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Demonstrate the concept of community ecology, succession, species interactions and ecosystem	PSO 2,5	U
CO-2	Illustrate different types of ecosystem	PSO 2,5	U, An
CO-3	Compare the various natural resources	PSO 2,5	U, An
CO-4	Rephrase the applications of biodiversity and renewable resources.	PSO 2,5	U, An
CO-5	Criticize the effects of pollution	PSO 2,5	U, E
CO-6	Appraise the economic importance of vermicomposting	PSO 2,5	U, E
CO-7	Defend the need for disaster management and Laws on environmental protect ion	PSO 1,2,5	U, E
CO-8	Summarize the concept of population dynamics, remote sensing and space travel and its applications	PSO 2,5	U
CO-9	Demonstrate the skills to explain and summarize the concepts of applied ecology	PSO 5	Ap

Course Title	MAJOR CORE 13: PRACTICAL III- ANIMAL PHYSIOLOGY, IMMUNOLOGY, APPLIED ECOLOGY, BIOTECHNOLOGY AND NANOTECHNOLOGY		
Code	**P16ZO3MCP13**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Examinee and interpret the various physiological parameters	PSO 2	R
CO-2	Apply and design immunological techniques for various purposes of study	PSO 2	U
CO-3	Analyse the quality of water and criticize the effect of possible water pollutants on freshwater ecosystems	PSO 1, 2	E
CO-4	Utilize the techniques in biotechnology and nanotechnology for identification and characterization studies	PSO 2	U

Course Title	MAJOR ELECTIVE 3: BIOTECHNOLOGY & NANOTECHNOLOGY		
Code	**P16ZO3MET05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Apply the basic tools and techniques of gene cloning in new innovative strategies.	PSO-3	Ap
CO-2	Summarize the principle and applications of gene sequencing methods	PSO-1	U
CO-3	Demonstrate the plant and animal tissue culture techniques	PSO-1	U
CO-4	Outline the applications of Biotechnology in various fields	PSO-1	U
CO-5	Analyze and design a method for the production and characterization of a nanoparticle	PSO-3	An
CO-6	Explain applications of nanotechnology in different fields	PSO-1	U
CO-7	Acquire the skills to teach biotechnology and nanotechnology	PSO-5	Ap

Course Title	MAJOR ELECTIVE 3: DRUG BIOLOGY AND NANOBIOTECHNOLOGY		
Code	**P16ZO3MET06**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain and evaluate the steps in drug discovery, its development and regulatory mechanism in human system.	PSO 3	Ap
CO-2	Outline and critically assess the pharmacology of drug through computer aided drug designing	PSO 3	An
CO-3	Summarize and assess the physiochemical property of drug molecule in relation to ADME.	PSO3, 4	E
CO-4	Define and explain the tools and working principle of bio-analytical & biophysical nano techniques.	PSO 1	U
CO-5	Develop & discuss the interventional therapies in nano drug discovery.	PSO 3	Ap
CO-6	Discuss & evaluate the nanotechnology based approaches in drug delivery and developing biomarkers	PSO 3	E
CO-7	Acquire the skills to teach drug biology and nanobiotechnology and design drugs	PSO-5	Ap

Course Title	NON-MAJOR ELECTIVE 2: HUMAN HEALTH CARE		
Code	**P16ZO3NMT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Apply the general care of eyes, ears, hair and teeth in one‘s own life	PSO-1	R,U
CO-2	Relate periodic screening of various diseases and healthy weight range to lead good life.	PSO-2	U
CO-3	Adopt measures that keep body and mind fit; manage time properly to reduce stress in life.	PSO-3	Ap
CO-4	Evaluate the various milestones in the life of a woman and newborn.	PSO-4	Ap
CO-5	Analyze the various complementary medicine practiced in India and the first aid procedures to be applied for specific situations.	PSO-5	Ap

Course Title	SELF STUDY PAPER: BIOLOGICAL TECHNIQUES AND BIOPHYSICS		
Code	**P16ZO4SST01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Compare and contrast the principle and applications of light and electron microscopy.	PSO1	An
CO-2	Compare the working principle of Geiger Muller counter and Scintillation counter.	PSO1,4	An
CO-3	Categorize the chromatography technique based on the principle involved in separation of protein.	PSO1,4	An
CO-4	Outline the steps involved in 2D gel electrophoresis	PSO1	U
CO 5	Gain the skills to explain the principle and application s of various biological techniques and concepts in biophysics	PSO 5	Ap

