



BISHOP HEBER COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

COURSE OUTCOMES

**DEPARTMENT
OF
ZOOLOGY**



BISHOP HEBER COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

STRUCTURE OF THE SYLLABUS

PROGRAM NAME	COURSE	COURSE CODE	COURSE NAME
B.Sc. Zoology	Core I	U21ZY101	Invertebrata
B.Sc. Zoology	Core Prac. I	U21ZY1P1	Core Practical - I
B.Sc. Zoology	Core II	U19ZY202	Chordata
B.Sc. Zoology	Core Prac. II	U19ZY2P2	Core Practical - II
B.Sc. Zoology	Core III	U19ZY303	Ecology and Evolution
B.Sc. Zoology	Core Prac. III	U21ZY3P3	Core Practical - III
B.Sc. Zoology	SBEC I	U19ZYPS1	SBEC I - Sericulture and Vermiculture
B.Sc. Zoology	Core IV	U19ZY404	Cell and Molecular Biology
B.Sc. Zoology	Core Prac. IV	U20ZY4P4	Core Practical - IV
B.Sc. Zoology	SBEC II	U19ZYPS2	SBEC II - Pisciculture
B.Sc. Zoology	Core V	U19ZY505	Genetics
B.Sc. Zoology	Core VI	U21ZY506	Microbiology
B.Sc. Zoology	Core Prac. V	U21ZY5P5	Core Practical - V
B.Sc. Zoology	Elective I	U21ZY5:1	Biophysics and Biochemistry
B.Sc. Zoology	Group Project	U19ZY5PJ	Project
B.Sc. Zoology	SBEC III	U20ZYPS3	SBEC III - Wild life ecology and Economic Entomology
B.Sc. Zoology	Core VII	U19ZY607	Animal Physiology
B.Sc. Zoology	Core VIII	U19ZY608	Developmental Biology and Immunology
B.Sc. Zoology	Elective II	U19ZY6:2	Biotechnology
B.Sc. Zoology	Core Prac. VI	U19ZY6P6	Core Practical - VI
B.Sc. Zoology	Elective III	U21ZY6:3	Biostatistics and Bioinformatics



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TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

CORE I: INVERTEBRATA **COURSE CODE: U21ZY101 HOURS/ WEEK: 6**
SEMESTER: I
CREDITS: 6

At the end of this course, the students will be able to

CO NO.	COURSE OUTCOMES	LEVEL	UNIT
CO1	Classify the level of organization in invertebrates	K4	I
CO2	Explain the functional significance of associated morphologies and behaviours	K5	II
CO3	Categorize the parasites and its associated diseases	K5	III
CO4	Explain the specific characteristics of molluscs and Echinodermata	K4	IV
CO5	Compare the diversity and adaptation of invertebrates	K5	V
CO6	Construct the phylogenetic relationship of various invertebrate phyla	K5	V

Core Practical-I: INVERTEBRATA **COURSE CODE :U21ZY1P1 HOURS / WEEK: 3**
SEMESTER : I
CREDITS : 2

At the end of this course, the students will be able to

CO.No	Course Outcomes	Level	Practicals
CO1	Analyze the structural organization of the different systems in Earthworm and Cockroach	K4	I
CO2	Compare the structural organization of mouthparts.(Cockroach, mosquito& Housefly)	K4	II
CO3	Identify the body setae in a muscle squash of earthworm and show under the compound microscope and Show the Appendages of Prawn in dissection microscope	K3, K4	II
CO4	Asses the organ systems of insects through dissection and virtual labs.	K6	III
CO5	Identify the specimen and write their classification and its Significance	K3,K4	III
CO6	Discuss the diversity and adaptations of invertebrates	K6	III



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CORE II: CHORDATA

SEMESTER : II
CREDITS : 4

COURSE CODE: U19ZY202
HOURS /WEEK: 6

At the end of this course, the students will be able to

CO.NO	COURSE OUTCOMES	LEVEL	UNIT
CO1	Classify the levels of organisation in vertebrates.	K4	I
CO2	Explain the unique characteristics of vertebrates from fishes to mammals	K5	I – V
CO3	Analyse and compare the external morphology, different systems and sexual dimorphism in chordates.	K4	I – V
CO4	Compare and analyse the difference between venomous and non-venomous snakes.	K4	III
CO5	Appraise the diversity and adaptation of vertebrates.	K5	IV, V
CO6	Develop knowledge in specific behavioural aspects in chordates.	K3	V

CORE PRACTICAL II: CHORDATA

SEMESTER : II
CREDITS: 2

CODE :U19ZY2P2
HOURS /WEEK: 6

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	PRACTICALS
CO1	Explain the structure and functions of organ systems in frog through virtual Dissections	K5	I
CO2	Identification of different fishes based on their scales	K3	II
CO3	Analyse the scales of fishes by mounting and observation under the microscope.	K4	II
CO4	Identify the characteristic features of different species of Chordates.	K5	III
CO5	Examine the skeletal systems of frog.	K4	III
CO6	Interpret the different types of dentitions in mammals.	K5	III



