

M.SC ZOOLOGY I SEMESTER
[July 2018- December 2018 (ESE Winter 2018)]

CODE	DESCRIPTION	PD/W	EXAM	CIA	ESE	TOTAL
MSZO 111	BIOSYSTEMATICS & EVOLUTION	4	3hrs	30	70	100
MSZO112	STRUCTURE & FUNCTION OF INVERTEBRATES	4	3hrs	30	70	100
MSZO 113	VERTEBRATE PHYSIOLOGY I	4	3hrs	30	70	100
MSZO114	ECOLOGY AND ANIMAL BEHAVIOR	4	3hrs	30	70	100
MSZO121	PRACTICAL BOARD I PRACTICAL BOARD II	24	6 hrs	30 30	70 70	100 100
TOTAL				180	420	600

MSZO111 BIOSYSTEMATICS & EVOLUTION

UNIT I

- Biosystematics
 - Definition
 - Importance of Biosystematics
 - Applications of Biosystematics in Biology
- Neotaxonomy – Consequences of New Systematic
 - Chemotaxonomy -
 - Kinds
 - Immunological Approach
 - Chromatographic Approach
 - Histo-chemical Approach
- Cytotaxonomy –
 - Chromosomal behaviour
 - Karyotype test
 - Chromosome number
 - Chromosome morphology
 - Linkage, recombination frequency analysis
 - Banding pattern – G,C,R,Q Banding
- Molecular Taxonomy
 - Source of variation, satellite DNA (Mini and micro DNA)
 - Molecular markers –RFLP, RAPD, and AFLP
 - Ribotyping and DNA sequencing

UNIT II

- Taxonomic Procedure -
 - Collection -
 - Value of Collection
 - Purpose of Scientific Collection
 - Collecting & Research
 - Scope of Collection
 - Where & How to Collect
 - Content of Collection
 - Preservation -
 - Introduction
 - Process of Preservation
 - Preservation of invertebrates and vertebrates (Basic Idea)
 - Curating -
 - Preparation of Material for Study
 - Housing
 - Cataloging
 - Arrangement of Collection
 - Curating of types
 - Exchange of Material
 - Expendable Material
- Taxonomic Keys - Types
 - Indented Key
 - Bracket Key
 - Ground Types
 - Pictorial Type
 - Branching Type
 - Circular Type
 - Box Type

UNIT III

- International code of Zoological nomenclature
 - Principles -
 - Principle of Binominal Nomenclature

- Principle of Priority
 - Principle of Coordination
 - Principle of the First Reviser
 - Principle of Homonymy
 - Principle of Typification
 - Structure
 - Gender agreement
 - Commission
- Species Indices -
 - Shannon – Weiner Index
 - Dominance Index
 - Similarity & Dissimilarity
 - Association Index

UNIT IV

- Modern Theory of Evolution
 - Lamarcks Theory and Neo Lamarckism
 - Theory of Catastrophism
 - Theory of Darwin and Neo Darwinism
 - Weismann's Theory
 - Modern Synthetic Theory
- Isolation & Isolating Mechanism
 - Definition
 - Pre-mating Mechanism -
 - Geographic isolation
 - Isolation due to distance
 - Climatic isolation
 - Seasonal isolation
 - Habitat isolation
 - Ethological isolation
 - Mechanical isolation
 - Physiological isolation
 - Post-mating Isolation -
 - Gametic Mortality
 - Zygotic Mortality
 - Hybrid Inviability
 - Hybrid Sterility
 - Origin of Reproductive Isolation-
 - Muller's view
 - Dobzhansky's View
- Speciation -
 - Modes of Speciation
 - Phyletic Speciation
 - Quantum Speciation
 - Gradual Speciation
- Evolution of Man -
 - Pre human ancestors
 - Evolution of man in Pleistocene

