Department of Zoology
M.Sc. Zoology Courses offered
2017 - 2020

Semester	Course code	Title of the paper	Hours/week	Credits
I	PZ1711	Core I - Biochemistry	6	4
	PZ1712	Core II - Cell and Molecular Biology	6	4
	PZ1713	Core III - Culture and Capture Fisheries	6	4
	PZ1714	Elective I - (a) Biosystematics and Biodiversity/ (b) Cell Technology	6	5
	PZ17P1	Practical I (Biochemistry, Cell and Molecular Biology & Culture and Capture Fisheries)	6	-
II	PZ1721	Core IV - Biostatistics, Computer Applications and Bioinformatics	6	4
	PZ1722	Core V - Genetics and Evolution	6	4
	PZ1723	Core VI - Research Methodology	6	4
	PZ1724	Elective II - (a) Developmental Biology / (b) Bioinformatics	6	5
	PZ17P1	Practical I (Biochemistry, Cell and Molecular Biology & Culture and Capture Fisheries)	-	5
	PZ17P2	Practical II (Biostatistics, Computer Applications and Bioinformatics, Genetics and Evolution & Research Methodology)	6	5
	LST172	Life Skill Training (LST) I	-	1
III	PZ1731	Core VII - Physiology	6	4
	PZ1732	Core VIII - Immunology	6	4
	PZ1733	Elective III - (a) General Endocrinology / (b) Health Care	6	5
	PZ17P3	Practical III (Physiology & Immunology)	4	-
	PZ17PR	Project	8	4
IV	PZ1741	Core IX - Microbiology	6	4
	PZ1742	Core X - Ecobiology	6	4
	PZ1743	Core XI - Biotechnology and Nanobiology	6	4
	PZ1744	Elective IV - (a) Parasitology/ (b) Medical Entomology	6	5
	PZ17P3	Practical III (Physiology & Immunology)	-	4
	PZ17P4	Practical IV (Microbiology, Ecobiology & Biotechnology and Nanobiology)	6	5
	LST174	Life Skill Training (LST) II	-	1
	STP171	Summer Training Programme	-	1
		Total	120	90

M.Sc. Programme Outcomes (POs)

PO No.	Upon completion of M.Sc. Degree Programme, the graduates will be able to:
PO - 1	Recognize the scientific facts behind natural phenomena.
PO - 2	Relate the theory and practical knowledge to solve the problems of the society.
PO - 3	Prepare successful professionals in industry, government, academia, research, entrepreneurial pursuits and consulting firms.
PO - 4	Face and succeed in high level competitive examinations like NET, GATE and TOFEL.
PO - 5	Carry out internship programme and research projects to develop scientific skills and innovative ideas.
PO - 6	Utilize the obtained scientific knowledge to create eco-friendly environment.
PO - 7	Prepare expressive, ethical and responsible citizens with proven expertise

M.Sc. Zoology PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO	Upon completion of M.Sc. Degree Programme, the graduates of Zoology department will be able to:	PO
PSO - 1	Acquire knowledge on the various aspects of life sciences including Biochemistry, Cell and Molecular Biology, Genetics, Physiology, Developmental Biology, Ecobiology, Immunology, Microbiology, Endocrinology, Evolution, Biotechnology and Nanobiology.	PO - 1
PSO - 2	Carry out experimental techniques and methods of statistical analysis appropriate for their course.	PO - 2
PSO - 3	Develop personal and key transferable skills such as group work, presentation and report writing.	PO - 5
PSO - 4	Develop competence in the design and execution of research.	PO - 5
PSO - 5	dependently assemble facts, summarize and draw conclusions from scientific text.	PO - 3
PSO - 6	quire skills in Zoology in a global, economic, environmental, and societal context.	PO - 6
PSO - 7	tain proficiency in analyzing applying and solving scientific problems.	PO - 4
PSO - 8	hance independent study and demonstrate awareness for lifelong learning and professional development.	PO - 3
PSO - 9	Acquire techniques, skills, and modern technology necessary to communicate effectively with professional and ethical responsibility	PO - 7
PSO - 10	rsue M. Phil/ Ph. D, compete in national eligibility test (NET) and select an independent professional career.	PO - 4

Course Outcomes(COs)

Semester : I **Core I**

Name of the Course : Biochemistry

Course code : PZ1711

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Assess the relationship between chemistry, physics and biology.	PSO - 1	E
CO - 2	Recognize the structure and functions of biomolecules.	PSO - 1	R
CO - 3	Discuss basic principles of metabolism and associated metabolic diseases.	PSO - 7	U
CO - 4	Demonstrate experiments and techniques related to biochemistry.	PSO - 2	Ap; An
CO - 5	Gain employability in industrial, biomedical and research laboratories.	PSO - 9	Ap