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CORE III: ECOLOGY AND EVOLUTION

SEMESTER: III
CREDITS: 4

COURSE CODE: U19ZY303
HOURS / WEEK: 44

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	UNIT
CO1	List out the biotic and abiotic factors.	K1	I
CO2	Relate the role of biogeochemical cycle in the environment.	K1	I
CO3	Explain different aspects of population ecology	K4	II
CO4	Summarize the types, key characters and adaptations of terrestrial habitat.	K2	III
CO5	Explain the importance of biodiversity and its conservation	K5	IV
CO6	Interpret the concept of origin of earth, compare the theories of evolution and relate the concept of speciation and evolutionary process.	K5	V

SBEC I: VERMICULTURE AND SERICULTURE

SEMESTER: III
CREDITS: 2

CODE:U16ZYPS1
HOURS / WEEK: 2

At the end of this course, the students will be able to

CO.No	Course Outcomes	Level	Unit
CO1	Analyse the economic importance of earthworms and silkworms.	K4	I & III
CO2	Classify the earthworms based on ecological and morphological concepts.	K4	II
CO3	Explain the importance of vermicompost with agricultural wastes.	K5	II
CO4	Construct sericulture unit based on the gained expertise.	K3	III
CO5	Explain the commercial characteristics of silk and analyse the diseases of silkworm.	K5	IV
CO6	Analyse the skills in establishing vermiculture and sericulture unit through field visit.	K5	V



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TAMILNADU, INDIA

CORE PRACTICAL III: ECOLOGY AND EVOLUTION

SEMESTER: III

CREDITS: 2

COURSE CODE:U21ZY3P3

HOURS / WEEK: 3

At the end of this course, the students will be able to

CO.NO	COURSE OUTCOMES	LEVEL	UNIT
CO1	Examine and analysing the water quality and its parameters through quantitative estimations in different habitats	K4	I
CO2	Distinguish the evolutionary significance and their adaptations of animals	K3	I - V
CO3	Examine the significance of fossils in evolution.	K4	I - V
CO4	Compare the theories of evolution and modifications	K3	III
CO5	Relate the concept of speciation and evolutionary process.	K2	IV, V
CO6	Identify, Compare the marine planktons and develop the skills of documenting the geological ages through field visit	K5	V

CORE - IV: CELL AND MOLECULAR BIOLOGY

SEMESTER: IV

CREDITS: 6

COURSE CODE:U19ZY404

HOURS / WEEK: 4

At the end of this course, the students will be able to

CO. NO	COURSE OUTCOMES	LEVEL	UNIT
CO 1	Explain the principles and applications of microscopes, cell theory and micro techniques	K2	I
CO2	Distinguish the ultrastructure of cell organelles and their functions.	K2	II
CO3	Relate the rapid advances in cell and molecular biology to a better understanding of diseases, including cancer.	K2	III
CO4	Explain the structure of protein folding and sorting	K4	IV
CO5	Justify the processes that control eukaryotic cell cycle and cell death.	K5	V
CO6	Illustrate the structural organization of genes and the control of gene expression.	K2	V



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TAMILNADU, INDIA

SBEC II: PISCICULTURE

SEMESTER : IV
CREDITS : 2

CODE : U19ZYPS2
HOURS/ WEEK : 2

At the end of this course, the students will be able to

CO.NO	COURSE OUTCOMES	LEVEL	UNIT
CO1	Assess the scope and economic importance of fish culture	K5	I
CO2	Create an employment opportunity for rural students	K5	II
CO3	Classify the fishes based on ecological and morphological concepts.	K3	III
CO4	Make use of the expertise to generate the high revenue	K4	IV
CO5	Design the unit based on the gained expertise.	K5	V
CO6	Apply skills to establish a fish form unit and identify the various diseases and their controlling measures through field visit.	K5	V

CORE PRACTICAL IV: CELL AND MOLECULAR BIOLOGY

SEMESTER : III
CREDITS : 2

COURSE CODE: U19ZY4P4
HOURS / WEEK: 3

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	Practicals
CO1	Apply practical skills in the cell and molecular biology techniques	K4	I&II
CO2	Identify and to describe the structure and functions of different types of cells present in the animals.	K3	I
CO3	Develop skills in squash preparation, permanent slides and staining	K6	I
CO4	Interpret the principles and applications of various instruments used in cell and molecular biology	K2	I &II
CO5	Identify DNA and RNA by differential staining	K2	II
CO6	Construct models of various nucleic acids	K6	I



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TAMILNADU, INDIA

CORE V: GENETICS

SEMESTER :V
CREDITS : 6

COURSE CODE: U19ZY505
HOURS / WEEK: 6

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	UNIT
CO1	Describe the mechanism of inheritance pattern	K4	I
CO2	Describe the concept of sex determination and its genetic significance	K5	II
CO3	Develop knowledge in molecular mutation and its applied aspects	K5	III
CO4	Describe the microbial genetic and its patterns of inheritance	K4	IV
CO5	Understand the chromosomal inheritance and expression of human	K5	V
CO6	Appraise the genetic disorders of human	K5	V

