

Holy Cross College (Autonomous), Nagercoil
Kanyakumari District, Tamil Nadu.
Accredited with A⁺ by NAAC - IV cycle – CGPA 3.35

Affiliated to
Manonmaniam Sundaranar University, Tirunelveli



Semester I - IV
POs, PSOs & COs
DEPARTMENT OF ZOOLOGY



2023-2026

(With effect from the academic year 2024-2025)

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Upon completion of M.A./ M. Sc. /MSW Degree Programme, the graduates will be able to:	Mapping with Mission
PEO1	apply scientific and computational technology to solve socio ecological issues and pursue research.	M1, M2
PEO2	continue to learn and advance their career in industry both in private and public sectors	M4 & M5
PEO3	develop leadership, teamwork, and professional abilities to become a more cultured and civilized person and to tackle the challenges in serving the country.	M2, M5 & M6

PROGRAMME OUTCOMES (POS)

POs	Upon completion of M.Sc. Degree Programme, the graduates will be able to:	Mapping with PEOs
PO1	apply their knowledge, analyze complex problems, think independently, formulate and perform quality research.	PEO1 & PEO2
PO2	carry out internship programmes and research projects to develop scientific and innovative ideas through effective communication.	PEO1, PEO 2 & PEO3
PO3	develop a multidisciplinary perspective and contribute to the knowledge capital of the globe.	PEO 2
PO4	develop innovative initiatives to sustain ecofriendly environment	PEO1, PEO 2
PO5	pursue active career, team work and using managerial skills guide people to the right destination in a smooth and efficient way.	PEO 2
PO6	employ appropriate analysis tools and ICT in a range of learning scenarios, demonstrating the capacity to find, assess, and apply relevant information sources.	PEO1, PEO 2 & PEO3
PO7	learn independently for lifelong to execute professional, social and ethical responsibilities promoting sustainable development.	PEO3

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSOs	Upon completion of M.Sc. Programme, the graduates will be able to:	PO addressed
PSO1	explain the various aspects of life sciences including Biochemistry, Cell and Molecular Biology, Biosystematics, Genetics, Evolution, Physiology, Developmental Biology, Exobiology, Immunology, Microbiology, Endocrinology, Bioinformatics, Biotechnology and Nanobiology.	PO1, PO2
PSO2	carryout experimental techniques, analyze statistically, draw conclusions, write report, present effectively and publish in indexed journals effectively	PO2, PO4, PO5, PO6
PSO 3	develop personal and key transferable skills and entrepreneurial skills through industrial / field visits and internships.	PO2, PO3
PSO 4	independently assemble facts, summarize and draw conclusions from scientific text and develop competence in the design and execution of research.	PO1, PO2,PO3, PO4,PO6
PSO 5	discriminate societal and environmental problems, adopt relevant technology, synthesis solution and claim for IPR	PO4, PO5, PO7

Mapping of PO'S and PSO's

POs	PSO1	PSO 2	PSO3	PSO4	PSO5
PO1	M	S	M	S	M
PO2	M	S	S	S	S
PO3	S	M	M	S	S
PO4	S	S	S	S	S
PO5	M	S	S	S	S
PO6	S	S	M	S	S
PO7	S	S	S	S	S

***S - Strong; M - Medium; L - Low**

**COURSE
OUTCOMES
SEMESTER I**

CORE COURSE I: STRUCTURE AND FUNCTION OF INVERTEBRATES

Course Code : ZP231CC1

On the successful completion of the course, student will be able to:		
1	remember the general concepts and major groups in animal classification, origin, structure, functions and distribution of life in all its forms.	K1
2	understand the evolutionary process. All are linked in a sequence of life pattern	K2
3	apply this for pre-professional work in agriculture and conservation of life forms.	K3
4	analyze what lies beyond our present knowledge of life process.	K4
5	evaluate and to create the perfect phylogenetic relationship in classification.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

SEMESTER – I

CORE COURSE II: COMPARATIVE ANATOMY OF VERTEBRATES

Course Code : ZP231CC2

On successful completion of the course, the student will be able to:		
1	remember the general concepts and major groups in animal classification, origin, structure, functions, and distribution of life in all its forms.	K1
2	understand the evolutionary process. All are linked in a sequence of life patterns.	K2
3	apply this for pre-professional work in agriculture and conservation of life forms.	K3
4	analyze what lies beyond our present knowledge of life process.	K4
5	evaluate and to create the perfect phylogenetic relationship in classification.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

