# 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.

**Kanya Maha Vidyalaya, Jalandhar (Autonomous)**

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

**Master of Science (Zoology) Semester-I**

Session-2022-23

| **Masters of Sciences (Zoology)Semester-I** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Name** | **Course Type** | **Hours Per Week** | **Credits** | **Total Credits** | **Marks** | | | | **Examination time (in hours)** |
| | | | | | | **Ext.** | | | | |
| | | | | **L-T-P** | | **L** | **P** | **CA** | **Total** | |
| MZOL-1481 | Functional Organization of Animals–I | C | 4 | 4-0-0 | 4 | 80 | - | 20 | 100 | 3 |
| MZOL-1482 | AnimalEcology | C | 4 | 4-0-0 | 4 | 80 | - | 20 | 100 | 3 |
| MZOL-1483 | CellBiology | C | 4 | 4-0-0 | 4 | 80 | - | 20 | 100 | 3 |
| MZOL-1484 | Concepts of Biotechnology | C | 4 | 4-0-0 | 4 | 80 | - | 20 | 100 | 3 |
| MZOM-1134 | Computer Programming and Data Processing | C | 4 | 2-0-1 | 3 | 25 | 15 | 10 | 50 | 3 |
| MZOP-1485 | Practical-I (FunctionalOrganizationofAnimals-I) | C | 6 | 0-0-3 | 3 | 40 | - | 10 | 50 | 3 |
| MZOP-1486 | Practical II (Ecology and Cell Biology) | C | 6 | 0-0-3 | 3 | 40 | - | 10 | 50 | 3 |
| IDEC-1101 | Effective Communication Skills | IDC<br>Students can opt any one | 3 | 4-0-0 | 4 | 80 | - | 20 | 100 | 3 |
| IDEM-1362 | Basic Fundamentals of Music (Vocal) | | 3 | 2-0-2 | 4 | 40 | 40 | 20 | 100 | 3 |
| IDEH-1313 | Human Rights and Constitutional Duties | | 3 | 4-0-0 | 4 | 80 | - | 20 | 100 | 3 |
| IDEI-1124 | Basics of Computer Applications | | 3 | 2-0-4 | 4 | 50 | 30 | 20 | 100 | 3 |
| Total | | | | | **29** | | | | **550** | |

**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: Functional Organization of Animals– I (Theory)**
**Course Code: MZOL-1481**

**L-T-P: 4-0-0**

**Maximum marks: 100**
**Theory marks: 80**
**CA:20**

**Instructions for the Paper Setter:**
Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A- D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**Unit –I**

**Nutrition and Digestion**
Ingestion of soluble food and particulate food in relation to habitat and habits
Symbiotic nutrition
Mechanism of digestion and regulation of secretion in non-chordates and chordates

**Unit – II**

**Transport and circulatory mechanisms**
Intracellular transport in Protozoa
Circulation of external medium of transport within the body of sponges and cnidarians
Open and closed types of circulatory system
Chambered, tubular and ampullary hearts
Neurogenic and myogenic hearts
Evolution of Heart and Cardiovascular system

**Unit–III**

**Respiratory System**
Respiratory organs in aquatic animals and aquatic respiration
Respiratory organs and aerial mode of respiration
Distribution and brief chemistry of respiratory pigments and their function in nonchordates and chordates

**Unit – IV**

**Excretion and Reproduction**
Excretory structures and waste disposal in non-chordates, coelom, coelomic ducts, nephridia, antennal / green glands, malpighian tubules
Regulation of water salt balance
Pattern of reproduction in non-chordates and their larval forms
Evolution of the urinogenital system in chordates with special reference to the separation of the two systems

**Suggested Reading Material:**


- Barrington, E. U. W. (1967), Invertebrates Structure and Functions. Houghton Mifflin Co. Boston.
- Barth, R. H. and Broshears, R. E (1982), The Invertebrate world. Holt Saunder, Japan.
- Brusca, R. C. and Brusca, G. J. (2003), Invertebrates second edition. Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
- Cooper, G. M. (2004), The Cell: A Molecular Approach IIIrd edition, ASM Press, Washington, D.C.
- Engemann, J. G. and Hegner, R. W. (1981), Invertebrate Zoology (3rd ed.) Macmillan, New York.
- Gardiner, M. S. (1972), The Biology of Invertebrates, McGraw Hill, New York.
- Hill, R. W., Wyse, G. K. and Anderson, N. (2004), Animal physiology. Sinauer Associate, INC. Pub. Saunderland, Massachusettes, USA.
- Hoar, W. S. (1984), General and Comparative Physiology. Prentice Hall of India Pvt. Limited, New Delhi, India.
- Karp, G.(2005), Cell and Molecular Biology; concepts and experiments (4th ed.),Hoboken, John Willy and Sons, New York.
- Meglitsch, P. A. and Schran, F. R. (1991), Invertebrate Zoology 3rd Ed. Oxford University Press, New York.
- Pechenik, A. Jan. (2000), Biology of the invertebrates, Fourth Edition, McGraw Hill Book Co. Singapore.
- Prosser, C.L. (1984), Comparative Animal Physiology. Satish Book Enterprise Books seller & Publishers, Agra.
- Purves, W. K., Oriane, G. H., Space, H. C. and Salava, D. (2001), Life – The Science of Biology 6th ed., Sinauer Assoc. Inc., USA.
- Randall, D., Burggren, K.L. and French, K. (2002), Eckert Animal Physiology:Mechanisms and Adaptations. W.H. Freeman and Company, New York
- Ruppert, E. E. and Barnes, R. D. (2004), Invertebrate Zoology 7th ed. Saunders Publ., Philadelphia.
- Willmer, P. Stone, G. and Johnston, I ( 2000 ). Environmental Physiology of Animals, Blackwell Science.
- Withers, P.C. (1992), Comparative Animal Physiology Saunder College Publishing, New York.