CORE VI: MICROBIOLOGY

SEMESTER : :V
CREDITS :: 6

COURSE CODE : U21ZY506
HOURS /WEEK: 6

At the end of this course, the students will be able to

CO. NO	COURSE OUTCOMES	LEVEL	UNIT
CO1.	Classify and compare the characteristics of microbes	K5	I
CO2	Explain the methods of isolating pure culture of Bacteria	K5	II
CO3	Examine the role of microbes in Biogeochemical cycle.	K6	III
CO4	Assess the drinking water standard by water potability test.	K5	IV
CO5	Evaluate the products of milk & dairy.	K5	IV
CO6	Assess the causes and preventive measures of various microbial diseases.	K5	V



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ELECTIVE I: BIOPHYSICS AND BIOCHEMISTRY

SEMESTER : VI
CREDITS: 5

COURSE CODE :U21ZY5:1
HOURS / WEEK: 5

At the end of this course, the students will be able to

CO. No.	COURSE OUTCOMES	LEVEL	UNIT
CO1	Analyze the significance of Biophysics in Biology	K5	I
CO2	Elaborate the principle and biological applications of Biophysical instruments.	K4	II
CO3	Explain the basic principles of Biochemistry and Metabolism	K6	III
CO4	Classify the types and properties of biomolecules and its metabolic pathways	K3	III
CO5	Explain the characteristics and mechanism of enzyme action.	K5	IV
CO6	Analyze the importance of enzyme kinetics and rate of enzyme action	K3	V

SBEC III: WILDLIFE ECOLOGY AND ECONOMIC ENTOMOLOGY

SEMESTER: III
CREDITS: 2

COURSE CODE: U20ZYPS3
HOURS/ WEEK: 2

At the end of this course, the students will be able to

CO.NO.	COURSE OUTCOMES	LEVEL	UNIT
CO1	Explain the wildlife ecology and the interaction between the elements of ecosystem	K4	I
CO2	Explain the communication and reproductive strategies of amphibians, reptiles, birds and mammals	K5	II
CO3	Familiar with the forest ecosystem and its pattern	K5	III
CO4	Explain the biology of wildlife and their communication methods	K4	IV
CO5	Explain about the beneficial and harmful insects and its management	K5	V
CO6	Acquire field exposure to various kinds of habitat and the management	K6	V



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ELECTIVE III: PROJECT

SEMESTER :V
CREDITS : 5

Code : U19ZY5:2
TOTAL HRS. : 75

CO.NO	COURSE OUTCOMES	Level	Practical
CO1	Explain the importance of Mendelian traits in human beings	K4	I
CO2	Assess the significance of Karyotyping and genetic disorders	K5	I
CO3	Examine the different techniques involved in microbiology using various analysis	K5	II
CO4	Identify the various macronutrients using biochemical concepts	K4	III
CO5	Analyze the functions of laboratory equipments for research	K5	III
CO6	Survey of animals in natural habitat and assess the ecological importance	K5	IV

At the end of this course, the students will be able to

CORE VI: ANIMAL PHYSIOLOGY

SEMESTER : VI
CREDITS:

COURSE CODE: U19ZY606
HOURS / WEEK: 66

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	UNIT
CO1	Describe the structural organization of the animals.	K4	I
CO2	Analyse the functional aspects of organ systems in the body of animals.	K5	II
CO3	Compare the structural and functional adaptations of the animals.	K5	III
CO4	Describe different systems of animals	K4	IV
CO5	Illustrate the function of receptor organs	K5	V
CO6	Explain the hormonal changes in reproductive cycle of male and female	K5	V



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TAMILNADU, INDIA

CORE VII : DEVELOPMENTAL BIOLOGY AND IMMUNOLOGY
SEMESTER : VI **COURSE CODE : U19ZY607**
CREDITS : 6 **HOURS / WEEK: 6**

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	Level	Unit
CO1	Illustrate the process of fertilization and development.	K2	I
CO2	Explain the process of placentation in mammals	K5	II
CO3	Discuss the basic concepts of stem cells and IVF	K6	III
CO4	Interpret the role of organiser through experiments.	K5	IV
CO5	Discuss the basis of immune system, lymphoid organs , cells and its functions	K6	V
CO6	Evaluate the various immunological techniques and its applications	K5	V

CORE VIII: BIOTECHNOLOGY
SEMESTER :VI **COURSE CODE : U21ZY608**
CREDITS : 6 **HOURS / WEEK: 6**

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	UNIT
CO1	Comprehend the basic and recent concepts of biotechnology.	K4	I
CO2	Demonstrate the methods used to establish animal/stem cell cultures	K5	I
CO3	Acquire knowledge in tools and techniques in genetic engineering	K5	II
CO4	Utilize novel procedures to increase industrial products	K6	III
CO5	Improvise new ideas for the production of transgenic animals, vaccines and plants through gene transfer	K6	IV
CO6	Apply nanobiotechnology in agriculture, medicine and environmental bioremediation. Exposure to IPR, biosafety and practice bioethics.	K6	V



