MANONMANIAM SUNDARANAR UNIVERSITY

M. Phil., Zoology

M.S. University Affiliated Colleges-CBCS

With effect from the academic year 2018-19 onwards

Sem.	Course Code	Title of the Paper	Credits	Contact Hours/week
I	MZO-1	Research and Teaching Methodology	4	4
I	MZO-2	Animal Biodiversity	4	4
I	MZOE3 (or) MZOE4	Elective 1- Animal Health (or) Elective 2– Applied Zoology	4	4
II	MZOP5	Project and Viva-voce	12	-
		Total	24	-

Duration of the course:

One year (Two semesters)

Date of Effect:

For the students admitted during the academic year 2018-2019 batch and onwards.

Eligibility condition:

Those who have passed M.Sc. Zoology, M.Sc. Applied Zoology, M.Sc. Advanced Zoology and Biotechnology, M.Sc. Life Science and M.Sc. Wild life from recognized university.

Theory Examination:

The M.Phil. Zoology Core Examination having the following marks.

Internal Marks – 25 marks

External Marks – 75 marks

Project Work - 100 marks (Dissertation 75 marks + Viva voce 25 marks)

MZO-1: RESEARCH AND TEACHING METHODOLOGY

L	P	T	C
4	0	0	4

Course objective:

To provide in-depth Knowledge on methods involved in preparation of working solutions, quantitative and also on the working principles of equipments involved in research and teaching pattern.

Learning outcome:

- Know to significance and preparation protocol of solution and buffers for research work.
- Learn to know the principle and functions of advanced biological instruments and their applications.
- Acquired Knowledge on the histopathological and histochemcical techniques.
- know the quantitative and qualitative estimation of biological macro and micro molecules.
- Learn to handle the computer aided statistical software packages.
- Enable to familiarize the methods of thesis writing and project proposal preparation.
- Inculcate the knowledge on the teaching and learning methods.

Unit I : Preparation of solutions :Types of Solutions- Standard Solutions, Stock Solution, Saturated Solution, Solution of Acids; Expression of Concentration - Molarity (M), Molality (m), Preparation of One Molar (1 M) Solutions, Normality (N), Mass Percent % (w/w), Percentage by Volume or % (v/v), Volume/Weight (V/W), Parts per Million (ppm), Parts per Billion (ppb); pH; Buffers and their preparation. -12h

Unit II: **Microscopy and Microtechnique**:Microscopy–Principle, working mechanism and applications of Light, Phase contrast, Fluorescent,Darkfield, SEM, TEM and STEM.Microtechnique–Preparation of Whole mount and sections, staining, mounting and preparation of permanent slides; Cyto and Histochemical techniques.-

-10h

Unit III: **Quantitative and Molecular Techniques**: Quantification of carbohydrate, protein, lipid, fatty acids and amino acids (Proximate composition); Estimation of Hydrolytic and Detoxication enzymes. Molecular Techniques – Principle, mechanism and application of SDS PAGE, AGE, PCR, RT-PCR; Basic principle and application of Chromatography; Basic principle and application of Spectrophotometer and UV Spectrophotometer. -14h

Unit IV: **Biostatistics:** Parametric – Student T test, F Test, Z – Test, Correlation, Regression and Co-efficient, ANOVA (One-way, Two-way), MANOVA, ANCOVA; Non-parametric – Chi-square, Wilcoxon signed rank test, Mann-Whitney test, Kolmogorov-Snirnow tests; SPSS, Sigma Plot, MAT LAB, and MiniTab for Biological data analysis. -12h

Unit V: Methodology of Teaching: Teaching-Objectives of Teaching, Phases of Teaching-Teaching methods: Lecture Method, Discussion method, Discovery learning, Inquiry, Problem Solving method, Project method, Seminar-Integrating ICT in teaching: Individualized instruction, ways for effective presentation with power point-Documentation-Evaluation: Formative, Summative and Continuous and

comprehensive evaluation-Later adolescent psychology: meaning, physical, cognitive, emotional, social and moral development-Teaching later adolescents. Manuscript, Thesis and Project writing. -12h

---

60h

Reference Books:

1. Rodney F. Boyer 2012. Biochemistry Laboratory: Modern Theory and techniques, second edition, Prentice Hall
2. Rajan Katoch. 2011. Analytical Techniques in Biochemistry and Molecular Biology, Springer, New York.
3. Chander,D.E. and Rtoberson, R.W.2009. Bioimaging: Current concepts in light and electron microscopy. Jones & Bartlet Publishers Jandberry M.A., USA.
4. Gurumani.2008. Text book of Research methodology.
5. Hoppert M.2003. Microscopic Techniques in Biotechnology. Wile and VCH,G Book & Co, Germany.
6. Sampath, K. Pannerselvam,A and Snathanam,S.1984. Introduction to educational technology(2nd Rebised edition), New Delhi:Sterling Publ.
7. Sharma, S.R.2003. Effective class room teaching modern methods, tools & techniques. Jaipur: Mangal Deep.
8. Vedanayagam, E.G.1989. Teaching technology for college teachers. New York: Sterling Publishers.