**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: Animal Ecology (Theory)**
**Course Code: MZOL-1482**

**L-T-P: 4-0-0**

**Maximum marks: 100**
**Theory marks: 80**
**CA:20**

**Instructions for the Paper Setter:**
Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A- D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**Unit-I**

**Introduction and History of Ecology**
Structure and Functions of some special types of ecosystems (Grasslands, forests, deserts, aquatic ecosystems and agroecosystem)
**Abiotic factors**
Temperature, Moisture, Light, fire, Malentite, Pollution

**Unit – II**

**Biotic Factors**
Analysis of Environment
Place in which to live
**Community Structure**
Ecological Niche, Food chains, Food webs, biomagnifications, succession / temporal changes
**Interactions and Coactions**
Intraspecific Interactions
Interspecific Interactions
Predation, Parasitism, Commensalism, Mutualism etc

**Unit- III**

**Adaptations**
Cave, deep sea, arboreal, aerial, and subterrestrial
Co-adaptations and adaptive resemblances (mimicry, warning colouration, seasonal polymorphism)
**Population Ecology**
Concept of Population
Biotic potential and carrying capacity, dispersal and distribution, population growth and its regulations
Methods of sampling
Life tables and longevity, Migration and Ecesis

**Unit – IV**

**Applied Ecology**
Anthropogenic interferences
Bio monitoring of environment using animal species
Modeling and Use of remote sensing (GIS ) in ecology (introduction)
Overview of sustainable development of ecosystems
**Bio Geography**
Zoo Geographical regions
Island ecology (endemicity)

**Suggested Reading Material:**


- Anderwartha, H.G. and Birch, L. C. (1970), The distribution and abundance of animals, University of Chicago Press, Chicago London.
- Beeby, A. (1992), Applying Ecology Chapman and Hall Madras.
- Begon, M., Harper J. L. and Townsend, C. R. (1995), Ecology – Individuals, populations and communities, Blackwell Science, Cambridge UK.
- Brewer, R. (1994), The science of Ecology, Saunders College of Publishing, New York.
- Chapman, J. L. and Resis, M. J. (1995), Ecology- Principles and applications, Cambridge University Press, Cambridge UK.
- Kaeighs, S. C. (1974), Ecology with special references to animal and Man, Prentice Hall Inc.
- Odum, E. P. (1983), Basic Ecology.
- Putmann, R. J. and Wratten, S. D. (1984), Principles of Ecology, Crown Helm, London.
- Salanki, J., Jeffery E. and Hughes G. M. (1994), Biological Monitoring ofthe Environment (A manual of Methods) CAB International, Wallingford UK.

**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: Cell Biology (Theory)**
**Course Code: MZOL-1483**

**L-T-P: 4-0-0**

**Maximum marks: 100**
**Theory marks: 80**
**CA:20**

**Instructions for the Paper Setter:**
Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A- D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

## Unit-I

**Introduction**
Cell – a unit of structure and function, cell theory
Prokaryotes and eukaryotes cells
**Cytoskeleton**
Actin filament, Myosin, Intermediate filament, microtubules
**Structure of Cell Membrane**
Chemical composition
Various Lipoprotein models including fluid mosaic model
**Nucleus**
The Nuclear Envelope and Traffic between the Nucleus and the Cytoplasm
Internal Organization of the Nucleus
The Nucleolus and rRNA Processing

## Unit – II

**Ribosomes**
Prokaryotic and Eukaryotic ribosomes
Role of ribosomes in protein synthesis in prokaryotes and eukaryotes
**Golgi complex**
Structure and Function of: Cisternae, vacuoles and vesicles
Types of Vesicle Transport and their functions
Protein sorting and targeting
GERL concept
**Endoplasmic Reticulum**
Structure and Function of endoplasmic reticulum
Membrane synthesis in the ER
Mechanism ensuring destruction of misfolded protein
ER to Golgi vesicular transport