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TAMILNADU, INDIA

ELECTIVE III: BIOSTATISTICS AND BIOINFORMATICS
SEMESTER : VI **COURSE CODE:U21ZY6:3**
CREDIT: 5 **HOURS / WEEK: 6**

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	UNIT
CO1	Analyze the various methods of data collection and the application of statistical tools in solving biological problems	K4	I
CO2	Assess biologically important predictions from annotated data and transformation of these data for DNA analysis	K5	II
CO3	Apply the statistical tools in solving biological problems	K3	III
CO4	Distinguish the various biological databases	K4	III
CO5	Analyze various databases of proteins, nucleic acids. Primary, secondary and composite databases. BLAST, FASTA, DOT PLOT	K4	IV
CO6	Compare and relate the alignment tools used in evolution and in drug designing. Make phylogenetic predictions or prediction of structure of proteins and nucleic acids	K5	V

CORE PRACTICAL VI :ANIMAL PHYSIOLOGY, DEVELOPMENTAL BIOLOGY, IMMUNOLOGY, BIOTECHNOLOGY AND BIOINFORMATICS
SEMESTER :VI **COURSE CODE : U19ZY6P6**
CREDITS :: 4 **HOURS / WEEK: 6**

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	UNIT
CO1	Analyze the physiological functions of animals through experiments	K4	I
CO2	Compare the developmental stages of frog and chick	K5	II
CO3	Examine the blood grouping and its parameters with modern immunological techniques	K4	III
CO4	Develop skills in the advanced Biotechnological techniques	K3	IV
CO5	Explain the basic tools of Bioinformatics	K5	V
CO6	Construct the Phylogenetic tree based on the analysis sequences	K3	V



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TAMILNADU, INDIA

ALLIED ZOOLOGY – I : BIOLOGY OF INVERTEBRATES AND CHORDATES
SEMESTER : I **COURSE CODE: U19ZYY1P1**
CREDITS : 4(Bot),5(Chem) **TOTAL HRS.:60(Bot),75(Chem)**
HOURS / WEEK:3

At the end of this course, the students will be able to

CO. NO	COURSE OUTCOMES	LEVEL	UNIT
CO1	Classify the levels of biodiversity and adaptations of Invertebrates and Chordates.	K4	I
CO2	Analyze the various organ systems of animals through type study.	K4	I
CO3	Compare the organization and taxonomic status of Invertebrates and Chordates and apply it in various fields and focus on conservatory techniques	K5	II
CO4	Distinguish the characters and classify the organisms belonging to different taxa.	K4	III
CO5	Assess the relative position of individual organs and associated structures through dissection of the invertebrate representatives.	K4	IV
CO6	Categorize the lower order animals with similar physiological mechanisms with that of the higher order chordates	K4	V

ALLIED ZOOLOGY - II: HUMAN PHYSIOLOGY AND ECONOMIC ZOOLOGY
SEMESTER : II **COURSE CODE: U20ZYY2P2**
CREDITS : 4 **HOURS / WEEK: 6**

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	UNIT
CO1	Explain the structural and functional aspects of organ systems in human beings	K5	I
CO2	Relate the coordinated functioning of complex human body machine and also the abnormalities and diseases	K2	II
CO3	Develop skills in Vermiculture, Apiculture, Sericulture and Pisciculture	K6	III
CO4	Ascertain the commercial importance of animals and apply the knowledge to become entrepreneurs.	K3	III
CO5	Interpret the significance of pollination, pollinators and the modes of pollination	K5	IV
CO6	Apply the acquired skills in pest management and apply the Integrated farming system to start a small scale unit.	K3	V



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TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

**BIOLOGY OF INVERTEBRATES, CHORDATES, HUMAN PHYSIOLOGY AND
ECONOMIC ZOOLOGY
ALLIED ZOOLOGY PRACTICAL I**

SEMESTER :2
CREDITS : 2

COURSE CODE : U20ZYYP1
HOURS/ WEEK: 4

At the end of this course, the students will be able to

CO.No	COURSE OUTCOME	LEVEL	PRACTICALS
CO1	Analyse the structural organization of the different systems in Earthworm, Cockroach and Frog	K4	I
CO2	Assess the organ systems of insects through dissection and virtual labs.	K6	I
CO3	Explain the structural organization of mouthparts	K4	I
CO4	Identify the body setae in a muscle squash of earthworm and show under the compound microscope Create a mount on Placoid scale	K4 K5	I
CO5	Identify the specimen and write their classification and its significance	K3,K4	II
CO6	Analyse the antigen and antibody reaction and identified the blood group	K4	II

Allied – II ENVIRONMENTAL ZOOLOGY

SEMESTER ::2
CREDITS ::3

COURSE CODE:U20ESZY2
HOURS/ WEEK: 4

At the end of this course, the students will be able to

CO.No	COURSE OUTCOME	LEVEL	UNIT
CO1	Explain the salient features of Kingdom Animalia and the levels of organization at cellular, tissue and organ grade level of organization	K6	I
CO2	Classify the major Phylum Invertebrata and Chordata with its distinctive characters and suitable examples	K3	II
CO3	Compare the major process of mechanism of migration and flight adaptations in animals.	K4	III
CO4	Explain the types of animal behaviour and distinguishing between stereotyped and Acquired behaviour in animals	K4	IV
CO5	Discuss the process of communication in birds and mammals	K6	V
CO6	Compare the external morphology of invertebrates and chordates	K4	II