Semester : I **Core II**

Name of the Course : Cell and Molecular Biology

Course code : PZ1712

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Recognize and describe the structural and functional organization of cell organelles.	PSO - 1	U
CO - 2	Illustrate DNA replication and trace the flow of genetic information from DNA to protein, protein sorting and trafficking	PSO - 4	Ap
CO - 3	Summarise the cell cycle and proteins involved in the regulation and molecular defects leading to cancer.	PSO - 5	U
CO - 4	Identify signaling components and pathways.	PSO - 3	U
CO - 5	Apply the principles and techniques of molecular biology for further education and employment.	PSO - 6	Ap

Semester : I **Core III**

Name of the Course : Culture and Capture Fisheries

Course code : PZ1713

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Acquire knowledge on different types of aquatic organisms and construction of ponds.	PSO - 6	U
CO - 2	Formulate the nutritional requirement of fishes and develop the breeding techniques.	PSO - 4	C
CO - 3	Explain the culture of finfish and shellfish and identify the diseases and control measures.	PSO - 6	U; Ap
CO - 4	Gain knowledge on fishery genetics and transgenic fishes.	PSO - 7	U
CO - 5	Identify fish resource, capture techniques and fish marketing.	PSO - 6	U
CO - 6	Develop entrepreneurship skill by employing fish processing techniques.	PSO - 9	Ap

Semester : I **Elective I (a)**

Name of the Course : Biosystematics and Biodiversity

Course code : PZ1714

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Evaluate the importance, application, and practice of systematic biology.	PSO - 1	U; Ap
CO - 2	Outline the classification of animal kingdom.	PSO - 1	R; E
CO - 3	Collect, identify, preserve zoological specimens and assign systematic position based on International Code of Zoological Nomenclature.	PSO - 2	Ap; An
CO - 4	Discuss the importance of biodiversity and its conservation.	PSO - 9	An; Ap
CO - 5	Assess the biodiversity and use library resources in biological research.	PSO - 2	E; Ap

Semester : I **Elective I (b)**

Name of the Course : Cell Technology

Course code : PZ1715

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Explain isolation, culture, harvest and preservation of cell.	PSO - 1	U
CO - 2	Prepare tissues for microtechnique and identify stains to distinguish histological and histo-chemical preparations.	PSO - 6	R; Ap
CO - 3	Apply differential staining technique for identification of diseases.	PSO - 4	Ap
CO - 4	Analyse the applications of stem cell technology and tissue engineering.	PSO - 9	An
CO - 5	Apply theoretical knowledge of cell manipulation techniques in research.	PSO - 4	Ap

Semester : II **Core IV**

Name of the Course : Biostatistics, Computer Applications and Bioinformatics

Course code : PZ1721

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Choose appropriate sampling scheme and interpret biological data.	PSO - 2	U; R
CO - 2	Formulate hypothesis and test the significance.	PSO - 4	Ap
CO - 3	Apply the computer skills for biological data management and presentation.	PSO - 6	Ap
CO - 4	Use database similarity search and retrieval tools in sequence analysis.	PSO - 8	C; Ap; An
CO - 5	Develop skills in submitting molecular data to scientific community.	PSO - 9	U; Ap

Semester : II **Core V**

Name of the Course : Genetics and Evolution

Course code : PZ1722

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Apply the principles of inheritance as formulated by Mendel.	PSO - 2	U; Ap

CO - 2	Identify the alterations in chromosome number and structure.	PSO - 7	R
CO - 3	Explain the molecular and biochemical basis of genetic diseases.	PSO - 1	R
CO - 4	Explain the key concepts in population, evolutionary and quantitative genetics	PSO - 1	U; An
CO - 5	Discuss the mechanism of molecular evolution and origin of primates and hominids.	PSO - 5	U; R

Semester : II Core VI

Name of the Course : Research Methodology

Course code : PZ1723

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Demonstrate a broad range of research methodologies and their relevance to specific research problems.	PSO - 1	U
CO - 2	Operate instruments like microscope, centrifuge, pH meter and spectrometer and perform experiments on histology, chromatography and electrophoretic techniques.	PSO - 2	Ap
CO - 3	Use scientific methods to develop hypotheses, design and execute experiments by selecting the appropriate research techniques.	PSO - 4	Ap; An
CO - 4	Conceptualize research processes, data presentation, report writing and publication in journals.	PSO - 5	Ap

Semester : II Elective II (a)