## Unit -III

**Mitochondria**
Structure and Functions
Oxidative metabolism in the Mitochondrion
Role of Mitochondria in the formation of ATP
Electron-Transport complexes
**Lysosomes**
Lysosomal acid hydrolases
Endocytosis and Lysosome formation
Lipofuscin pigments
**Peroxisomes**
Functions of peroxisomes
Glyoxylatepathway
Peroxisome assembly

## Unit – IV

**Cell signaling**
Signaling molecules and their receptors
Functions of cell surface receptors
Pathways of intracellular signal transduction
Signal transduction and the cytoskeleton
**Cell Cycle**
Various cell cycle check points
Cyclin and cyclin dependent kinases
Regulation of CDK- cyclin activity

**Suggested Reading Material:**


- Alberts, B. Bracy, P. Lewis , J. Raff, M. Roberts K and Watson, J. (eds) (1994). Molecular Biology of the Cell, Garland Publishing , New York.
- Avers, C. J. (1976). Cell Biology , Van Nostrand Reinhold, New York.
- Cooper, G. M. (2004). The cell, A Molecular Approach ASM press, Washington, D.C.
- Darnell, J. Lodish, H. and Baltimore, D. (2004). Molecular Cell Biology, 2nd edition, Freeman, New York.
- Derobertis, E. D. P. and Derobertis, E.M.F. (1987). Essentials of Cell and Molecular Biology. Hold Saunders – Philadelphia.
- Karp, G. (1984). Cell Biology 4th Edition, McGraw Hill, New York.
- Karp G. (1999). Cell and Molecular Biology. Concepts and Experiments, 2nd Editon John Wiley and Sons, Inc. New York, Brisbane, Toronto.
- Powar, C. B. (1990). Cell Biology. Himalaya Publishing House, Bombay.

**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: Concepts of Biotechnology (Theory)**
**Course Code: MZOL-1484**

**L-T-P: 4-0-0**

**Maximum marks: 100**
**Theory marks: 80**
**CA:20**

**Instructions for the Paper Setter:**
Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A- D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**Unit – I**

**Brief introduction to Biotechnology**
**Cell culture and medium**
Cell culture, Cell lines, protocol cryo-preserving cultured cells, cell viability and cell proliferation
**Restriction Enzymes**
DNA ligase, Klenow enzyme, T4 DNA polymerase, Polynucleotide kinase, Alkaline phosphatase
**Stem Cells and Tissue engineering**
Embryonic stem cell, adult stem cells, stem cell differentiation

**Unit – II**

**Markers and Vectors**
**Molecular markers**
RFLP, RAPD, SSLP markers
**Vectors**
Plasmid vectors, Bacteriophage vectors, Cosmids, M13,Phagemids, Fosmids, BACs andYACs
**Cloning**
Gene cloning and sequencing, cDNA cloning, Identification of Specific clone with a specific probe, Practical applications of gene cloning

**Unit – III**

**Techniques**
Principal, theory and application of Southern, Northern, Western Blotting
Polyacrylamide gel electrophoresis (PAGE)
Polymerase chain reaction (PCR)
DNA finger printing
DNA foot printing
In situ hybridization
Restriction fragment length polymorphism (RFLP)

## Unit – IV

**Hybridoma Technology**
Immunization of animals: isolation of stimulated spleen cells
Myeloma cell lines used as fusion partners
Fusion methods
**Monoclonal antibodies**
Detection and applications
**Vaccines**
Conventional vaccines
Viral vaccines
Peptide vaccines
Genetically engineered vaccines
Production and applications of Cytokines

**Suggested Reading Material:**


- Spier, R.R. and Griffttths, J.B. (1994). Animal Cell Biotechnology, 6th Ed., Academic Press, London.
- Krogsgaard-larsen P. ,Liljefors T., Madsen U. and Larsen K, Liljefors T. Madsen U. (2016). Textbook of Drug Design and Discovery, 5 th Ed. Taylor and Francis Publications, Washington D.C.
- Gupta, P. K. (1996). Elements of Biotechnology, Rastogi and Co.,Meerut.
- Henry, R. J. (1997). Practical Applications of Plant Molecular Biology, Chapman and Hall.

**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-I (Functional Organization of Animals-I)**
**Course Code: MZOP-1485**

**L-T-P: 0-0-3**

**Maximum marks: 50**
**Practical marks: 40**
**CA:10**

**Instructions for the Practical Examiners:**
Question paper is to set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

**Study of permanent slides**
Mouth parts: honey bee, housefly, cockroach, butterfly, mosquito, and bug
Salivary glands
Blood smear of animals
Radula of Pila
Jaws of Leech

**Using slides/charts/models/videos study of following**

Anatomy of gut in relation to food and feeding habits of detritivores, carnivores, herbivores, omnivores and sanguivores
Different kinds of Heart and blood vascular system in animals
Respiratory structures: Gills (Crustaceans, Bivalves, Cephalopods, and Fish); Book Lungs (Scorpion); Trachea and spiracles (Cockroach)
Nephridia in annelids (earthworm), green glands in crustaceans, Malpighian tubules in Cockroach
Excretory system of frog, lizard, bird and rat
Histology of ovary, oviduct, uterus, testis and placenta in different groups of invertebrates and vertebrates
Reproductive organs in Hydra, Flatworm, Earthworm, Cockroach, Pila, Fish, Frog, Lizard, Bird and Rat

Note: The above mentioned practicals are in accordance with the guidelines of UGC. Practicals involving animal material will be conducted using models/charts/e- resources. Minor modifications in the curriculum are allowed subject to availability of resources.