PROGRAMME – M.Phil ZOOLOGY

PO NO.	PROGRAMME OUTCOMES **Upon completion of the M.Phil programme, the graduate will be able to**
PO – 1	Acquire a comprehensive knowledge of research methodology and gain the skills to teach basic and advanced concepts in life sciences
PO – 2	Demonstrate the ability to connect and apply biological knowledge to other disciplines and to integrate knowledge into their personal and professional lives
PO – 3	Demonstrate the ability to engage in critical, independent, and creative thinking
PO – 4	Understand how scientific knowledge grows, and is organized, evaluated and disseminated
PO – 5	Acquire the practical skills and ability to perform experiments and analyses to obtain accurate results and thus gain the ability to solve problems

PSO NO.	PROGRAMME SPECIFIC OUTCOMES **Upon completion of these courses the student would**
PSO – 1	Acquire cognitive and hands-on skills in advanced scientific methods used for identification and analytical purposes in animal sciences research
PSO – 2	Be able to identify and apply the recent advances in animal sciences for the improvement of the standard of living through its application in medicine, agriculture, pharmacology and other relevant fields
PSO – 3	Apply statistical tools, and technologies integrated with biology to solve problems in biology and create solutions for pharmaceutical and therapeutical issues.
PSO – 4	Acquire knowledge and skills in teaching and critically analyzing the concepts of animal sciences
PSO – 5	Recognize the fundamental aspects of microbiology the applications of microbial technology in various fields
PSO – 6	Become proficient in the knowledge and skills pertaining to vermiculture, vermicomposting techniques, stem cell identification, cancer biology and regenerative medicine
PSO – 7	Apply the techniques of extracting and isolating phytocompounds, analysis of phytochemical constituents, extraction and estimation of hormones in research
PSO – 8	Be proficient at critical thinking, annotation and communication of scientific information and able to succeed in competitive examinations and interviews.

Course Title	PAPER I - Research Methodology		
Code	**MPH16ZO1C01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Assess critically the following methods: literature study, case study, structured surveys, interviews, focus groups and research methods pertinent to technology innovation research.	PSO 1, 8	An
CO-2	Demonstrate knowledge of establishment of cell lines and their maintenance.	PSO 1, 6	An
CO-3	Compare and contrast the principle and applications of microtechniques and microscopy.	PSO 2, 4	An
CO-4	Describe the development of Omics technologies, with emphasis on genomics and proteomics	PSO 2, 4	U
CO-5	Describe and discuss the basic statistical concepts.	PSO 3, 4	An

Course Title	PAPER II- RECENT TRENDS IN ANIMAL SCIENCE		
Code	**MPH16ZO1C02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the molecular mechanisms of gene expression, protein synthesis, protein sorting and transport, signal transduction, and Cancer Genetics..	PSO 2, 4	U
CO-2	Relate the importance of antibodies, stem cells and protein products to their applications in immunotherapy and health care.	PSO 2	An
CO-3	Explain the concepts of RNA technology, gene knockout, applications of genetic engineering and IPR.	PSO 2	U
CO-4	Apply the techniques of media preparation and staining, cytotoxicity assays in animal cell culture.	PSO 1, 2	Ap
CO-5	Relate the methods of synthesis and characterization of nanoparticles to its uses as drugs, gene and RNAi carriers and cancer treatment.	PSO 1, 2	An

Course Title	PAPER III- TEACHING AND LEARNING SKILLS		
Code	**MPH18TS1CO3**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	After completing the course, the students will: Develop skills of ICT and apply them in Teaching Learning context and Research.	PSO 4	Ap
CO-2	Be able to use ICT for their professional development.	PSO 4, 8	Ap
CO-3	Leverage OERs for their teaching and research.	PSO 4, 8	An
CO-4	Appreciate the role of ICT in teaching, learning and Research.	PSO 4, 8	An
CO-5	Develop communication skills with special reference to Listening, Speaking, Reading and Writing.	PSO 4, 8	Ap
CO-6	Learn how to use instructional technology effectively in a classroom.	PSO 4	U
CO-7	Master the preparation and implementation of teaching techniques	PSO 4	Ap
CO-8	Develop adequate skills and competencies to organize seminar/ conference /workshop / symposium / panel discussion	PSO 4	Ap
CO-9	Develop skills in e-learning and technology integration.	PSO 4	Ap
CO- 10	Have the ability to utilize Academic resources in India for their teaching.	PSO 4	Ap
CO- 11	Have the mastery over communication process through the web.	PSO 4	Ap
CO- 12	Develop different teaching skills for putting the content across to targeted audience.	PSO 4, 8	Ap
CO- 13	Have the ability to use technology for assessment in a classroom.	PSO 4, 8	Ap

