FACULTY OF LIFE SCIENCES

Syllabus for

Master of Science (Zoology)
(Under Credit Based Evaluation System) (SEMESTER: I-II)
Session: 2022-23

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
The Heritage Institution

Master of Science (Zoology) (Session 2022-23)
Program Specific Outcomes

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 flows 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 understood of living organisms at several levels of Zoological and Biological organization from the molecular, through to cells and whole organisms and ecosystems all organs of evolutionary perspectives.

PSO5 Understand how the chemistry and structure of the major biological macromolecules, including proteins and nucleic acids, determines their biological properties.

PSO6 Demonstrate knowledge to acquire, articulate, retain, and employ practical skills relevant to Fundamentals of computer, Molecular biology&rDNAtechnology.

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.

Session 2022-23
Master of Science Zoology (Semester–I)
Course Title: Functional Organization of Animals– I (Theory)
Course Code: MZOL-1481

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.

Session 2022-23
Master of Science Zoology (Semester–I)
Course Title: Animal Ecology (Theory)
Course Code: MZOL-1482

COURSE OUTCOMES

Afterpassingthiscoursethestudentwillbeableto:

- CO1DemonstrateandUnderstandtheecologicalrelationshipsbetweenorganismsandtheirenvironment.
- CO2Explainandidentifytheroleoftheorganisminenergytransfers.
- CO3Understand varoious types of adaptations and ecology of population
- CO4.Understandtheapplied aspect of ecology

Session 2022-23
Master of Science Zoology (Semester–I)
Course Title: Cell Biology (Theory)
Course Code: MZOL-1483

COURSE OUTCOMES

Afterpassingthiscoursethestudentwillbeableto:

- CO1Describethe ultra-structureandfunctionsofcellorganelles.
- CO2UnderstandDNAreplication,RNAandprotein synthesisandcometoknowproteinsynthesiscanbecontrolledatthelevelof transcriptionandtranslation.
- CO3Understandcellsignalingandcellular communication.
- CO4Understandthetypesandapplicationsofstemcells.

Session 2022-23
Master of Science Zoology (Semester–I)
Course Title: Concepts of Biotechnology (Theory)
Course Code: MZOL-1484

COURSE OUTCOMES

Afterpassingthiscoursethestudentwillbeableto:

- CO1Describecellculture and cell lines.
- CO2Understandmolecular markers and vectors used in biotechnology fields.
- CO3Understandcloning and its applications.
- CO4Understandthetypesandapplicationsofstemcells.
- CO5 Understand various techniques used in biotechnology.

Session 2022-23
Master of Science Zoology (Semester–I)
Course Title:Practical-I (Functional Organization of Animals-I)
Course Code: MZOP-1485

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

Session 2022-23
Master of Science Zoology (Semester–I)
Course Title: Practical-II (Ecology and Cell Biology)
Course Code: MZOP-1486

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 Analyse various physicochemical parameters in environmental matrices.

Session: 2022-23
Interdisciplinary course
HUMANRIGHTSANDCONSTITUTIONALDUTIES
Course Code: IDEH-1313/ IDEH-3313

CourseOutcomes

Attheendofthiscoursestudentwillbeable to:

CO1:Understandtheconcept of Human rights.

CO2:Analysisdifferenttypes ofhumanrights.

CO3:ApplythetheoreticalandpracticalunderstandingoftheFundamentalDutiesinIndianConstitution

Session: 2022-23
Interdisciplinary Compulsory Course
BASICS OF COMPUTER APPLICATIONS
Course Code: IDEI-1124

Course Outcomes:

After passing this course the student will be able to:
CO1: Comprehend basics of internet and operate an email account.
CO2: Comprehend basic word processing skills such as text input formatting, editing, cut, copy, paste, spell check, margin, printing, tables, header and footer, etc.
CO3: Apply features of spreadsheet software for data manipulation, data entry, worksheet formatting, functions and formulae.
CO4: Apply skills to make effective presentations using associated application software.

Session 2022-23
Master of Science Zoology (Semester–II)
Course Title:Functional Organization of Animals –II (Theory)
Course Code: MZOL-2481

COURSEOUTCOMES

Afterpassingthiscoursethestudentwillbeableto:

- CO1Describethespecializationsandevolutionofskin.
- CO2Describethephysiologyofnervoussystem ofhumanbeings.
- CO3 Understand the physiology of sense organs, musclesandendocrine system.