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

**L-T-P: 0-0-3**

**Maximum marks: 50**
**Practical marks: 40**
**CA: 10**

**Instructions for the Practical Examiners:**
Question paper is to set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, KanyaMahaVidyalaya, Jalandhar.

**Population estimations**
Using Mark and Release method and to study the effect of migration on them (Using colored beads).

**Estimation of population**
Protozoans, Nematodes and Soil arthropods

**Combined population studies using quadrates**
Intra-population distribution and Poisson distribution, construction of life table and survivorship curves from given data.

**Analysis of following**
Normal and abnormal constituents in urine sample
RBC, WBC (TLC, DLC), platelet counts
Determination of ESR and PCV of human blood

**Study of cell using permanent slides**
Prokaryote cells: Lactobacillus, E. coli. Blue green algae
Eukaryote cells, Testicular material (for studies of spermatogenesis).

**Microtomy**
Introduction of the instrument – its use, care

**Study of permanent slides of various tissues**
(gut region, liver, lung, spleen kidney, pancreas, testis, ovary, tongue, skin etc.).

**Study of electron micrographs of various cell organelles**
Plasma membrane, Mitochondria, Golgi complex, Lysosomes, Endoplasmic reticulum (smooth and granular), Cilia, Centrioles, inclusions like glycogen and lipids etc

Note: The above mentioned practicals are in accordance with the guidelines of UGC. Practicals involving animal material will be conducted using models/charts/e- resources. Minor modifications in the curriculum are allowed subject to availability of resources.

**Session: 2022-23**
**Interdisciplinary compulsory course**
**Course Title: EFFECTIVE COMMUNICATION SKILLS**
**Course Code:** IDEC-1101/ IDEC-3101

**LTP: 4-0-0**

**Max. Marks- 100**

**Theory - 80**

**CA – 20**

**Instructions for the Paper Setter:**
The question paper will consist of four sections. The candidate will have to attempt five questions in all selecting one from each section and the fifth question from any of the four sections. Each question will carry 16 marks. **(5x16=80)**

**Unit - I**

Introduction: Basic Communication, Basic forms of Communication, Principles of effective Communication, Strategies to overcome barriers to Communication

**Unit - II**

Reading Skills: Model of Reading to learn – Reading tactics and strategies; Reading outcomes: Paraphrasing / Précis – writing and Summary writing, Note Taking

**Unit - III**

Modern Forms of Communication- E- mail Writing, New Media Writing (Blog and Report Writing etc.), Notice, Agenda, Minutes, Business Letters, Personal Letters, Job Application, Resume Writing

**Unit - IV**

Making Power Point Presentation, Telephonic Skills, Public Speaking, Interview Skills,

**Books Recommended:**

1. John Seely: *Oxford Guide to Effective Writing and Speaking* OUP
2. Geetha Nagaraj – *A Course in Grammar and Composition,* Foundation Books, 2006

**Session: 2022-23**
**Inter Disciplinary Course**
**Course Title: Basic Fundamentals of Music (Vocal)**
**Course Code:** IDEM-1362/ IDEM-3362

**LTP: 2-0-2**

**Total Marks: 100**
**Theory: 40**
**Practical: 40**
**CA: 20**

## (Theory)

**Note: Instructions for the Paper Setters:**

The paper setter will set Eight questions of equal marks. Two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**Unit – I**

1. Define Music. Explain the types of Music.
2. Knowledge of following basic Technical Terms of Music: Swara, Saptak, Arov, Avroh, Alankar.

**Unit - II**

3. Definition and Explanation of the following musical terms: Vadi - Samvadi - Anuvadi – Vivadi.
4. Concept of Raga & Jatties of Raagas.
5. Importance of Laya & Tala in the Hindustani Music.

**Unit – III**

6. Life Sketches: Tansen, Pt. Vishnu Narayan Bhatkhande.
7. Role of Multimedia in the promotion of Music.
8. Ability to write notations of any light composition in prescribed talas.

**Unit – IV**

9. Brief knowledge of following Ragas: Yaman, Bhairavi.
10. Ability to write notations of following talas: Teental, Kehrawa, Dadra, Roopak

## (Practical)

**Time - 20 Minutes** **Marks - 40**

**Instructions for the paper setter:**

Question paper is to be set on the spot jointly by the Internal and External Examiners.