Name of the Course : Developmental Biology

Course code : PZ1724

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Discuss basic concepts and develop knowledge on major developmental processes.	PSO - 1	U
CO - 2	Explain the development of different organ and organ systems.	PSO - 6	R
CO - 3	Analyse the mechanisms regulating developmental processes.	PSO - 7	U; An
CO - 4	Evaluate the different technologies adopted in assisted reproduction.	PSO - 9	An; E
CO - 5	Apply the concepts in new areas of developmental biology.	PSO - 8	Ap

Semester : II Elective II (b)
Name of the Course : Bioinformatics
Subject code : PZ1725

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Describe the basics of bioinformatics.	PSO - 1	U
CO - 2	Explain bioinformatics tools and data bases.	PSO - 2	R
CO - 3	Gain knowledge on sequence alignment and alignment programs.	PSO - 2	U
CO - 4	Identify the tools for drug discovery, docking and molecular phylogeny.	PSO - 2	An
CO - 5	Use bioinformatics tools for molecular data analysis and submission.	PSO - 3	Ap; An

Semester : I Practical I
Name of the Course : Biochemistry, Cell and Molecular Biology and Culture and Capture Fisheries
Course code : PZ17P1

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Estimate the biomolecules and demonstrate the bio-techniques.	PSO - 1	An
CO - 2	Use the tools and techniques in cell biology.	PSO - 1	Ap
CO - 3	Prepare temporary mounting of cell and tissues.	PSO - 1	Ap
CO - 4	Assess the fish population and determine the age of fishes.	PSO - 2	Ap; E
CO - 5	Identify the factors that challenge aquaculture.	PSO - 4,	An

Semester : II Practical II
Name of the Course : Biostatistics, Computer applications and Bioinformatics, Genetics and Evolution & Research Methodology
Course code : PZ17P2

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Collect, analyze and interpret data using statistical methods.	PSO - 1	Ap; An
CO - 2	Compute data using MS Excel and identify data bases using bioinformatic tools.	PSO - 2	Ap; E
CO - 3	Compute and calculate gene frequencies for solving genetic issues.	PSO - 2	Ap; E

CO - 4	Analyze the evolutionary concepts through experiments.	PSO - 2	An
CO - 5	Perform whole mounting of specimen, histotechniques and adopt separation procedures using chromatography.	PSO - 4	Ap

Semester : III Core VII
Name of the Course : Physiology
Course code : PZ1731

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Describe the anatomy of different physiological systems at the tissue and cellular levels.	PSO - 1	U
CO - 2	Evaluate the physiological functioning of different organs.	PSO - 2	E
CO - 3	Analyze the physiological changes in relation to environmental conditions.	PSO - 7	Ap; An
CO - 4	Identify different tissues related to anatomy and physiology from an evidence-based perspective.	PSO - 9	U
CO - 5	Carry out physiological studies in the laboratory, Interpret data and graphs and write a report.	PSO - 9	Ap; An

Semester : III Core VIII
Name of the Course : Immunology
Course code : PZ1732

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Explain the importance of innate immune response in providing adaptive immunity.	PSO - 1	U
CO - 2	Know the evolution of immune molecules in different groups of animals.	PSO - 1	U
CO - 3	Differentiate the types of hypersensitive allergic reactions by seeing the symptoms and duration and suggest the remedies.	PSO - 2	R; An
CO - 4	Discuss the role of immune molecules in different diseases and organ transplantation.	PSO - 6	Ap
CO - 5	Demonstrate detailed knowledge and understanding of immunology and the way it is applied in diagnostic and therapeutic techniques and research.	PSO - 9	U; Ap

Semester : III **Elective III (a)**
Name of the Course : General Endocrinology
Course code : PZ1733

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	Discuss the principles of endocrine system, hormonal communication and neuroendocrine mechanism in animals.	PSO - 1	U
CO - 2	Explain the secretion and transportation of hormones to maintain homeostasis.	PSO - 10	U
CO - 3	Apply the knowledge of endocrinology to understand hormone-related disorders.	PSO - 8	Ap
CO - 4	Explain women related physiological processes such as menstruation, gestation and lactation	PSO - 3	Ap
CO - 5	Correlate endocrine regulation of reproduction and metamorphosis in various invertebrates and vertebrates.	PSO - 5	Ap; An

Semester : III **Elective III (b)**
Name of the Course : Health Care
Course code : PZ1734

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	Realize quality life and factors that determine health.	PSO - 5	U
CO - 2	Identify personal health problems and its remedies.	PSO - 8	R
CO - 3	Gain knowledge on motherhood and childcare.	PSO - 8	U; Ap
CO - 4	Describe mental and environmental health hazards.	PSO - 5	Ap
CO - 5	Discuss alternative medicines and apply safety and first aid measures.	PSO - 5	An; Ap

