

Program Specific Outcomes: PSO of M.Sc. Zoology

- PSO1 Used the evidences of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth. They are able to use specific examples to explicate how descent with modification has shaped animal morphology, physiology, life history, and behavior.
- PSO2 Explicate the ecological interconnectedness of life on earth by tracing energy and nutrient flow through the environment. They are able to relate the physical features of the environment to the structure of populations, communities, and ecosystems.
- PSO3 Subjects such as invasive or endangered species, embryonic development in mammals and ageing in social insects. Lead to advances in medicine to prevent disease amongst both animals and human beings.
- PSO4 Develop knowledge and understand of living organisms at several levels of Zoological and Biological organization from the molecular, through to cells and whole organisms and ecosystems from all organs of evolutionary perspectives.
- PSO5 Understand how the chemistry and structure of the major biological macromolecules, including proteins and nucleic acids, determine their biological properties.
- PSO6 Demonstrate knowledge to acquire, articulate, retain, and employ practical skills relevant to Fundamental computer, Molecular biology & rDNA technology,
- PSO7 Define event, outcome, trial, simple event, sample space and calculate the probability of events for more complex outcomes related to conditional, additive and multiplicative law of probability.
- PSO8 Understand the concept of mathematical expectation and use it to find out the mean, variance, standard deviation, kurtosis etc. of different probability distributions like Binomial, Poisson and Normal etc.
- PSO9 Use Correlation to identify the strength and direction of a linear relationship between two variables and using Regression to predict how much a dependent variable changes based on adjustments to an independent variable and also apply Karl Pearson Correlation coefficient and Spearman's Rank Correlation and Least Square technique for Regression lines.

Master of Science Zoology

Session 2020-21

(Semester-I)

Course Code: MZOL-1481

FUNCTIONAL ORGANIZATION OF ANIMALS-I (Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understand the physiological mechanisms.
- CO2 Familiarize with the physiology of digestive and respiratory system of chordates & non-chordates.
- CO3 Understand the blood composition, types, groups and circulatory system.
- CO4 Understand the physiology of excretory system.
- CO5 Come to know the physiology of reproductive system.

Course Code: MZOL-1482

ANIMAL ECOLOGY (Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Demonstrate and Understand the ecological relationships between organisms and their environment.
- CO2 Present an overview of diversity of life forms in an ecosystem.
- CO3 Explain and identify the role of the organism in energy transfers.
- CO4 Describe the Habitat ecology and Resource ecology.
- CO5 Understand the Environmental Pollution and their management.

Course Code: MZOL-1483
CELL BIOLOGY (Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Describe the ultra-structure and functions of cell organelles.
- CO2 Understand DNA replication, RNA and protein synthesis and come to know protein synthesis can be controlled at the level of transcription and translation.
- CO3 Understand cell signaling and cellular communication.
- CO4 Understand the types and applications of stem cells.

Course Code: MZOL-1485
Practical-I (Functional Organization of Animals-I)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understand the comparative anatomy of gut through demonstration.
- CO2 Understand the comparative physiology of circulatory, excretory & reproductive system through ICT based videos, presentations and charts.

Course Code: MZOL-1486
Practical-II (Ecology & Cell Biology)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Perform the experiments to analyze the macromolecules in animals
- CO2 Describe the fine structure and functions of cell organelles.
- CO3 Perform a variety of cellular biology techniques.
- CO4 Analyze various physicochemical parameters in environmental matrices.

Master of Science (Zoology)

Session: 2020-21 SEMESTER II

Coursecode: MZOL-2481

CourseTitle:Functional Organization of Animals–II

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Describe the specializations and evolution of skin.
- CO2 Describe the physiology of nervous system of human beings.
- CO3 Understand the physiology of sense organs, muscles and endocrine system.

Coursecode: MZOL-2482

CourseTitle: Applied Zoology-I (Invertebrates)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Describe the Taxonomy, Morphological sex differences in larva and adult of beneficial and harmful insects.
- CO2 Understand the culture of mulberry plants, mulberry silk and silk gland.
- CO3 Know the culture methods of *B. mori* and *Apis*.
- CO4 Understand the diseases and pests of *B. mori* and plants.
- CO5 Study the quality of silk and marketing strategies of silk.
- CO6 Know the culture and harvesting methods of Lac.
- CO7 Describe the insect species and host plants of Lac.
- CO8 Know the culture methods of honey bee and prawn.

CourseCode: MZOL-2483

Course Title: Evolution

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understand that many of the organisms that inhabit the Earth today are different from those that inhabited it in the past.
- CO2 Understand that the four propositions underlying Darwin's theory of evolution through natural selection are:
 - (1) More individuals are produced than can survive;
 - (2) There is therefore, a struggle for existence
 - (3) Individuals within a species show variation
 - (4) Offspring tend to inherit their parental characters
- CO3 Explain adaptation, providing examples from several different fields of biology.
- CO4 Explain how the molecular record provides evidence for evolution.
- CO5 Understand the Human origin and evolution.