1. Basicknowledge of playing Harmonium/Key - Board.
2. Ability to Sing ten Alankars with the instrument of your choice.
3. Ability to sing three light compositions (Bhajan/Shabad/Cinematic/Sufi/FolkSong e.t.c.) based on Ragas.
4. Knowledge and ability to recite the following Talas on hands:
   - Teentaal (16 Beats)
   - Keharva (8 Beats)
   - Roopak (7 Beats)
   - Dadra (6 Beats)
5. Ability to recite Bhajan/Shabad with Tanpura.
6. Ability to sing National Anthem with Harmonium.

### Suggested Readings


- Hmare Sangeet Ratan- Sangeet Karyalya, Hathras, 2004
- Sangeet Roop - Dr. Davinder Kaur
- Sangeet Saar- Veena Mankaran
- Raag Parichay (I-IV) - Sh. Harish Chandar Srivastava
- Sangeet Visharad - Basant, Sangeet Karyalya, Hathras, 2004
- Sangeet Subodh - Dr. Davinder Kaur

**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**
**Course Title: HUMANRIGHTSANDCONSTITUTIONALDUTIES**
**Course Code:** IDEH-1313

## (Theory)

**LTP: 4-0-0**

**Total Marks: 80**
**CA: 20**
**Time: 3 hours**

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Each question will carry 8 marks. Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four).Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

### Unit-I

**INTRODUCTION TO HUMAN RIGHTS**

Foundational Aspects: Meaning, Nature, Characteristic, Classification.
International Framework: Constituents of the Universal Declaration of Human Rights (UDHR).

### Unit-II

**Constitutional Realisation in India**: Fundamental Rights (Part III, Constitution of India).**ProtectiveMechanisminIndia**:Thecomposition,PowersandFunctionsoftheNationalHumanRightsCommission ofIndia (NHRC).

### UnitIII

I**NTRODUCTIONTOHUMANDUTIES**
**ConceptualPerspective:** Meaning,Nature&CharacteristicsofHumanDuties.
**Intellectualdiscourses:**ClassificationofHuman Duties; RelevanceofHumanDuties.

### UnitIV

**ConstitutionalRecognitioninIndia:**FundamentalDutiesin IndianConstitution,PartIVA

**Reference Books:**


1. UnitedNations.The*UnitedNationsandHumanRights1945-1995*.Geneva:UnitedNationsBlue Books Series,Vol.VII, 1996.
2. Sastry,S.N.*IntroductiontoHumanRightsandDuties*.Pune:UniversityofPunePress,2011.
3. Mertus,Julie.*TheUnitedNationsandHumanRights-AGuideforaNewEra*.London:Routledge,2009.
4. Donnelly,Jack.*UniversalHumanRightsinTheoryandPractice*.NewYork:CornellUniversityPres

s, 2013.
5. Hammarberg,Thomas.*TakingDutiesSeriously-IndividualDutiesinInternationalHumanitarianLaw.* Versoix: InternationalCouncil on HumanPolicy, 1999.
6. MillerP.Frederic,*etal.FundamentalRights,DirectivePrinciplesandFundamentalDutiesinIndia*. New York: VDMPublishing, 2009.
7. Cinganelli,DavisLouis.*HumanRights-TheoryandMeasurements*.London:MacmillanPress,1988.
8. Ishay,M.R.*TheHistoryofHumanRights*.NewDelhi: OrientLongman,2004.
9. Mohapatra,ArunRay.*NationalHumanRightsCommissionofIndia:Formation,FunctioningandFuture Perspectives*.New Delhi: Atlantic, 2004.
10. Deol,SatnamSingh.*HumanRightsinIndia-TheoryandPractice*.NewDelhi:SerialsPublications,2011.

**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**

**Interdisciplinary Compulsory Course**

# BASICS OF COMPUTER APPLICATIONS

Course Code: IDEI-1124

**L-T-P: 2-0-2** **Max. Marks: 100**

**Credits: 4**

**Examination Time: 3 + 3 Hours** **Theory: 50**

**Practical: 30**

**CA:20**

**Instructions for Paper Setter -**

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

## UNIT - I

**Introduction to Internet**: Meaning, Working of Internet, Benefits/Services offered by Internet, Internet Service Providers, Web browsing, World Wide Web, TCP/IP, HTTP, FTP and DNS.

**Basics of E-mail:** Introduction, Advantages and disadvantages, Structure of an e–mail message, working of e–mail (sending and receiving messages), managing e–mail (creating new folder, deleting messages, forwarding messages, filtering messages).

## UNIT - II

**Introduction to Word Processing:** Features, Graphical User Interface (Title bar, Menu bar, Status bar and Ruler), understanding the Ribbon, Quick Access Toolbar

**Working with Document:** Creation of New Documents, Opening Document, Saving Document, Printing Document, Formatting of a document. Adding Picture, Page Colors and Watermarks, Borders and Shading, Drawing Objects, Insert Equations, Spell Checker and Thesaurus.

**Page Layout:** Page Setup, Margins, Gutters, Page Breaks, Header & Footer

**Managing Data through Tables:** Creating a Table, Entering and Editing Text in Tables.

## UNIT - III

**Introduction to Spreadsheet:** Basics, Components of Excel Window, Concept of Worksheets. Creation, Saving, Opening and Closing Workbook, Printing of Worksheet, Editing Data, Formatting Data, Sort and Filters.