SEMESTER I
CORE LAB COURSE I: LAB COURSE IN INVERTEBRATES & VERTEBRATES
Course Code : ZP231CP1

On the successful completion of the course, student will be able to:		
1	understand the structure and functions of various systems in animals	K1
2	learn the adaptive features of different groups of animals	K2
3	learn the mounting techniques	K3
4	acquire strong knowledge on the animal skeletal system	K4

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

SEMESTER I
ELECTIVE COURSE - I
BIOMOLECULES AND THEIR INTERACTION
Course Code : ZP241EC1

On the successful completion of the course, student will be able to:		
1	define structure and types of chemical bonds in biomolecules such as hydrogen ions, water, protein, carbohydrate, lipid, nucleotides, enzymes and vitamins.	K1
2	explain the fate of biomolecules in different metabolic pathways.	K2
3	apply cognitive, technical and creative skills to pursue higher studies and employability in industrial, biomedical and research laboratories.	K3
4	analyse biomolecules in biological systems and relate deficiency disorders.	K4
5	design biochemical experiments and publish the results through effective written and oral communication after drawing accurate conclusions.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate

SEMESTER I
ELECTIVE COURSE - I
(b) GLOBAL ENVIRONMENTAL ISSUES
Course Code : ZP241EC2

On the successful completion of the course, students will be able to:		
1.	relate the fundamental issues of environment.	K1
2.	classify the different sources of environmental problems and remedial measures.	K2
3.	solve the environmental issues for a better economic growth and quality of life.	K3
4.	analyse the global changes in the environment and the various schemes for mitigation.	K4
5.	assess the environmental problems and how the environment management system can save the environment.	K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** – Evaluate

SEMESTER: I
ELECTIVE COURSE - I
(a) WILDLIFE CONSERVATION AND MANAGEMENT
Course Code : ZP241EC3

On the successful completion of the course, student will be able to:		
1	develop the ability to use the fundamental principles of wildlife ecology to solve local, regional and national conservation and management issues	K1
2	develop the ability to work collaboratively on team-based projects	K2
3	demonstrate proficiency in the writing, speaking, and critical thinking skills needed to become a wildlife technician	K3
4	gain an appreciation for the modern scope of scientific inquiry in the field of wild life conservation management	K4
5	develop an ability to analyze, present and interpret wildlife conservation management information.	K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** – Evaluate

SEMESTER I

ELECTIVE COURSE – II a) BIOSTATISTICS

Course Code : ZP231EC4

Upon completion of this course the students will be able to:		
1	recall different biological data, methods of collection and analysis of data.	K1
2	comprehend the design and application of biostatistics relevant to experimental and population studies.	K2
3	acquire skills to perform various statistical analyses using modern statistical techniques and software.	K3
4	analyze the data and interpret the results manually or by using software	K4
5	evaluate on the merits and limitation of practical problems in biological/ health management study as well as to propose and implement appropriate statistical design/ methods of analysis.	K5

K1- Remember; K2- Understand; K3- Apply; K4-Analyze; K5-Evaluate

SEMESTER I

ELECTIVE COURSE - II (b) APPLIED ZOOLOGY

Course Code : ZP231EC5

Upon completion of this course the students will be able to:		
1	apply the knowledge of animal husbandry in economic development.	K1
2	identify the kinds of bees and the methods of bee keeping.	K2
3	rear silkworms, harvest and market the cocoons.	K3
4	apply skills and experience about the management of poultry and Dairy farming.	K4
5	culture of economically important finfish and shell fishes.	K5

K1- Remember; K2- Understand; K3- Apply; K4-Analyze; K5-Evaluate

SEMESTER I
ELECTIVE COURSE - II(c) PEST MANAGEMENT
Course Code : ZP231EC6

Upon completion of this course the students will be able to:		
1	outline the pest groups affecting different agricultural crops and control measures.	K1
2	select correct IPM in cropping systems with traditional and alternative control measures.	K2
3	analyze the impact of pesticides on environment and adopt better agricultural practices.	K3
4	evaluate the control measures adopted for pests of household and stored products.	K4