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TAMILNADU, INDIA

Allied Practical – II : ENVIRONMENTAL ZOOLOGY LAB
SEMESTER : II **COURSE CODE: U20ESYP2**
CREDITS :4 **HOURS/ WEEK: 3**

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	PRACTICALS
CO1	Conversant with organ systems of Earthworm and cockroach.	K4	I
CO2	Mount body setae of Earthworm and observe under the microscope.	K5	II
CO3	Study and distinguish various mouthparts of insects with its functions.	K5	II
CO4	Analyze the process of Biological rhythms and communication in bees.	K4	III
CO5	Interpret the various adaptation in animals	K4	III
CO6	Study the biological significance of the given spotters	K4	III

NMEC-I : PUBLIC HEALTH AND HYGIENE
SEMESTER : – III **COURSE CODE :U19ZY3E1**
CREDITS :: 2 **HOURS/WEEK. : 2**

At the end of this course, the students will be able to

CO.NO	COURSE OUTCOMES	LEVEL	UNIT
CO1	Compare the spectrum of health	K2	I
CO2	Classify the nutrients in food and assess the importance of balanced diet	K4	II
CO3	Explain the effects of malnutrition	K5	II
CO4	Interpret the maternal and child health	K5	III
CO5	Inspect about mental illness and its causes	K4	IV
CO6	Appraise the practices of health education	K5	V



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TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

NMEC- II : INDUSTRIAL ZOOLOGY

SEMESTER : IV
CREDITS : 2

Code : U19ZY4E2
HOURS/WEEK. : 2

At the end of this course, the students will be able to

CO.NO	COURSE OUTCOMES	LEVEL	UNIT
CO1	Analyse the economic importance of earthworms, apiculture, sericulture, Poultry and Pisciculture	K4	I
CO2	Classify the earthworms, honey bees, silkworms, fowls and fishes based on ecological and morphological concepts.	K4	II
CO3	Importance of vermicompost, honey, silk, fowls and fishes and agriculture.	K5	III
CO4	Construct vermicompost, Apiculture, sericulture, Poultry, Pisciculture unit based on the gained expertise.	K4	IV
CO5	Develop the skills in establishing a above mention unit through field visit.	K3	V
CO6	Identify the various diseases of various forming organisms	K3	V



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TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

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PROGRAM NAME	COURSE	COURSE CODE	COURSE NAME
M.Sc. Zoology	Core I	P19ZY101	Functional Morphology of Invertebrates and Chordates
M.Sc. Zoology	Core II	P19ZY102	Cell Biology
M.Sc. Zoology	Core III	P19ZY103	Molecular Biology and Bioinformatics
M.Sc. Zoology	Core Prac. I	P21ZY1P1	Core Practical I
M.Sc. Zoology	Core Prac. II	P19ZY1P2	Core Practical II
M.Sc. Zoology	Elective I	P20ZY1:1	Microbiology
M.Sc. Zoology	Elective I	P19ZY1:2	Parasitology
M.Sc. Zoology	Core IV	P19ZY204	Animal Physiology
M.Sc. Zoology	Core V	P19ZY205	Biochemistry
M.Sc. Zoology	Core Prac. III	P19ZY2P3	Core Practical III
M.Sc. Zoology	Core Prac. IV	P19ZY2P4	Core Practical IV
M.Sc. Zoology	Elective II	P19ZY2:1	Immunology
M.Sc. Zoology	Elective II	P19ZY2:2	Endocrinology
M.Sc. Zoology	Elective III	P19ZY2:3	Biostatistics
M.Sc. Zoology	Core VI	P19ZY306	Environmental Biology
M.Sc. Zoology	Core VII	P19ZY307	Developmental Biology
M.Sc. Zoology	Core VIII	P19ZY308	Genetics
M.Sc. Zoology	Core IX	P19ZY309	Research Methodology and Bio techniques
M.Sc. Zoology	Core Prac. V	P19ZY3P5	Core Practical V
M.Sc. Zoology	Elective IV	P19ZY3:1	Animal Biotechnology
M.Sc. Zoology	Elective IV	P19ZY3:2	Genomics and Proteomics
M.Sc. Zoology	Core X	P19ZY410	Evolution and Animal Behaviour
M.Sc. Zoology	Elective V	P19ZY4:1	Applied Entomology
M.Sc. Zoology	Elective V	P19ZY4:2	Bioinformatics
M.Sc. Zoology	Project	P19ZY4PJ	Project
M.Sc. Zoology	Project	P19ZY4PJ	Wildlife Photography Mechanics and Requirements
M.Sc. Zoology	Project	P19ZY4PJ	Field Techniques of Photography
M.Sc. Zoology	Project	P19ZY4PJ	Wildlife Photography Mechanics, Requirements and Field Techniques