Semester : IV **Core IX**
Name of the Course : Microbiology
Course code : PZ1741

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Explain the structure, distribution, classification and life cycle of microorganisms.	PSO - 1	U
CO - 2	Culture microbes by selecting appropriate culture media.	PSO - 2	R; Ap
CO - 3	Explain the *role of microbes* in food industries and environmental cleaning.	PSO - 7	R
CO - 4	Identify the microbial pathogen and preventive measures.	PSO - 9	Ap
CO - 5	Develop microbiological laboratory skills applicable to clinical research.	PSO - 10	Ap

Semester : IV **Core X**
Name of the Course : Ecobiology
Course code : PZ1742

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Explain the interaction of organisms with the physical and biological environment.	PSO - 1	U
CO - 2	Compare the differences in the structure and function of different types of ecosystems.	PSO - 1	U
CO - 3	Assess the human population increase with respect to anthropological activities and environmental impact.	PSO - 2	E; An
CO - 4	Formulate hypotheses and test them by designing appropriate experiments, analyze, interpret data and report	PSO - 3	C; An; E
CO - 5	Use scientific knowledge of ecology to evaluate contemporary social and environmental issues.	PSO - 5	Ap; E
CO - 6	Participate in environmental protection and conservation.	PSO - 3	Ap

Semester : IV **Core XI**
Name of the Course : Biotechnology and Nanobiology
Course code : PZ1743

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Explain the basic concepts of gene cloning and the importance of DNA sequencing in biotechnological intervention.	PSO - 1	U
CO - 2	Demonstrate cell culture techniques and prepare protocol to perform experiments.	PSO - 2	U; Ap
CO - 3	Identify the progression of biotechnology in different areas like medicine, agriculture, environmental sustainability and forensics.	PSO - 2	R
CO - 4	Apply the knowledge of genetically modified organism in bioremediation.	PSO - 4	Ap; An; C
CO - 5	Outline the basic concepts of nanotechnology, its applications and threat to the environment.	PSO - 9	U
CO - 6	Communicate the concepts of biotechnology and develop research skills.	PSO - 4	Ap

Semester : IV **Elective IV (a)**
Name of the Course : Parasitology
Course code : PZ1744

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Explain the basic biology and lifecycle of parasites including epidemiology, diagnosis and treatment.	PSO - 1	U
CO - 2	Recognize morphological characteristics for identification of parasites and their developmental stages.	PSO - 2	R
CO - 3	Identify appropriate techniques and develop basic skills for detection of parasites.	PSO - 3	U; R
CO - 4	Critically analyze, interpret and discuss factual information on parasites.	PSO - 2	Ap; An
CO - 5	Analyze the medical and public health aspects of human parasitic infections.	PSO - 5	An
CO - 6	Seek employment in veterinary hospitals, clinical and research laboratories.	PSO - 3	Ap

Semester : IV **Elective IV (b)**
Name of the Course : Medical Entomology
Course code : PZ1745

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Identify the medically important arthropods by their general morphology and important characteristics.	PSO - 1	R ; U
CO - 2	Describe the biology, ecology and geographical distribution of medically important pests and their role in transmission of diseases.	PSO - 2	U
CO - 3	Outline the biology of tropical parasites and vectors and the relationship between parasites and their hosts.	PSO - 2	Ap
CO - 4	Assess the immunological approaches in the control of parasitic infections.	PSO- 2	E
CO - 5	Enumerate strategies for prevention and care of Vector Borne Disease.	PSO - 1	Ap; E

Semester : IV **Practical III**

Name of the Course : Physiology and Immunology

Course code : PZ17P3

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	Gain knowledge on the functioning of organ and organ systems.	PSO - 1	U
CO - 2	Demonstrate the effect of abiotic factors on the physiology of the systems through experiments.	PSO - 2	Ap; An
CO - 3	Identify the immune cells in a blood smear.	PSO - 1	R
CO - 4	Demonstrate immune-techniques on antigen-antibody interaction.	PSO - 10	Ap

Semester : IV **Practical IV**

Name of the Course : Microbiology, Ecobiology & Biotechnology and Nanobiology

Course code : PZ17P4

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Isolate, culture, stain and identify bacteria and perform antibiotic sensitivity test.	PSO - 1	Ap
CO - 2	Estimate the physico-chemical parameters of water samples.	PSO - 2	An; E
CO - 3	Identify the producers and consumers of a pond ecosystem and measure the primary productivity.	PSO - 1	R; Ap
CO - 4	Extract and quantify genomic DNA.	PSO - 1	Ap
CO - 5	Prepare commercial products by using biotechnological methods.	PSO - 9	C