SEMESTER I
ELECTIVE LAB COURSE I
MOLECULES AND THEIR INTERACTION RELEVANT TO BIOLOGY & BIostatISTICS
Course Code : ZP231EP1

Upon completion of this course the students will be able to:		
1	learn and study of chemical and physical structure of biological macromolecules.	K1
2	analyze the biomolecules and physicochemical parameters in samples	K2
3	analyze and interpret the collected data using statistical methods	K3
4	design biological experiments and evaluate the samples applying appropriate statistical methods.	K4

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

SEMESTER I
SPECIFIC VALUE ADDED COURSE BASICS OF EXCEL
Course Code : ZP231V01

On completion of this course, students will be able to		
1	recall the components of Excel's interface and basic cell formatting.	K1
2	summarize the significance of relative, absolute, and mixed cell references in formulae.	K2

3	apply data entry techniques and utilize basic calculations and formulas.	K3
4	analyze different chart types to determine their suitability for presenting specific types of data.	K3
5	evaluate the effectiveness of using functions and charts to ensure clarity and effective visualization.	K5
6	design and create various types of charts (bar, column, pie) based on specific data sets.	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

SEMESTER I
SPECIFIC VALUE ADDED COURSE
FERMENTATION TECHNIQUES
Course Code : ZP231V02

On completion of this course, students will be able to:		
1.	describe the role of microbes in food production and importance of fermentation	K1
2.	differentiate the microbes and the food products produced by using those microbes	K2
3.	analyse the quality and benefits of fermented products.	K3
4.	apply Food Laws and Food safety regulations of India for the preparation of fermented food	K4
5.	evaluate the fermented food products prepared out of milk, cereal and fruits for marketing in the local area.	K5

K1- Remember; **K2**- Understand; **K3**- Apply; **K4**-Analyze; **K5**-Evaluate

SEMESTER II
CORE COURSE III: CELLULAR AND MOLECULAR BIOLOGY
Course Code : ZP232CC1

On the successful completion of the course, students will be able to:		
1.	recall general concepts of cell biology and fundamental cellular structures and organelles.	K1
2.	explain the various cellular components and their activities.	K2
3.	identify the changes or losses in cell function caused by dysregulation.	K3

4.	compare different cellular processes, their regulation, and their significance.	K4
5.	assess the societal and environmental impacts through cellular and molecular research.	K5

K1- Remember; **K2**- Understand; **K3**- Apply; **K4**-Analyze; **K5**-Evaluate

SEMESTER II
CORE COURSE IV: DEVELOPMENTAL BIOLOGY
Course Code : ZP242CC2

On the successful completion of the course, student will be able to:		
1	recall and summarize the chief events in animal development, recognizing their significance and historical context	K1
2	understand the different mechanisms and how extrinsic and intrinsic factors influence embryonic development in various animal embryos.	K2
3	apply their knowledge to explain the role of hormones in animal development.	K3
4	analyze the different stages of embryonic development and the genetic control mechanisms involved.	K4
5	critically evaluate ethical issues associated with cryopreservation in mammalian reproduction.	K5

. **K1**- Remember; **K2**- Understand; **K3**- Apply; **K4**-Analyze; **K5**-Evaluate

SEMESTER II
CORE LAB COURSE II: LAB COURSE IN CELL BIOLOGY AND DEVELOPMENTAL BIOLOGY
Course Code : ZP232CP1

1.	recall the principles of using a micrometer for cell size determination and the stages of mitosis & meiosis and their characteristics.	K1
2.	comprehend the steps involved in preparing blood smears and mounting the muscle fibres using microscopy.	K2
3.	develop handling - skills through the wet-lab course.	K3
4.	interpret observations & make connections between reproductive processes and the ecological context of the organisms studied	K4
5.	evaluate and compare different developmental stages in chick embryos.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate;