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TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

CORE – I : FUNCTIONAL MORPHOLOGY OF INVERTEBRATES CHORDATES
SEMESTER: I **COURSE CODE: P19ZY101**
CREDITS: 5 **HOURS/WEEK: 5**

At the end of this course, the students will be able to

CO NO.	COURSE OUTCOME	Level	Unit
CO1	Identify the basics of systematics and compare the hierarchy of various animals	K3	I
CO2	Analyze the diversity in structure, function and habits of invertebrates	K4	I
CO3	Explain the diagnostic characters of different phyla through detailed studies of the various systems and organizations with examples	K5	II
CO4	Identify the evolutionary significance of the lower order invertebrates by comparing their larval forms	K3	III
CO5	Classify the morphological and functional characters of Chordates	K4	IV
CO6	Explain the structure and functions of integumentary system and compare the anatomy of nervous and urino-genital system	K5	V

Core Course: II CELL BIOLOGY
SEMESTER : 1 **COURSE CODE : P19ZY102**
CREDITS : 5 **HOURS/ WEEK: 5**

At the end of this course, the students will be able to

CO. NO	COURSE OUTCOMES	Level	Unit
CO1	Distinguish prokaryotic and eukaryotic cells through basic structural organizations. Analyzing membrane structures and protein transport.	K4	I
CO2	Examine the functional significance of mitochondria, NPC, Intra cellular traffic and cytoskeleton structure	K4	II
CO3	Analyze cell-cell interaction, receptor based signal transduction, cell cycle and its control systems with check points	K4	III
CO4	Identify the mode of cell growth, death through apoptosis and tissue maintenance.	K4	III
CO5	Explain the significance of stem cells, types and its mechanism of self renewal and potency, stem cell characterization and IPS generation with application.	K5	IV
CO6	Evaluate the molecular pathogenesis of cancer, role of oncogene/ tumor viruses, survival and death pathways and recent treatment strategies.	K5	V



BISHOP HEBER COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

CORE – III: MOLECULAR BIOLOGY AND BIOINFORMATICS

SEMESTER: I

COURSE CODE :P19ZY103

CREDITS : 5

HOURS / WEEK: 5

At the end of this course, the students will be able to

CO. NO	COURSE OUTCOMES	LEVEL	UNIT
CO1.	Explain the structure, synthesis and function of biomolecules.	K2	1
CO2.	Interpret the C-value paradox and its importance.	K2	I
CO3.	Compare the process of DNA replication in both Prokaryotes and in Eukaryotes	K5	II
CO4.	Analyze the process of transcription and gene expression in eukaryotes.	K4	III
CO5.	Distinguish the types of various biological databases and tools used for protein structure visualization.	K5	IV
CO6.	Compare and relate the alignment tools used in evolution and in drug designing.	K5	V

CORE PRACTICAL-I: LAB IN CELL AND MOLECULAR BIOLOGY

SEMESTER: I

COURSE CODEE: P21ZY1P1

CREDITS: 3

HOURS / WEEK: 5

At the end of this course, the students will be able to

CO. NO	COURSE OUTCOME	LEVEL	Experiments
CO1	Examine the stages of mitotic cell division	K4	I
CO2	Analyze various events in cell division and cell cycle.	K4	I
CO3	Develop permanent slides and perform various staining procedures.	K6	I
CO4	Estimate protein/DNA using gel electrophoresis and analyze their molecular mass	K6	II
CO5	Test gene amplification using PCR	K5	II
CO6	Explain the significance of concentrating biomolecules	K5	II



BISHOP HEBER COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

CORE PRACTICAL -II LAB IN MICROBIOLOGY AND BIOINFORMATICS
SEMESTER: I **COURSE CODE: P19ZY1P2**
CREDITS: 3 **HOURS / WEEK: 5**

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	UNIT
CO1	Categorise and determine the bacteria based on colony morphology	K4	I
CO2	Assess the different bacterial culture techniques applied for isolating pure culture.	K5	I
CO3	Determine the growth of bacteria in four stages by Spectrophotometry method.	K5	I
CO4	Evaluate the antibiotic sensitivity of bacteria by Disc Diffusion method.	K5	I
CO5	Justify the similarities between multiple sequences & to track the evolution.	K5	II
CO6	Determine the 3D structure of protein and to assess the phylogenetic relationship between the organisms.	K5	II

ELECTIVE – I: MICROBIOLOGY
SEMESTER: I **COURSE CODE: P20ZY1:1**
CREDITS: 5 **HOURS / WEEK: 5**

At the end of this course, the students will be able to

CO. NO	COURSE OUTCOME	LEVEL	UNIT
CO1	Explain the structure, function, diversity, metabolism, and the genetics of metabolic regulation microorganisms.	K5	I
CO2	Explain the nutrient types essential for the microbial growth	K5	II
CO3	Discuss about the multiplication and the physical factors influencing the growth of microbes.	K6	III
CO4	Identify and assess the various accessory pigments and their functions for major metabolic processes	K2	IV
CO5	Explain the functional role of microbes in large scale industries	K5	V
CO6	Categorize the diverse threat of microorganisms causing deadliest diseases	K2	VI