UNIT - V

- Variation -
 - Kinds of Variation-
 - Meristic & substantive
 - Continuous & Discontinuous
 - Determinate & Indeterminate
 - Somatic & Germinal
 - Sources of Variation
 - Basis of Variation -
 - Chromosomal Aberration
 - Variations in chromosome number
- Natural Selection -
 - Types -
 - Stabilizing selection
 - Directional Selection
 - Disruptive Selection
 - Selection Pressure
- Genetic Drift -
 - Theory of genetic Drift
 - Salient Features of Genetic Drift

- Genetic basis of Random Genetic Drift
- Hardy-Weinberg equilibrium & Genetic Drift
- Mimicry –
 - Kinds –
 - Protective
 - Aggressive
 - Conscious
 - Significance of Mimicry

MSZO112 STRUCTURE & FUNCTION OF INVERTEBRATES

Unit I

- Organization of Coelom
 - Evolution of Coelom (Various Theories)
 - Modification of Coelom
 - Significance of Coelom
- Acoelomate
- Pseudocoelomate
- True Coelomate
- Metamerism – Types, Origin and Evolution
- Difference between Protostomia and Deuterostomia

Unit II

- Nutrition, Feeding, Structure and physiology of Digestion
 - Protozoa
 - Platyhelminthes (Class Turbellaria)
 - Annelida (Class Polychaeta)
 - Arthropoda (Class Insecta)
 - Mollusca (Class Cephalopoda)
 - Echinodermata

Unit III

- Different types of Respiratory organs in Invertebrates- their structure and functions
 - Gills
 - Lungs
 - Trachea
- Respiratory Pigments (Specific to invertebrates only)

Unit IV

- Different types of Excretory organs in Invertebrates- their structure and functions
 - Nephridia
 - Malpighian Tubules
- Brief idea about accessory excretory organs
 - Coaxial Glands
 - Kebers Organ
 - Bojanus Organ
- Mechanism of Excretion

Unit V

- Nervous System
 - Primitive Nervous System – Echinodermata
 - Advanced Nervous System –
 - Annelida (Class Oligochaeta)
 - Arthropoda (Class Insecta)
 - Mollusca (Class Cephalopoda)

MSZO113 VERTEBRATE PHYSIOLOGY I

Unit I

- Digestion:
 - Digestive glands and alimentary canal
 - Digestive enzymes and their secretion
 - Digestion of Protein, Fat and Carbohydrate
- Vitamins-
 - Types
 - Sources
 - Physiological Functions
 - Diseases Caused By Deficiency

Unit II

- Respiration
- Respiratory Organs Structure – Structure of lungs
- Mechanism of Breathing-
 - Inspiration
 - Expiration
- Exchange and Transport of Gasses-

- Oxygen dissociation curve
- Regulation of Breathing
- Respiratory Pigments- Hemoglobin structure
- Unit III**
 - Blood
 - Composition
 - Function of Blood & Lymph
 - Blood Clotting – Factor theory
 - Heart beat Origin and Conduction
 - **Heart diseases – causes, prevention and treatment.**
 - Cardiac Cycle
 - E.C.G
 - Blood Pressure
 - Anemia
- Unit IV**
 - Excretion-
 - Structure of Kidney and Nephron
 - Mechanism of Urine Formation and Elimination-
 - Ultra filtration
 - Selective Absorption
 - Tubular Secretion.
 - Counter Current Multiplier Hypothesis
 - Urea Cycle.
 - **Stone formation in kidney and gall bladder- causes, prevention and treatment**
- Unit V**
 - Muscles-
 - Types
 - Ultra structure
 - Muscle Proteins-
 - Actin
 - Myosin
 - Tropomyosin
 - Troponin
 - Physiology of Muscle Contraction – Sliding filament theory, Cori Cycle,
 - Muscle Properties-
 - Muscle twitch
 - Summation
 - Tetanus
 - Isometric and Isotonic contraction
 - Muscle fatigue