Course Code: MZOL-2334

Course Title: Biostatistics

Course Outcomes

After the successful completion of the subject students will be able to

CO 1: Know how to collect, analyze and interpret data and use this data to find out different measures of central tendency, dispersion, skewness, kurtosis and moments.

CO 2: Define event, outcome, trial, simple event, sample space and calculate the probability of events for more complex outcomes related to conditional, additive and multiplicative law of probability.

CO3: Able to use and stimulate random variable, distribution function, probability mass function and probability density function using calculus to answer the quantitative

questions about the outcome of probabilistic systems.

CO 4: Understand the concept of mathematical expectation and use it to find out the mean, variance, standard deviation, kurtosis etc. of different probability distributions like Binomial, Poisson and Normal etc.

CO 5: Use Correlation to identify the strength and direction of a linear relationship between two variables and using Regression to predict how much a dependent variable changes based on adjustments to an independent variable and also apply Karl Pearson Correlation coefficient and Spearman's Rank Correlation and Least Square technique for Regression lines.

CO 6: Understand how to develop Null and Alternative Hypothesis and examine the process of Hypothesis testing with reference to one or two tailed test at a given level of significance.

CO 7: Manage to solve problems using t, Z and Chi-Square test.

CO 8: To describe the use of ANOVA for one way and two way classified data with one observation per cell.

Course Code-MZOP-2486

Course Title-PRACTICAL-III (Functional Organization of Animals-II)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understand the comparative anatomy through demonstration.
- CO2 Understand the comparative physiology of sense organs, muscles, endocrine system through ICT based videos, presentations and charts

Course Code: MZOP-2487

CourseCode: PRACTICAL IV (Evolution and Applied Zoology-I)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Know the Animals of evolutionary importance, fossils, analogous and homologous organs, Mimicry and Colouration.
- CO2 Acquaint with the applied aspects of Zoology i.e. sericulture, lac culture, apiculture, dairy farming, poultry etc.
- CO3 Understand the propositions underlying theories of evolution through demonstrations.
 - (1) More individuals are produced than can survive;
 - (2) There is therefore, a struggle for existence
 - (3) Individuals within a species show variation
 - (4) Offspring tend to inherit their parental characters

CourseCode: MZOS-2485

CourseTitle: Seminar

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Express their innovative ideas & creativity on any scientific phenomenon & develop interest in research aptitude.
- CO2 Build up confidence for public speaking.
- CO3 Improve their presentation skills.

Master of Science (Zoology)

Session: 2020-21 SEMESTER III

CourseCode: MZOS-3481

CourseTitle: RESEARCH TECHNIQUES AND METHODOLOGY (THEORY)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understanding the theoretical principles and applications of immunological techniques.
- CO2 Understanding of the theoretical principles of centrifugation techniques and the scope of their applications.
- CO3 Understanding of the theoretical principles of electrophoretic and some electro analytical techniques and their applications.
- CO4 Explain the theoretical principles and applications of a range of chromatographic techniques.
- CO5 Understanding of physical, chemical, biological principles behind techniques used to separate macromolecules.
- CO6 Understanding purification methods for isolating macromolecules in scientific research

CourseCode: MZOS-3482

CourseTitle: DEVELOPMENTAL BIOLOGY

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 To impart knowledge regarding basic concepts of differentiation and growth, differential gene expression as well as cytoplasmic determinants to the students.
- CO2 To develop detailed understanding of essential events of developmental

biology through proper explanation of gametogenesis, fertilization, blastula formation, gastrulation as well as embryological induction as part of early embryonic development.

- CO3 To provide adequate explanation to the students regarding concept of late embryonic developmental events including fate map, germ layers development, extra-embryonic membranes, embryo implantation and significance of placental formation.
- CO4 To give adequate information to the students regarding post embryonic development especially, metamorphosis, regeneration and ageing processes.
- CO5 To make the students aware about modern implications of developmental biology by impartment of knowledge regarding in-vitro fertilization.

Course Code: MZOS-3483

Course Title: GENERAL BIOCHEMISTRY

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Students will understand the synthesis of proteins, lipids, nucleic acids, and carbohydrates and their role in metabolic pathways along with their regulation at the epigenetic, transcriptional, translational, and post-translational levels including RNA and protein folding, modification, and degradation. Regulation by non-coding RNAs will be tied to the developmental and physiological functioning of the organism.
- CO2 Students will analyze structural-functional relationships of genes and proteins from bacteria to eukaryotes using genomic methods based on evolutionary relationships.