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TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

CORE – IV: ANIMAL PHYSIOLOGY

SEMESTER: II
CREDITS:

CODE: P20ZY204
HOURS / WEEK:5

At the end of this course, the students will be able to

CO.NO	COURSE OUTCOME	LEVEL	UNIT
CO1	Analyze the structural and functional aspects of digestive and respiratory systems in mammals.	K4	I
CO2	Evaluate the function of the blood and the process of circulation in mammals.	K5	II
CO3	Interpret the mechanism of excretion, regulation of water balance, acid-base balance, electrolyte balance, thermoregulation and stress adaptations	K5	III
CO4	Examine the transmission of nerve impulses and physiology of muscle contraction	K4	IV
CO5	Asses the role of hormones in the coordination of activities in the biological systems	K5	V
CO6	Explain the reproductive processes and disorders of ovary in mammals	K5	V

CORE – V: BIOCHEMISTRY

SEMESTER: II
CREDITS: 5

COURSE CODE: P19ZY205
HOURS / WEEK:5

At the end of this course, the students will be able to

CO.No.	COURSE OUTCOME	LEVEL	UNIT
CO1	Explain the basic concepts/functions of solutes, chemical bonding and organic compounds.	K2	I
CO2	Predict the structure of proteins and their biological active sites	K6	II
CO3	Assess quantitative and qualitative estimation of biomolecules	K5	III
CO4	Explain the importance of biochemical metabolism of carbohydrate	K5	IV
CO5	Evaluate the importance of biochemical metabolism of protein and lipid	K5	V
CO6	Analyze the importance of essential aminoacids	K4	V



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TAMILNADU, INDIA

ELECTIVE – II: IMMUNOLOGY

SEMESTER: II
CREDITS : 4

COURSE CODE: P19ZY2:1
HOURS/ WEEK : 4

At the end of this course, the students will be able to

CO.No.	COURSE OUTCOME	LEVEL	UNIT
CO1	Interpret the structure and functions of lymphoid organs.	K5	I
CO2	Explains the functions of Complements and its mechanism to form Membrane attack complex.	K5	II
CO3	Interpret the types and functions of MHC complex	K5	III
CO4	Explains about tumor antigens and its immune response.	K5	IV
CO5	Appraise the role of vaccines in treating diseases	K5	IV
CO6	Elaborate the importance of immunotechniques	K6	V

ELECTIVE – III: BIOSTATISTICS

SEMESTER: II
CREDITS : 2

COURSE CODE: P19ZY2:3
HOURS /WEEK: 4

At the end of this course, the students will be able to

CO. NO	COURSE OUTCOME	LEVEL	UNIT
CO1	Explain the methods of data collection in biological research	K5	I
CO2	Compare and interpret results by chi-square and ANOVA among two or more populations	K4	II
CO3	Compare and interpret the various distribution methods	K4,K3	III
CO4	Examine the hypotheses and compare the data using student 't' test.	K4	IV
CO5	Verify and evaluate the basic concepts of statistics using SPSS.	K6,K4	V
CO6	Analyse the statistical inference by correlation and regression	K4	V



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TAMILNADU, INDIA

CORE PRACTICAL – III : LAB IN ANIMAL PHYSIOLOGY AND IMMUNOLOGY
SEMESTER: II **COURSE CODE: P19ZY2P3**
CREDITS : 3 **NO OF HOURS PER WEEK: 5:**

At the end of this course, the students will be able to

CO.No.	COURSE OUTCOME	LEVEL	PRACTICALS
CO1	Apply the physiological concepts in experiments	K3	I
CO2	Interpret the results in physiological experiments.	K5	I
CO3	Identify the tissues of different endocrine organs	K3	I
CO4	Apply the immunological techniques in biology	K3	II
CO5	Analyze the various immunological disorders.	K4	II
CO6	Identify the tissues of lymphoid organs and Lymphocytes	K3	II

CORE PRACTICAL - IV: LAB IN BIOCHEMISTRY
SEMESTER: II **CODE: P19ZY2P4**
CREDITS: 3 **HOURS / WEEK: 5**

At the end of this course, the students will be able to

CO. No	COURSE OUTCOMES	LEVEL	EXPERIMENTS
CO1	Evaluate the experiments based on biochemical calculations.	K5	1
CO2	Design & prepare the Acetate & Phosphate buffers.	K6	3
CO3	Evaluate the acid-base titration for pKa determination.	K5	3
CO4	Develop knowledge in structure, reactions and energy metabolism of the cellular biomolecules.	K6	4,5
CO5	Categorize & classify the micro molecules by TLC method	K5	8
CO6	Classify & separate the amino acids by Paper Chromatography method.	K5	9