SEMESTER II
ELECTIVE COURSE III: a) ECONOMIC ENTOMOLOGY
Course Code : ZP232EC1

On the successful completion of the course, students will be able to:		
1.	recall the features of various insect orders and describe the life history, social organization, and management practices of insects.	K1
2.	understand the biology of insects associated with medical, household, and veterinary/public health importance.	K2
3.	apply their knowledge of pest biology to assess damage and beneficial insect life cycles to practical rearing.	K3
4.	analyze the causes of pest outbreaks and the economic threshold levels.	K4
5.	synthesize knowledge to propose effective control measures for vectors associated with medical, household, and veterinary/public health importance.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate;

SEMESTER II
ELECTIVE COURSE III: b) PARASITOLOGY
Course Code : ZP232EC2

On the successful completion of the course, student will be able to:		
1.	define the basic biology and life cycle of parasites including epidemiology, diagnosis, and treatment.	K1
2.	explain morphological characters of parasites, developmental stages and their infestation.	K2
3.	identify appropriate techniques and develop basic skills for detection of parasites.	K3
4.	analyse the medical and public health aspects of human parasitic infections.	K4
5.	compare the diagnostic methods of parasitic infestation in veterinary hospitals, clinics and research laboratories.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** – Evaluate

SEMESTER II
ELECTIVE COURSE III: c) AGROCHEMICALS AND
PEST MANAGEMENT
Course Code : ZP232EC3

On the successful completion of the course, student will be able to:		
1.	outline agrochemicals, their modes of action and their fate in the agro-ecosystem.	K1
2.	recognize pesticide families based on their specific modes of activity.	K2
3.	apply appropriate pesticide management strategies by evaluating specific pest type.	K3
4.	analyze the impact of agrochemicals and pesticides for effective pest management.	K4
5.	evaluate the efficacy of organic manures, chemical fertilizers, conventional pesticides and bio-pesticides for agronomical practices.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** – Evaluate

SEMESTER II
ELECTIVE COURSE IV: a) RESEARCH METHODOLOGY
Course Code : ZP232EC4

On the successful completion of the course, students will be able to:		
1.	recall the principles of laboratory equipments, research techniques and the process of scientific report writing.	K1
2.	Explain the procedures involved in operating laboratory equipment, applying research techniques, and engaging in scientific writing.	K2
3.	apply biological techniques in laboratory settings to gain practical experience in research processes and scientific report writing.	K3
4.	analyze the principles and techniques to make wise choices in experimental design, data interpretation, and research reports in biological sciences.	K4
5	evaluate the quality, reliability, and limitations of data generated by research techniques and obtained from literature for specific research goals.	K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** – Analyze; **K5** - Evaluate

SEMESTER II
ELECTIVE COURSE IV: b) APICULTURE
Course Code : ZP232EC5

On the successful completion of the course, students will be able to:		
1.	understand the morphology, life cycle, characteristics of honey bees and bee keeping.	K1
2.	acquire skills to perform bee keeping from managing colonies of bees in order to harvest honey and other Bee related by-products in different setups and as an Entrepreneurial venture.	K2
3.	knowledge on the harvesting, preserving and processing of bee products and identification of the appropriate markets to sell the produce.	K3
4.	identify of different bee enemies and diseases and control measures and its management	K4
5.	evaluate the honey chemical composition of different environment.	K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4**-Analyze **K5**-Evaluate

SEMESTER II
ELECTIVE COURSE – IV: c) SERICULTURE
Course Code : ZP232EC6

On the successful completion of the course, students will be able to:		
1.	recall and describe the fundamental concepts, terminology, and processes related to sericulture, and sericulture industry practices.	K1
2.	demonstrate the key concepts, processes, properties of silk fiber, mulberry cultivation techniques, cocoon characteristics, and the significance of sericulture practices in the silk production industry.	K2
3.	apply their knowledge of sericulture principles and practices to solve practical problems and optimizing cocoon processing techniques.	K3
4.	critically analyze the challenges and opportunities in the sericulture industry and assess the economic and environmental implications of sericulture practices.	K4
5.	evaluate the effectiveness of different sericulture practices, technologies, and policies, and make informed decisions to optimize silk production.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate

SEMESTER II
ELECTIVE LAB COURSE -II: ECONOMIC ENTOMOLOGY &
RESEARCH METHODOLOGY
Course Code : ZP232EP1

On the successful completion of the course, students will be able to:		
1.	comprehend the principles and concepts of economic entomology & research methodology.	K1
2.	summarize the economic impact of insect pests. explain the principles behind different techniques & research designs	K2
3.	utilize appropriate methodologies to collect and analyze data of insects and apply statistical techniques to interpret and draw conclusions.	K3
4.	interpret practical solutions to address challenges in economic entomology, incorporating research methodology principles.	K4
5.	evaluate research methodologies and experimental designs used in economic entomology studies.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate;

SEMESTER II
SKILL ENHANCEMENT COURSE I: POULTRY FARMING
Course Code : ZP232SE1

On the successful completion of the course, students will be able to:		
1.	recall the key components of a poultry house to ensure optimal living conditions for poultry.	K1
2.	explain the different methods of rearing and the significance of proper vaccination programs in poultry farming.	K2
3.	develop a practical feeding plan for a specific stage of poultry considering their nutritional requirements.	K3
4.	analyze the impact of different housing systems on poultry welfare and productivity,	K4
5.	critically assess the effectiveness of poultry feeds and the disease control measures in poultry farming,	K5
6.	design a comprehensive waste management and recycling system for poultry farms.	K6

K1- Remember; **K2**- Understand; **K3**- Apply; **K4**-Analyze; **K5**-Evaluate; **K6**- Create

SEMESTER – I & II
LIFE SKILL TRAINING – I ETHICS

Course Code : PG23LST1

On completion of this course the student will be able to		
1	understand deeper insight of the meaning of their existence.	K1
2	recognize the philosophy of life and individual qualities	K2
3	acquire the skills required for a successful personal and professional life.	K3
4	develop as socially responsible citizens.	K4
5	create a peaceful, communal community and embrace unity.	K3

SEMESTER III
CORE COURSE V: GENETICS AND EVOLUTION

Course Code : ZP233CC1

On the successful completion of the course, students will be able to:		
1	relate the principles of inheritance and evolution.	K1
2	describe the mechanisms of heredity and speciation.	K2
3	apply the genetic and evolutionary concepts to real-world scenarios.	K3
4	analyse the cause for variation and adaptation.	K4
5	evaluate the impact of genetic variation on biodiversity.	K5

K1 - Remember; K2 - Understand; K3 – Apply; K4 - Analyse; K5 – Evaluate

SEMESTER III
CORE COURSE VI: ADVANCED ANIMAL PHYSIOLOGY

Course Code : ZP233CC2

On the successful completion of the course, students will be able to:		
1	recall the structure and functions of organ systems.	K1
2	compare the structure, functions and regulation of the different organs and organ systems of animals.	K2
3	relate the functions of different organ system in maintaining homeostasis.	K3
4	analyze the physiological changes in relation to environmental conditions.	K4
5	evaluate the effect of physical factors on physiological functioning of different organs.	K5

K1 - Remember; K2 - Understand; K3 – Apply; K4 - Analyse; K5 – Evaluate

SEMESTER III
CORE LAB COURSE: LAB ON GENETICS AND EVOLUTION AND
ADVANCED ANIMAL PHYSIOLOGY
Course Code : ZP233CP1

On the successful completion of the course, students will be able to:		
1.	explain the fundamental principles of Mendelian inheritance, population genetics, adaptive radiation and function of organ and organ systems	K1
2.	interpret the importance of genic inheritance, changes in gene and gene frequencies in a population and physiology of the organ system.	K2
3.	apply the genetic, evolutionary, and physiological concepts.	K3
4.	analyse the causes of genetic variation, adaptation and physiological changes.	K4
5.	design experiments based on Hardy-Weinberg Law, enzyme activity and effect of physical factors on physiological activities.	K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** - Evaluate

SEMESTER III
CORE - RESEARCH PROJECT
Course Code : ZP233RP1

On the successful completion of the course, students will be able to:		
1.	learn to manage research projects, adhering to timelines, and effectively adapting to challenges.	K1
2.	understand ethical considerations in research, collaborate effectively with peers and advisors, and maintain integrity throughout the research process.	K2
3.	conduct independent research, proficiently formulating research questions, designing methodologies, and gathering relevant data.	K3
4.	communicate research findings clearly and persuasively through well-structured written reports and articulate oral presentations.	K4
5.	develop critical thinking skills, analyzing findings and drawing informed conclusions.	K5 & K6