Course Title	PAPER IV - MICROBIAL TECHNOLOGY		
Code	**MPH16ZO1E04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Identify and illustrate the basic technique of fermentation Technology.	PSO 5	An
CO-2	Comprehend the significant activities of microbes in production of biofuel, biopigment and biopolymer.	PSO 5	U
CO-3	Acquire and apply the principles of microbial techniques in food, enzyme, biopesticide and pharmaceutical products	PSO 1,5	Ap
CO-4	Apply the various methods to determine biodegradation and metal recovery	PSO 2, 8	Ap
CO-5	Evaluate the strategies of IPR and Bioethics	PSO 2, 8	An
CO-6	Understand and evaluate the beneficial and harmful microbes and analyse its coding communication in applied field of microbiology.	PSO 2, 5	An

Course Title	PAPER IV - VERMITECHNOLOGY		
Code	**MPH16ZO1E05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Identify the different earthworm species	PSO 6	U
CO-2	Demonstrate the different techniques of breeding in vermiculture	PSO 1, 2, 6	Ap
CO-3	Apply vermitech process in solid waste management	PSO 2, 6, 8	Ap
CO-4	Compare and evaluate the quality of the Vermicompost	PSO 2, 6	E
CO-5	Defend the use of earthworms in medicine	PSO 2, 6	An
CO-6	Create a research design in vermitechnology for use in agriculture and medicine	PSO 2, 6, 8	C

Course Title	PAPER IV - REGENERATIVE MEDICINE		
Code	**MPH16ZO1E06**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Differentiate adult and embryonic stem cells	1, 6	An
CO-2	Explain the role of stem cells in embryonic development	6	U
CO-3	Relate the properties of adult stem cells to its uses in regenerative medicine	2, 6	An
CO-4	Outline the immune responses of the body and the diseases of the immune system	4, 6	U
CO-5	Comprehend the role of immune system and the stem cells involved	4, 6	U
CO-6	Discuss the prospective use of iPSCs in therapeutic processes	2, 8, 6	An

Course Title	PAPER - IV PHYTOMEDICINE		
Code	**MPH16ZO1E07**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the process of extract preparation, isolation and analysis of phytocompounds	PSO 1, 7	U
CO-2	Relate the function of phytochemical substances present in different plant extracts	PSO 4, 7	An
CO-3	Apply the analytical techniques to study the structure and function of phytocompounds	PSO 1, 7, 8	Ap
CO-4	Examine the potential uses of phytomedicine in the treatment of various diseases	PSO 2, 7, 8	E
CO-5	Evaluate and Construct drugmolecules related to phytochemical structures	PSO 1, 2, 7	C

Course Title	PAPER – IV MOLECULAR ENDOCRINOLOGY AND REPRODUCTIVE TECHNOLOGY		
Code	**MPH16ZO1E08**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Summarize the chemical nature, purification and characterization of hormones and its production by rDNA technology	PSO 2, 4, 7, 8	U
CO-2	Analyse the relationship between the structure and functions of hormones	PSO 4, 7	An
CO-3	Explain the role played by hormones in the regulation of metabolism	PSO 4, 7, 8	U
CO-4	Estimate the level of specific hormones in urine and perform, bioassays of hormones	PSO 1, 4, 7	E
CO-5	Outline the processes involved in assisted reproductive technology	PSO 4, 7	U

Course Title	PAPER – IV CANCER BIOLOGY		
Code	**MPH16ZO1E09**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Relate the changes in the cell cycle that lead to cancer	PSO 4, 6	An
CO-2	Explain the mechanism of physical and chemical carcinogenesis	PSO 4, 6, 8	U
CO-3	Outline the methods of detection and identification of oncogenes	PSO 4, 6	U
CO-4	Analyse the mechanism of cancer metastasis	PSO 1, 6, 8	An
CO-5	Summarize the techniques for cancer detection and treatment	PSO 2, 6, 8	An