BISHOP HEBER COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

CORE –VI: ENVIRONMENTAL BIOLOGY

SEMESTER: III
CREDITS : 5

COURSE CODE: P15ZY306
HOURS / WEEK: 5

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	UNIT
CO1	Analyse the interrelation between abiotic and biotic environment and scope of Ecology	K4	I
CO2	Explain the characteristics of ecosystem.	K5	II
CO3	Explain the characteristics of population, Niche, Niche parameter.	K4	III
CO4	Compare ecological succession, equivalents and indicators.	K4	IV
CO5	Classify freshwater and marine habitats. List the characters of terrestrial habitat.	K2	V
CO6	Discuss the importance of biodiversity and its conservation.	K6	V

CORE-VII: DEVELOPMENTAL BIOLOGY

SEMESTER: III
CREDITS : 5

COURSE CODE: P19ZY307
HOURS / WEEK: 5

At the end of this course, the students will be able to

CO.No	COURSE OUTCOMES	LEVEL	UNIT
CO1	Illustrate the basic principles of growth and development in animals.	K2	I
CO2	Interpret the axis and pattern formation in Drosophila.	K5	II
CO3	Explain the environmental regulation of animal development	K5	III
CO4	Examine the metamorphosis in amphibia and regeneration in salamander.	K4	IV
CO5	Justify the concepts of organiser in determining the fate of developing embryos	K5	IV
CO6	Identify the role of genes in the embryonic development.	K3	V



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TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

CORE-VIII: GENETICS

SEMESTER: III
CREDITS : 5

COURSE CODE: P19ZY308
HOURS PER WEEK: 5

At the end of this course, the students will be able to

CO. No	COURSE OUTCOMES	LEVEL	UNIT
CO1	Interpret the Mendelian law of inheritance.	K4	I
CO2	Compare the nuclear and maternal inheritance of genes	K4	II
CO3	Elaborate the environmental effects and gene expression	K6	III
CO4	Analyze the concepts of Microbial genetics	K4	IV
CO5	Discuss the perception of Evolutionary and population genetics	K6	V
CO6	Assess the importance of human genetics and its related disorders	K5	V

CORE IX RESEARCH METHODOLOGY AND BIOTECHNIQUES

SEMESTER : III
CREDIT : 5

COURSE CODE : P19ZY309
HOURS / WEEK: 5

At the end of this course, the students will be able to

CO.No	COURSEOUTCOMES	LEVEL	UNIT
CO1	Apply the Statistical principles and skills in biological research	K3	I
CO2	Analyse, review and assess critically scientific hypotheses and theories using scientific evidence and information	K6,K4	II
CO3	Design to the learning process of how to write thesis and how to publish papers in various journals	K5	II
CO4	Investigate the various chemical compounds using chromatographic technique	K4	III
CO5	Explain the principles and applications of spectrophotometry and electrophoresis	K4	IV
CO6	Select and use the animal cell culture technique	K3	V



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TIRUCHIRAPPALLI – 620017
TAMILNADU, INDIA

**CORE PRACTICAL - V: LAB IN ENVIRONMENTAL BIOLOGY,
DEVELOPMENTAL BIOLOGY AND GENETICS**

SEMESTER III
CREDITS: 3

COURSE CODE: P15ZY3P5
HOURS / WEEK: 5

At the end of this course, the students will be able to

CO.No.	COURSEOUTCOMES	LEVEL	PRACTICALS
CO1	Qualitatively and qualitatively estimate different ecological parameters.	K3	I
CO2	Interpret the results of qualitative and quantitative estimations	K5	I
CO3	Identify the embryonic development of chick and frog	K3	I
CO4	Apply the immunological techniques in biology	K3	II
CO5	Examine different genetic traits and chromosomal aberrations in Human being	K4	III
CO6	Prepare a pedigree chart for chromosomal traits	K3	III

CORE-X: EVOLUTION AND ANIMAL BEHAVIOUR

SEMESTER- IV
CREDITS: 5

COURSE CODE: P19ZY410
HOURS /WEEK: 5

At the end of this course, the students will be able to

CO.NO	COURSE OUTCOMES	LEVEL	UNIT
CO1	Explain the origin of life on earth and theories with evidences	K5	I
CO2	Define the various factors which affected the evolution of sex and reproductive strategies	K3	II
CO3	Illustrate the concept of speciation and evolutionary time scale	K3	III
CO4	Explain the evolutionary history of man	K5	IV
CO5	Relate the different aspects of environmental perception and communication in animals.	K3	IV
CO6	Explain the various aspects of behavior and social organization in animals	K5	V



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TAMILNADU, INDIA

ELECTIVE - IV: APPLIED ENTOMOLOGY

SEMESTER: IV
CREDIT: 4

COURSE CODE: P19ZY4:1
HOURS /WEEK: 5

At the end of this course, the students will be able to

CO.No.	COURSE OUTCOMES	LEVEL	UNIT
CO1	Classify the different orders of insect organisms	K4	I
CO2	Categorize the biological life cycle of agricultural and industrial important pests.	K4	II
CO3	Examine the structure and mode of action of important insecticides belonging to different groups	K4	III
CO4	Apply Integrated Pest Management	K4	IV
CO5	Recommend methods of insect control and the damages and benefits regarding practical applications.	K5	V
CO6	Improve employability skills of students to become an entomologist in government and private sectors.	K6	V