MSZO114 ECOLOGY AND ANIMAL BEHAVIOR

- UNIT I**
 - Ecological Energetics
 - Concept of energy
 - Laws governing energy transformation
 - Energy flow in ecosystem
 - Energy flow models
 - Theories of limiting similarity
 - Community
 - Introduction
 - Classification
 - Characteristics
 - Succession
 - Types
 - Process
 - Patterns
 - Climax concept
 - Models of succession
- Unit II**
 - Secondary Productivity
 - Characteristics of Secondary Production in a Ecosystem
 - Methods of estimating secondary production
 - Increment summation
 - Removal summation,
 - The instantaneous growth method
 - The Allen curve method
 - Predation
 - Models of predatory dynamics

- Optimal foraging theory
 - Patch choice
 - Diet choice
 - Prey selectivity
 - Foraging time
- Role of predation in nature- **with reference to Blackbuck, chinkara, and bluebull.**

Unit III

- Demography of Population
 - Structure and patterns of population
 - Life tables and its Statistical analysis
- Population growth
 - Growth of organisms with non-overlapping and overlapping population
 - Population growth model –Verhulst- Pearl Logistic Model

Unit IV

Animal behavior

- Innate behavior- Types
 - Taxis
 - Kinesis
 - Reflexes
 - Fixed action pattern (Instinct)
 - Motivation and its different phases
- Learned behavior- Types
 - Habituation
 - Conditioned reflexes
 - Trial & error
 - Latent learning
 - Insight learning
 - Reasoning
 - Imprinting
- Rhythmic behaviour and Biological clocks
- **Man- animal conflict with reference to – Blackbuck, chinkara, bluebull ,Rhesus monkey, and Leopard**

Unit V

- Role of hormones in Behavior
- Role of pheromones in behavior
- Communication in animals
- Social behavior and organization in
 - Insects
 - Fishes
 - Birds
 - Mammals (Primates)

MSZO 121 PRACTICAL BOARD I

- A. Dissections - *Sepia* – Nervous system, Crab - Nervous system, *Aplysia* – Nervous system, *Echinus*- Aristotle Lantern
- B. Microscopic preparation- Gemmules, Hastate plate, Statocyst *Nereis* Parapodium
- C. Identification and Systematic position up to order of following Museum specimens- Protozoa- *Paramecium*, *Noctiluca*, *Opalina*, *Balantidium*, *Nyctotherus*, *Vorticella*.
 Porifera- *Sycon*, *Hyalonema*, *Euplectella*, *Euspongia*
 Coelentrata- *Physalia*, *Porpita*, *Corallium*, *Gorgonia*, *Pennatula*.
 Platyhelminthes- *Fasciola*, *Taenia*, *Schistosoma*
 Aschelminthes- *Ascaris*, *Dracunculus*, *Wucheria*.
 Annelida- *Nereis* and *Heteronereis* Phase, *Aphrodite*, *Hirudinaria*.
 Arthropoda- *Limulus*, *Palaemon*, *Apus*, *Lepas*, *Balanus*, *Sacculina*, *Schistocerca*, *Papilio*, *Bombyx*, *Apis*, *Julus*, *Scolopendra*, **Life history of *Laccifer lacca***
 Mollusca- *Chiton*, *Mytilus*, *Ostrea*, *Teredo*, *Nautilus*, *Octopus*
 Echinodermata- *Pentaceros*, *Holothuria*, *Antedon*.
- D. Study of prepared slides- T.S *Sycon*, *Ephyra* Larva, Mature and Gravid Proglottid of *Taenia*, Developmental stages of *Fasciola* (Miracidium, Sporocyst, Radia, Cercaria, Metcercaria), Arthropoda Larval forms- Nauplius, Zoa, Megalopa, Mysis. Mollusca - Glochidium Larva, Echinodermata- Pedicellariae

Marking Scheme

Distribution of marks

Marks allotted Time duration 6 hrs

1. Dissection –	20
2. Microscopic preparation –	10
3. Spots – (6 spots x 5)	30
4. CCA	30
5. Viva voice -	10
Total	100

MSZO 121 PRACTICAL BOARD II

E. Physiology Experiments

1. Estimation of Packed Cell Volume (P.C.V.)
2. Estimation of Hemoglobin in blood sample
3. Identification of Blood Groups
4. Study of E.C.G. of different age group persons and its analysis.
5. Blood smear and identification of different types of blood cells.
6. Demonstration of working of sphygmomanometer (B.P. measurement) with the help of stethoscope.