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** - Evaluate; **K6** – Create

SEMESTER III
ELECTIVE COURSE V: a) ANIMAL BEHAVIOUR AND CHRONOBIOLOGY
Course Code : ZP233EC1

On the successful completion of the course, students will be able to:		
1.	attain a thorough comprehension of the fundamental principles concerning genetics, evolution, perception, learning, decision-making, and chronobiology in animal behaviour.	K1
2.	elucidate the evolutionary and ecological elements impacting social behaviour, the interplay between animal physiology and behaviour, the intricacies of decision-making processes in animals, and the principles underlying biological clocks.	K2
3.	interpret animal behaviour patterns, social behaviour dynamics, predict and manage animal physiology and behaviour, solve behavioural problems, optimise human health and well-being.	K3
4.	critically analyse and assess the impact of environmental changes on physiology and behaviour, evaluate the decision-making processes in complex behavioural scenarios and role of biological clocks in human health and disease management.	K4 & K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** - Evaluate

SEMESTER III
ELECTIVE COURSE V: b) BIOTECHNOLOGY AND NANOBIOLOGY
Course Code : ZP233EC2

On the successful completion of the course, students will be able to:		
1.	explain the various techniques used in modern biotechnology.	K1
2.	outline the basic concepts of Biotechnology and Nanobiology, its application and threat to the society.	K2
3.	apply the biotechnological principles in research and judicial use of bio- and nanotechnology to solve societal problems.	K3
4.	analyze the impact of biotechnological products and genetically modified organisms in bioremediation.	K4
5.	evaluate the function, gene modulation and their effects on improvement of crops and animals after the applications of cloned genes.	K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** - Evaluate

SEMESTER III
ELECTIVE COURSE V: c) BIOINFORMATICS
Course Code : ZP233EC3

On the successful completion of the course, students will be able to:		
1	define the scope and applications of bioinformatics in biological research and data analysis.	K1
2	explore methods for querying, retrieving, and interpreting data from biological databases.	K2
3	apply sequence alignment techniques to identify similarities, homologies, and evolutionary relationships between biological sequences.	K3
4	make phylogenetic predictions or prediction of structure of proteins and nucleic acids	K4
5	trace the evolutionary relationship among different organisms.	K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** - Evaluate

SEMESTER III
SKILL ENHANCEMENT COURSE II: DAIRY FARMING
Course Code : ZP233SE1

On the successful completion of the course, students will be able to:		
1.	categorize cattle breeds and the diverse feed options for livestock.	K1
2.	understand the various housing options and the nutritional needs of dairy animals at different life stages.	K2
3.	apply breeding techniques and implement managerial parameters to uphold optimal conditions in dairy housing.	K3
4.	analyze and explore milk composition and factors leading to spoilage.	K4
5.	prepare and asses new variety of dairy products and their nutritional vlaues.	K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** - Evaluate

SEMESTER III
SPECIFIC VALUE-ADDED COURSE
PRESERVATION OF FOOD PRODUCTS
Course Code : ZP233V01

On completion of this course, students will be able to:		
1	recognize a variety of animal products, such as meat, poultry, fish, and dairy.	K1
2	explain food spoilage and the contribution of microorganisms to the deterioration of food products.	K2

3	select and utilize suitable preservation techniques for different animal products.	K3
4	select appropriate preservation methods based on product characteristics, storage conditions, etc	K4
5	assess the effectiveness, safety, and sustainability of different preservation technique	K5

K1- Remember; K2- Understand; K3- Apply; K4-Analyze; K5-Evaluate

**SEMESTER III
SPECIFIC VALUE-ADDED COURSE HONEY BEE PRODUCTS
Course Code : ZP233V02**

On completion of this course, students will be able to:		
1.	identify different value-added honey bee products.	K1
2.	interpret the quality standards for honey and honey-based products.	K2
3.	demonstrate practical skills in producing and packaging value-added bee keeping products.	K3
4.	formulate strategies to ensure the regulatory standards of honey bee products.	K4
5.	assess the quality of value-added bee keeping products	K5