Session 2022-23
Master of Science Zoology (Semester–II)
Course Code: Applied Zoology–I (Theory)
Course Code: MZOL-2482

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 understand the methods of bee keeping, diseases of honeybee and various bee products.
- CO2 Know the culture and harvesting methods of Lac and mulberry silkworm.
- CO3 Understand the various methods of prawn farming. The students will also know about the spoilage, processing and preservation of prawns.
- CO4 Understand the artificial pearl formation and economics of Vermiculture.

Session 2022-23
Master of Science Zoology (Semester–II)
Course Title: Evolution
Course Code: MZOL-2483

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.

Session 2022-23
Master of Science Zoology (Semester–II)
Course Title: PRACTICAL –III (Functional Organizations of Animals-II)
Course Code: MZOP-2486

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.

Session 2022-23
Master of Science Zoology (Semester–II)
Course Title: PRACTICAL –IV (Evolution and Applied Zoology-I)
Course Code: MZOP-2487

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

Session 2022-23
Master of Science Zoology (Semester–II)
Course Title: Seminar
Course Code: MZOS-2485

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.

FACULTY OF LIFE SCIENCES

SYLLABUS

Of

Master of Science Zoology (Semester III - IV)

(Under Continuous Evaluation System)

Session: 2022-23

The Heritage Institution

KANYA MAHA VIDYALAYA JALANDHAR (Autonomous)

Master of Science (Zoology) (Session 2022-23)

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Master of Science (Zoology) Semester–III

Session-2022-23

Course Code: MZOL-3481

Course Title: Research Techniques and Methodology

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 electroanalytical techniques and their applications.
- CO4 Explain the theoretical principles and applications of a range of chromatographictechniques.

Master of Science (Zoology) Semester–III

Session-2022-23

Course Code: MZOL-3482

Course Title: 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 concepts 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.

Master of Science (Zoology) Semester–III

Session-2022-23

Course Code: MZOL-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

Master of Science (Zoology) Semester–III

Session-2022-23

Course Code: MZOL-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.

Master of Science (Zoology) Semester–III
Session-2022-23
Course Code: MZOL-3485
Course Title: Research Techniques and 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

Master of Science Zoology
Session: 2022-23
(Semester–III)
Course Code: MZOL-3486
Course Title: 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 carbohydratesestimation.

Master of Science (Zoology) Semester–IV

Session-2022-23

Course Code: MZOL-4481

Course Title: 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 behavior and designing and implementing experiments to test hypothesis relating to animal behavior.
- CO2 Completely discuss social and reproductive behaviors.
- CO3 Know about wildlife in India and awareness for wildlife conservation.
- CO4 Knowledge of conservation of threatened animal species.

Master of Science (Zoology) Semester–IV

Session-2022-23

Course Code: MZOL-4482

Course Title: Animal Genetics and Biotechnology

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Genetic material, Linkage and crossing over.
- CO2 Mutations and gene concepts.
- CO3 know about bacterial and viral genetics.
- CO4 Understand various techniques in genetics.

Master of Science (Zoology) Semester–IV

Session-2022-23

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 humoral and cell mediated immunity.
- CO3 Understand the molecular basis of complex, cellular processes involved in inflammation and immunity, in states of health and disease.
- CO4 Describe basic and state-of-the-art experimental methods and technologies.

Master of Science (Zoology) Semester–IV

Session-2022-23

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 and understanding of taxonomic classification

Master of Science (Zoology) Semester–IV

Session- 2022-23

Course Code: MZOL-4485

Course Title: PRACTICAL-VII (Behaviour and Wild Life Conservation)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understanding of behavior of animals
- CO2 Understanding of wild life

Master of Science (Zoology) Semester–IV

Session- 2022-23

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 familycharts.
- CO2 Knowledge of isolation of DNA from human blood and buccalcells.
- CO3 Understanding of cell division.
- CO4 Understanding of inheritance of morphogenetic human characters.

Master of Science (Zoology) Semester–IV

Session- 2022-23

Course Code: MZOD-4477

Course Title: PRACTICAL-VIII (Genetics and Biosystematics)

COURSE OUTCOMES

After passing this course the student will be able to:

CO1 do research projects.

CO2 write thesis and research papers.

CO3 understand current problems with respect to environment and toxins and be able to suggest possible solutions.