**Formula and Functions**: Ways to Enter Formula in Sheet, Operators, Types of Functions, Application of Functions.

**Data Representation in Sheet:** Inserting and managing Graphs.

## UNIT - IV

**Introduction to Presentation:** Exploring Menus, Starting a New Slide, Opening Existing Presentation, Saving Presentation, Printing Slides, Inserting Slide, Deleting Slide, Copying and moving slides, Duplicating Slides, Layout of Slides, Applying theme to presentation, Views of Presentation,

**Editing and Formatting Slides:** Font Formatting, Text Alignment, Bullets and Numbering. Displaying Slide Show, Adding Multimedia, Slide Transitions.

**References:**


1. Anshuman Sharma, "Fundamentals of Internet Applications", Lakhanpal Publications, 1st Ed., 2016.
2. Douglas E. Corner, "Computer Networks and Internet with Internet Applications", Pearson, 4th Ed., 2008.
3. Joyce Cox, Joan Lambert and Curtis Frye, "Microsoft office Professional 2010 Step by Step", Microsoft Press, 1st Ed., 2010.
4. V. Rajaraman, Neeharika Adabala, "Fundamentals of Computers", PHI Learning, 1st Ed., 2015.
5. Anshuman Sharma, "A book of Fundamentals of Information Technology", Lakhanpal Publishers, 5th Ed., 2017.
6. Peter Weverka, Office 2019, All in One for Dummies, Wiley.
7. Peter Norton, "Computing Fundamentals", McGraw-Hill Technology Education, 1st Ed., 2006.

**Kanya Maha Vidyalaya, Jalandhar (Autonomous)**

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

**Master of Science (Zoology) Semester-II**

Session-2022-23

| **Masters of Sciences (Zoology) Semester-II** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Name** | **Course Type** | **Hours Per Week** | **Credits** | **Total Credits** | **Marks** | | | | **Examination time (in hours)** |
| | | | | | | **Ext.** | | | | |
| | | | | **L-T-P** | | **L** | **P** | **CA** | **Total** | |
| MZOL-2481 | Functional Organization of Animals–II | C | 4 | 4-0-0 | 4 | 80 | - | 20 | 100 | 3 |
| MZOL-2482 | Applied Zoology-I(Invertebrates) | C | 4 | 4-0-0 | 4 | 80 | - | 20 | 100 | 3 |
| MZOL-2483 | Evolution | C | 4 | 4-0-0 | 4 | 80 | - | 20 | 100 | 3 |
| MZOL-2334 | Biostatistics | C | 4 | 4-0-0 | 4 | 40 | - | 10 | 50 | 3 |
| MZOS-2485 | Seminar | C | 4 | 0-0-2 | 2 | 40 | - | 10 | 50 | 3 |
| MZOP-2486 | Practical-III(FunctionalOrganizationofAnimals–II) | C | 6 | 0-0-3 | 3 | 40 | - | 10 | 50 | 3 |
| MZOP-2487 | Practical- IV (Evolution and Applied Zoology-I) | C | 6 | 0-0-3 | 3 | 40 | - | 10 | 50 | 3 |
| Total | | | | | **24** | | | | **550** | |

**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 Title: Functional Organization of Animals –II (Theory)**
**Course Code: MZOL-2481**

**L-T-P: 4-0-0**

**Maximum marks: 100**
**Theory marks: 80**
**CA:20**

**Instructions for the Paper Setter:**
Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A- D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

## Unit - I

**Integumentary System**
Embryonic origin
General features of the Integument Specializations of integument Evolution of Skin
**Muscular System**
Classification of Muscles, Structure of Skeletal Muscles and cardiac muscle, Tendons Muscle mechanics Muscle Function Basis of Muscles contraction,
Muscle Fiber, Muscle organs and fibers Bone-muscle lever systems

## Unit–II

**Skeletal System**
Exo and Endo Skeleton in Invertebrates
Appendicular skeleton in vertebrates
Basic Components
Phylogeny of fishes and tetrapods
Evolution of the appendicular system
Form and Function
Swimming
Terrestrial locomotion

## Unit – III

**Integratory Systems**
Chemical coordination of body functions through neuro-secretion in non-chordates Physiology of nerve net and giant fibre system
Evolution of functional anatomy of brain
**Endocrine System**
Endocrine organs

Chemical coordination of body functions through hormones and neuro-secretions

## Unit-IV

**Sensory System**
General sensory organs Free sensory receptors
Encapsulated sensory receptors
Associated sensory receptors
Mechanisms of perceiving stimuli
Special sensory organs (Mechano, Radiation, Chemo. and Electroreceptors)
Additional special sensory organ