K1- Remember; K2- Understand; K3- Apply; K4-Analyze; K5-Evaluate

**SEMESTER III
SELF-LEARNING COURSE
SOLID WASTE MANAGEMENT
Course Code : ZP233SL1**

On completion of this course, students will be able to:		
1.	define solid waste and classify different types of solid waste.	K1
2.	understand the legal and regulatory frameworks governing solid waste management	K2
3.	assess the environmental and public health impacts of improper solid waste management practices.	K3
4.	analyze the various methods of solid waste collection, transportation, treatment, and disposal.	K4
5.	evaluate the feasibility and effectiveness of different solid waste management.	K5

K1- Remember; K2- Understand; K3- Apply; K4-Analyze; K5-Evaluate

SEMESTER IV
CORE COURSE VII: IMMUNOLOGY
Course Code : ZP234CC1

Upon completion of this course the students will be able to:		
1	recall the importance of immunity, immune response, MHC, BCR and TCR, antigen –antibody interaction.	K1
2	relate the evolution of immune molecules in different groups of animals, immunodeficiency diseases and immunotechniques.	K2
3	make use of immunization schedules, differentiate the types of hypersensitive allergic reactions and symptoms.	K3
4	analyse the immune response in relation to toxicants, vaccines, tumour, and infectious diseases.	K4
5	evaluate the role of immune cells and humoral factors in immune response	K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** - Evaluate

SEMESTER IV
CORE COURSE VIII: MICROBIOLOGY
Course Code : ZP234CC2

On the successful completion of the course, students will be able to:		
1.	recall the structure, distribution and life cycle of microorganisms and their role in human welfare.	K1
2.	explain culture techniques, growth, fermentation and microbial products.	K2
3.	apply the microbiological laboratory skills in clinical research, food industries and environmental management.	K3
4.	analyze beneficial and harmful microbes	K4
5.	evaluate the microbial importance and applications in various fields.	K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** - Evaluate

SEMESTER IV
CORE LAB COURSE: LAB ON IMMUNOLOGY AND MICROBIOLOGY
Course Code : ZP234CP1

On the successful completion of the course, students will be able to:		
1.	recall Immunological and Microbiological experiment protocols.	K1
2.	identify tools and techniques relevant to Immunology and Microbiology	K2
3.	perform Immunological and Microbiological experiments pertaining to the welfare of the environment and society.	K3

4.	analyse the impact of microbiological products and genetically modified organisms in bioremediation and Immunology.	K4
5.	explore the role of agglutination in serological testing and blood typing.	K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** - Evaluate

SEMESTER IV
ELECTIVE COURSE VI: a) AQUACULTURE
Course Code : ZP234EC1

On the successful completion of the course, students will be able to:		
1.	recall the basic principles and concepts of aquaculture, as well as the primary species of aquatic organisms cultivated in this field.	K1
2.	understand various aquaculture systems and their practical applications in water quality management essential for successful aquaculture operations.	K2
3.	utilize diverse aquaculture techniques to propagate and culture aquatic organisms effectively.	K3
4.	apply the knowledge about different culture methods in aquaculture	K4
5.	asses the different fish's diseases, diagnosis, and their management strategies.	K5

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** - Evaluate

SEMESTER IV
ELECTIVE COURSE VI: b) FORENSIC BIOLOGY
Course Code : ZP234EC2

On the successful completion of the course, student will be able to		
1	recall the fundamentals of forensic biology, psychology, and criminal profiling.	K1
2	outline the use of scientific evidence in a legal context using basic facts, fundamental principles, and functions of forensic science.	K2
3	apply the knowledge to render forensic service during real-time crime scenes.	K3
4	analyze fingerprints, personal identification evidence, bite marks and pug marks.	K4
5	evaluate information to find strategies to resolve problems in forensic biology.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyse; **K5** - Evaluate

SEMESTER IV
ELECTIVE COURSE VI: c) ECOLOGY
Course Code : ZP234EC3

On the successful completion of the course, students will be able to:		
1.	relate the evolutionary and functional basis of animal ecology.	K1
2.	comprehend how organisms interact with their environment.	K2
3.	engage in field-based research activities for gathering data in the field.	K3
4.	analyse a biological problem, derive testable hypotheses and then design experiments and put the tests into practice.	K4
5.	solve the environmental problems involving interaction of humans and natural systems at local or global level.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate

SEMESTER IV
ELECTIVE COURSE VII: a) ORNAMENTAL FRESHWATER FISH PRODUCTION
Course Code : ZP234EC4

On the successful completion of the course, students will be able to:		
1.	identify the commonly cultured key species of ornamental freshwater fish.	K1
2.	explain the various culture and the factors that influence the growth and development of these fish.	K2
3.	utilize different breeding methods to raise freshwater fish and keep the water clean for their health and growth.	K3
4.	examine the economic feasibility of various production methods in ornamental freshwater fish farming.	K4
5.	assess the sustainability of ornamental freshwater fish production systems in meeting market demand while minimizing ecological pollution.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate

SEMESTER IV
ELECTIVE COURSE VII: b) BIODIVERSITY CONSERVATION AND SUSTAINABLE DEVELOPMENT
Course Code : ZP234EC5

On the successful completion of the course, students will be able to:		
1.	recall the impact of the degraded environment and the importance of biodiversity	K1
2.	explain the consequences of biodiversity loss and the judicious utilization of natural resources.	K2
3.	apply green technology, eco-friendly practices, and prospects of environmental protection in daily practices.	K3

4.	analyse legal and ethical issues in the work environment.	K4
5.	evaluate environmental issues to propose solutions and advocate for sustainable practices.	K5

K1- Remember; K2- Understand; K3- Apply; K4-Analyze; K5-Evaluate

**SEMESTER IV
ELECTIVE COURSE VII: c) MEDICAL LAB TECHNOLOGY**

Course Code : PZ234EC6

On the successful completion of the course, students will be able to:		
1.	outline the laboratory principles applied in diagnosis of disease and methods of biomedical waste disposal.	K1
2.	explain the type of specimens, collection and use of appropriate diagnostic techniques.	K2
3.	prepare reagents, handle instruments and perform clinical analysis.	K3
4.	systematically analyze complex laboratory data, identifying patterns, trends, and anomalies	K4
5.	critically evaluate and assess various laboratory methodologies and techniques in medical diagnostics	K5

K1- Remember; K2- Understand; K3- Apply; K4-Analyze; K5-Evaluate

**SEMESTER IV
SKILL ENHANCEMENT COURSE III: ANIMAL FOOD PROCESSING AND
QUALITY CONTROL
Course Code :ZP234SE1**

On the successful completion of the course, students will be able to:		
1.	recall different processing techniques used in the animal food industry.	K1
2.	explain the principles behind various processing methods used in animal food production.	K2
3.	demonstrate the use of quality control tools and techniques in monitoring and maintaining product quality.	K3
4.	analyze the impact of processing methods on the nutritional value of animal food products.	K4
5.	evaluate the effectiveness of quality control of processed foods.	K5

K1- Remember; K2- Understand; K3- Apply; K4-Analyze; K5-Evaluate

**SEMESTER IV
SELF-LEARNING COURSE
ENVIRONMENTAL SUSTAINABILITY
Course Code : ZU234SL1**

On completion of this course, students will be able to:		
1.	define environmental sustainability and explain its significance.	K1
2.	identify key environmental issues and their interconnections.	K2
3.	infer the interdisciplinary approaches to practically address environmental sustainability challenges	K3
4.	analyze the various methods of solid waste collection, transportation, treatment, and disposal.	K4
5.	evaluate sustainability initiatives and strategies in various sectors.	K5

K1- Remember; **K2-** Understand; **K3-** Apply; **K4-**Analyze; **K5-**Evaluate

**SEMESTER III & IV
LIFE SKILL TRAINING – II - VALUES
Course Code : PG23LST2**

On completion of this course the student will be able to		
1	recognize the perception of life and lead a positive life	K1
2	understand relationship with family, friends and the society	K2
3	develop as socially responsible citizens.	K3
4	assess goals, fix targets and value life	K4
5	create a peaceful, communal community and embrace unity.	K6

K1-Remember; **K2-**Understand; **K3-**Apply; **K4 –** Analyse; **K6-** Create