- CO3 Demonstrate an understanding of the chemistry, structure and function of biological molecules
- CO4 Explain biological mechanisms, such as the processes and control of bioenergetics and metabolism as chemical reactions
- CO5 Demonstrate an understanding of the principles, and have practical experience of, a wide range of biochemical techniques (e.g. basic molecular biology, cell biology and microbiology methods, Spectrophotometry, the use of standards for quantification, enzyme kinetics; macromolecular purification, chromatography and electrophoresis)
- CO6 To analyze the biochemical data (e.g. in enzyme kinetics, molecular structure analysis and biological databases).

Course Code: MZOS-3484

Course Title: APPLIED ZOOLOGY-II (VERTEBRATES)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understand the concept of Fish culture, poultry, dairy farming, and wool industry.
- CO2 Understanding of Pharmaceutical products from animals.
- CO3 Understanding of problems associated to economically important animals.
- CO4 Skill development for small scale industry.

Course Code: MZOL-3485

PRACTICAL V (RESEARCH TECHNIQUES & APPLIED ZOOLOGY-II)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understanding of various scientific research techniques.
- CO2 Estimation of protein content, DNA/RNA.

- CO3 Understanding of economically important animals rearing, use of their products and awareness of small scale industry.

Course Code: MZOL-3486

PRACTICAL VI (DEVELOPMENTAL BIOLOGY AND BIOCHEMISTRY)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understanding of development patterns of frog and chick.
- CO2 Knowledge of process of gametogenesis.
- CO3 Understanding of techniques related to protein, lipids and carbohydrate estimation.

Session-2020-21

Semester–IV

CourseCode: MZOL-4481

CourseTitle: Animal Behaviour and Wildlife Conservation

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Demonstrate knowledge of key concepts in animal behaviour
- CO2 Understand and identify behaviors in a variety of taxa
- CO3 Designing and implementing experiments to test hypotheses relating to animal behaviour
- CO4 Completely discuss the evolutionary origins of various behaviors
- CO5 Understand the proximate controls of behavior including the role of hormones, the animal's genotype and the animal's environment in the development of behavior
- CO6 Adaptive significance of behaviour, emphasizing animal communication, social behavior, territoriality, sexual selection and mating systems
- CO7 Demonstrate skills in the collection of behavioural data in the field.
- CO8 Understanding and awareness for wildlife conservation
- CO9 Knowledge of conservation of threatened animal species

CourseCode: MZOL-4482

CourseTitle: ANIMAL GENETICS AND BIOTECHNOLOGY

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 describe the basic principles and techniques in genetic manipulation and genetic engineering.
- CO2 describe gene transfer technologies for animals and animal cell lines.
- CO3 Learn different techniques for animal research
- CO4 To understand genetic material, processes related to heredity, problems associated with genes
- CO5 have Knowledge of micro-organisms.

Course Code: MZOL-4483

Course Title: CONCEPTS OF IMMUNOLOGY

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Describe the basic mechanisms, distinctions and functional interplay of innate and adaptive immunity
- CO2 Define the cellular/molecular pathways of humoral/cell-mediated adaptive responses
- CO3 Define the basic mechanisms that regulate immune responses and maintain tolerance
- CO4 Explain the cellular and molecular aspects of lymphocyte activation, homeostasis, differentiation, and memory.
- CO5 Understand the molecular basis of complex, cellular processes involved in inflammation and immunity, in states of health and disease
- CO6 Describe basic and state-of-the-art experimental methods and technologies
- CO7 Integrate knowledge of each subsystem to see their contribution to the functioning of higher-level systems in health and disease

Course Code: MZOL-4484

Course Title: BIOSYSTEMATICS

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understand the patterns and processes of evolution above the species level
- CO2 Appreciate the differences between the three methods of phylogenetic analysis: evolutionary systematics, phenetics, cladistics.
- CO3 Classify using scientific names and the hierarchy.
- CO4 have knowledge of preparing scientific reports
- CO5 Understanding of taxonomic classification

Course Code: MZOL-4485

Course Title: PRACTICAL-VII ANIMAL BEHAVIOUR AND
WILDLIFE CONSERVATION

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understanding of behavior of animals
- CO2 Understanding of wildlife

Course Code: MZOL-4486

Course Title: PRACTICAL-VIII GENETICS AND
BIOSYSTEMATICS

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understanding of pedigree analysis and preparation of family charts
- CO2 Knowledge of isolation of DNA from human blood and buccal cells.
- CO3 Understanding of cell division.
- CO4 Understanding of inheritance of morphogenetic human characters.
- CO5 Knowledge of collection, preservation and nomenclature of animals.