**Suggested Reading Material:**


- Barrington, E. U. W. (1967), Invertebrates Structure and Functions. Houghton Mifflin Co. Boston.
- Barth, R. H. and Broshears, R. E (1982), The Invertebrate World. Holt Saunder, Japan.
- Brusca, R. C. and Brusca, G. J. (2003), Invertebrates Second Edition. Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
- Prosser, C.L. (1984), Comparative Animal Physiology. Satish Book Enterprise Books Seller & Publishers, Agra.
- Purves, W. K., Oriane, G. H., Space, H. C. and Salava, D. (2001), Life – The Science of Biology 6th ed., Sinauer Assoc. Inc., USA.
- Randall, D., Burggren, K.L. and French, K. (2002), Eckert Animal Physiology: Mechanisms and Adaptations. W.H. Freeman and Company, New York.
- Ruppert, E. E. and Barnes, R. D. (2004), Invertebrate Zoology 7th ed. Saunders Publ., Philadelphia.
- Willmer, P., Stone, G. and Johnston, I (2000). Environmental Physiology of Animals, Blackwell Science.
- Withers, P.C. (1992), Comparative Animal Physiology. Saunder College Publishing New York.

**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 Code: Applied Zoology–I (Theory)**
**Course Code: MZOL-2482**

**L-T-P: 4-0-0**

**Maximum marks: 100**
**Theory marks: 80**
**CA:20**

**Instructions for the Paper Setter:**
Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A- D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

## Unit – I

**Apiculture**
History and Introduction Honey bee and kinds
Social organization of colony and nests Life Cycle
Relation between honeybees and plants Flora for Apiculture
Honey composition, quality and importance
Bee keeping, selection, methods, precautions Products of bee keeping
Bee enemies and diseases

## Unit – II

**Lac culture**
Introduction
Lac insect species, Life cycle and Host plants Lac composition, properties & importance Cultivation and harvesting of Lac
Enemies of Lac insect and host plants Lac industry in India
**Sericulture**
Indian sericulture industry (distribution and prospects) Silk moth species and their Life Cycle
Silk composition, kinds and uses Mulberry cultivation
Rearing of silkworm
Treatment and disposal of cocoons Silk reeling, twisting and weaving Diseases & pests of silkworm

## Unit – III

**Prawn Culture**

Introduction to prawns Prawn: species
Fresh water prawn farming and Marine Prawn farming
Methods of Prawn farming
Spoilage and its prevention
Processing and preservation of prawns
Future of prawn culture

**Unit – IV**

**Pearl Culture**
Historical background
Pearl oyster –species
Pearl formation, composition, quality and commercial value
Artificial Culturing of Pearls
Synthetic pearls types and their manufacturing
Methods of harvesting
Problems of pearl industry

**Vermiculture**
Species of worms
Conditions for efficient Vermiculture (domestic and commercial level)
Economics of Vermiculture

**Suggested Reading Material:**


- Bhamrah, H. S. &Juneja, K. (2001), An Introduction to Mollusca. Anmol Publications Pvt,. Ltd. New Delhi.
- Bhatnagar, R. K. and Palta, R. K. (2003), Earthworm ; Vermiculture and Vermicomposting , Kalyani Publishers India.
- Carter, G. A. (2004) Beekeeping, Biotech Books, New Delhi.
- Fenermore, P. G. and Prakash, A. (1992), Applied Entomology, Wiley Eastern Ltd. New Delhi
- Ghorai, N. (1995), Lac Culture in India. International Books and Periodicals, New Delhi.
- Jhingran, V. G. (1991) Fish and Fisheries of India, Hindustan Publishing Company India.
- Kumar, A. and Nigam, P. M. (1989), Economic and Applied Entomology EMKAY Publishing Co. New Delhi.
- Mishra, R. C. (1995), Honey Bees & their Management in India. ICAR, New Delhi.
- Mustafa, S. (1990) Applied and Industrial Zoology. Associated Publishing Company, New Delhi.
- Shukla, G. S. &Upadhaya, V. B. (1991-92), Economic Zoology, Rastogi Publications, Meerut.
- Sathe, T. V. and Jadhav, A. D. (2001) Sericulture and Pest Management, Daya Publishing House, New Delhi.
- Shimizu, M. (1972) Handbook of Silkworm Rearing (Agricultural Techniques Manual- Fuji Publishing Co. Ltd , Tokyo, Japan.
- Singh, S. (1962), Bee Keeping in India, I. C. A. R. Publications, New Delhi.
- Sobti, R. C. (1992), Medical Zoology, Nagin Chand & Co. Jalandhar.

- Srivastava, P. A. (1977), Economic Zoology, Commercial Publication Bureau, Kanpur.
- Venkatanarasaiah, P. (1992), Sericulture in India, Ashish Publishing House, New Delhi.