F Ecological experiments

1. To study soil texture colour and appearance.
2. Estimation of Soil Moisture
3. Estimation of Water holding capacity of different soil.
4. Recording of Rainfall, Humidity and Air Pressure
5. To study the community by quadrant method by determining frequency, density and abundance of different species present in community.
6. **Assessing the biodiversity of a community using species diversity indices.**
7. Water analysis for pH, dissolved oxygen, free carbon dioxide, alkalinity/salinity and hardness.
8. Estimation of conductivity of water sample by conductivity meter
9. Identification, study and permanent preparation of zooplanktons from various water bodies
10. Estimation of productivity of water body using light and dark bottle method

G. Animal behavior experiments

1. To study the response of light to store grain pest
2. To study prey and predator relationship
3. To study effect of trail pheromone in ants communication.
4. To study nesting behavior of birds/wasps.

Marking Scheme

Distribution of marks	Marks allotted	Time duration 6 hrs
1. Physiology Experiments	20	
2. Ecological experiments	20	
3. Animal ethology experiment	20	
4. CCA	30	
5. Viva voice -	10	
6. Total	100	

Suggested Readings

1. Principles Of Animal Taxonomy – G.G Simpson- Oxford & IBH Publication
2. Elements Of Taxonomy – E. Mayer – Tata Mcgraw Hill Co
3. Biosystematics And Taxonomy – R.C. Tripathi- University Book House
4. Biodiversity, Taxonomy And Ecology – G K Singh- Alp Books
5. Theory And Practices Of Animal Taxonomy- VC Kapoor – Oxford And Ibh Co
6. Fundamentals Of Biodiversity And Taxonomy (HB) – J.Juneja- Cubertech Publications
7. The Invertebrates- Vol I- VI –L.H Hyman – Mcgraw Hill Co
8. The Invertebrate Structure And Function – E.J.W Barrington- Thomas Nelson And Sons
9. Invertebrate Zoology – Rc Barnes- W.B Saunders And Co, Phillidelphia
10. Text Book Of Zoology By T.J Parker And W.A Haswell- Vol I – Mcmillan And Co, London
11. Biology Of Invertebrates – Pechenik – McGraw Hill Higher Education (Hb)
12. General And Comparative Animal Physiology- Ws Hoar – Prientice Hall Of India
13. Animal Physiology: Adaptation And Environment – Knet Schemdt Nelson – Cambridge University Press
14. Animal Physiology : Mechanism And Adaptation- R Eckert Randall- Wh Freeman And Co
15. Principles Of Animal Physiology (PB) – Christopher Moyes- Pearson Education
16. Text Book Of Animal Physiology By Sherwood – Cengage Learning India
17. Introduction To Animal Physiology – I Kay- Garland Publishing
18. Animal Physiology By Margaret Brown- Apple Academic
19. Text Book Of Animal Physiology – R. Nagabhushnam, Kodarkar & Sarojini- Oxford IBH Co
20. Animal Behavior – Manning – Cambridge University Press
21. Ecology – Odum- W.B Saunders And Co
22. Environment And Ecology – R. Rajgopalan- Oxford India
23. Elements Of Ecology – Smith – Pearson Education
24. Animal Behavior – Dr Reena Mathur –Rastogi Publications Animal Behavior – Alcock
25. A Text Book Of Animal Behavior – F.B.Manda- Phi Publication
26. Animal Behavior – H.V. Bhaskar – Campus Book International
27. Animal Behavior – V.K Agarwal – S. Chand And Co , India
28. Fundamentals Of Animal Behavior – A Sarkar –Discovery Publishing House