**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: Evolution**
**Course Code: MZOL-2483**

**L-T-P: 4-0-0**

**Maximum marks: 100**
**Theory marks: 80**
**CA:20**

**Instructions for the Paper Setter:**
Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A- D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**Unit – I**

**Origin of Life**
Origin of Micro molecules
Origin of Macro molecules
Origin of Viruses
Origin of Prokaryotes
Origin of Unicellular eukaryotes and multicellularity
**Organic Evolution**
Theories (Lemarkism and Darwinism)
Evidences
Separation of kingdoms

**Unit –II**

**Variations**
Types of variations
Causes of variations
Mutation rates and directions
**Natural Selection**
Types of selection
Selection forces
Experimental demonstration of Natural selection
Industrial melanism and polymorphism
Sexual selection
Selection and non adaptive characters

**Unit –III**

**Speciation**
Isolation and its types
Gradual and abrupt
Origin of higher categories

**Distribution of Species**
Island, Ocean and Continental distribution
Theories of continental drift

**Extinction**
Kinds of extinction and causes of extinction
Major extinctions

## Unit-IV

**Quantative and Molecular Aspects of Evolution**
Hardy- Weinberg law
Genetic drift
Selection pressure
Mutation pressure
Migration
Meiotic drive
**Brief account of**
Evolution of genome in viruses, prokaryotes and eukaryotes
Evolution of sexual reproduction
Molecular clocks
Evolution of Horse, Elephant, Man (in brief)
Future Course of Evolution

**Suggested Reading Material:**


- Avers, C. J.(1989). Evolution Process and Pattern in Evolution Oxford University, Press, New York, Oxfor.
- Ayala, F. J. and Valentine J. W. (1979). Evolving the theory and Process of Organic Evolution, Benjamin Cumming.
- Brookfield, A. P. (1986). Modern aspects of Evolution. Hutchinson London, Melbourne.
- Gallow, P. (1983). Evolutionary principles. Chapman and Hall.
- Freeman, S. and Herron, Jon C. (2007). Evolutionary analysis Pearson Prentice Hall, New Jersey.
- Futuyma, D. J. (1998), Evolutionary Biology, Sinauer Assoc. Inc. Pub. USA.
- Meglitsch, P. A. (1991), Invertebrate Zoology (3rd edition), Oxford University Press.
- Minkoff, E. C. (1983), Evolutionary Biology, Addison Wesley Pub. Co., London.
- Wen-Hsiung Li (1997), Molecular Evolution, Sinauer associates Inc.Pub. USA.

**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 –III (Functional Organizations of Animals-II)**
**Course Code: MZOP-2486**

**L-T-P: 0-0-3**

**Maximum marks: 50**
**Practical marks: 40**
**CA:10**

**Instructions for the Practical Examiners:**
Question paper is to set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

**1. Study of permanent slides**
Skin of fish, frog, lizard, bird and mammal
Setae of earthworm
Spicules of Sponges and Herdmania
Internal ear of fish
Tentorium of grasshopper
Muscle fibers, cartilage and bone
Endocrine glands of vertebrates
**2. Appendicular skeleton**
**3. Study the following with the help of charts/models/videos/permanent slides**
Appendages of Prawn
Wing venation, coupling and types of wings of insects
Comparative anatomy of nervous system in Earthworm, Cockroach, Pila, Sepia, Fishes, Bird and Mammal
Eye muscles of fish/mammal
Modification of antennae of arthropods

**Note:** The above mentioned practicals are in accordance with the guidelines of UGC. Practicals involving animal material will be conducted using models/charts/e-resources. Minor modifications in the curriculum are allowed subject to availability of resources.

**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: PRACTICAL –IV(Evolution and Applied Zoology-I)**
**Course Code: MZOP-2487**

**L-T-P: 0-0-3**

**Maximum marks: 50**
**Practical marks: 40**
**CA:10**

**Instructions for the Practical Examiners:**
Question paper is to set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, KanyaMahaVidyalaya, Jalandhar.

1. Calculations for regression, correlation and variance of gene frequency and genetic equilibrium (taking pea pods).
2. Examination of the principle of natural selection as a process related to evolution in a population (using coloured marbles /beads).
3. Comparison of skeletons for listing evolutionary trends.
4. Comparison of molluscan shells to depict polyphyletic origin.
5. Comparison of homologous and analogous structures (e.g. insect antenna, legs, limbs of vertebrate etc.).
6. Demonstration of kinds of mimicry in various groups of animals.
7. Mapping of geographic distribution of some birds, insects, fish etc.
8. Study of various evolutionary phenomenon using slides / photographs.
9. Study of fossils.
10. Preparation of Phylogenetic tree using some Priory weight characters with the help of 8 – 10 animals from various categories.
11. Visit to apiary/vermicomposting unit/ sericulture unit/ Prawn Farm and preparation of report.

**Note:** The above mentioned practicals are in accordance with the guidelines of UGC. Practicals involving animal material will be conducted using models/charts/e-resources. Minor modifications in the curriculum are allowed subject to availability of resources.

**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.

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

**L-T-P: 0-0-2**

**Maximum marks: 50**
**Theory marks: 40**
**CA:10**

**Instructions for the Paper Setters:**

The students are required to present a seminar on a topic of relevance and importance from the subject Zoology. The seminar carries 40 marks for the seminar based paper at the end of the semester.