MZO-2: ANIMAL BIODIVERSITY

L	P	T	C
4	0	0	4

Course Objective : To provide knowledge on animal diversity, its significance in natural environmental and conservation strategies.

Learning Outcome:

- Understand the ecosystem, diversity of organisms and their ecological relationship.
- Know the genetic relationship of an animals their distribution and biological hotspot areas.
- Realize the importance of animal classification and taxonomy; species concept and their evolutionary significance.
- Inculcate conservation strategies of ecosystem and various enactments relating to conservation policy at national and international status.

- Learn the measurement of biodiversity richness, species evenness and geometric analysis.

Unit I : **Basic concepts of Biodiversity**: Definition - Components of Biodiversity – Ecosystem – Genetic and Species diversity Species Concept – Patterns of Diversity (alpha, beta and gamma diversities) – Principles of Taxonomy: Animal diversity – Distribution, Population inventory – Biodiversity Hotspots – Mammals, Birds, Reptiles, Fishes and Invertebrates. -10h

Unit II : **Identification of below ground faunal biodiversity**: meso- or meio- and macro faunal biodiversity and estimation of their diversity indices. Environmental pollution; global environmental change; biodiversity: status, monitoring and documentation; major drivers of biodiversity change; biodiversity management approaches. -10h

Unit III : **Biological diversity** : Species richness gradient, levels of diversity – genetic, species and ecosystem diversity, patterns of diversity – alpha, beta and gamma diversities, diversity indices – Shannon, Simpson, Brillounin index, Jaccard index, Keystone species – predators, food source, Ecosystem modifies and ecosystem engineers, indicator species, endemism and hot spots – ecosystem services. -14h

Unit IV : **Threats to biodiversity (Extinctions)**: IUCN categories of threat, red data book, causes for biodiversity loss – habitat fragmentation, population reduction - Threats Status of Species Isolated species – Rate, Endemic and Threatened towards extinctions Wild species – Measurement – Organizations – UNEP, MoEF (India), NERI, NBA (India) – A brief account. -12h

Unit V : **Conservation of biodiversity**: Principles of conservation, studies on conservation/management strategy - Environmental impact assessment (EIA) – Remote sensing in EIA – *In situ* conservation (Project Tiger, biosphere reserves, national parks, wild life sanctuaries) and *Ex situ* conservation (Zoological and Botanical gardens, Cryopreservation, Tissue culture) – Tools in Conservation of wild life (statistics) and methods of interpretation wild life maps – Economics of biodiversity conservation. -14h

---

60h

Reference Books

1. Parker, T. F. and W. A. Haswell. 1921. Text Book of Zoology. Macmillan and Company Limited.
2. Simpson, G. G. 1961. Principle of animal taxonomy, Columbia University Press.
3. Avise, J.C. 1994. Molecular Markers, Natural History, and Evolution. Chapman and Hall, New York.
4. Odum, E. P. 1996. Fundamentals of Ecology, Nataraj Publishers, Dehradun.
5. Wilson, E. O. 1999. The Diversity of Life (The College Edition), W.W. Northern and Co.
6. Stiling, P. 2004. Ecology – Theories and Applications, Prentice Hall of India Pvt. Ltd. New Delhi, India.

7. Avise, J.C. 2008. Clonality: The Genetics, Ecology, and Evolution of Sexual Abstinence in Vertebrate Animals. Oxford Univ. Press, New York.

8. Hickman, P. C., Roberts, L.S., Keen, S.L., Larson, A. and D. Eisenhour. 2011. Animal Diversity. McGraw-Hill Higher Education.

MZOE3: ELECTIVE - ANIMAL HEALTH

L	P	T	C
4	0	0	4

Course Objective:

To provide knowledge on animal health, disease control, and related farm management practices.

Learning Outcome:

- Know the importance of animal nutrition, nutritional deficiency diseases and feed management.
- Learn the control and management of zoonotic organisms.
- Know the cattle/livestock management practices.

Unit I:Animals nutrition and Nutritional diseases: Animals nutrition- Nutritional importance of carbohydrates, lipids, proteins, vitamins, minerals and water- Nutritional deficiency diseases- Feeds and fodders, Scientific feeding of livestock, Feeding schedule for different categories of livestock and poultry- Feed additives- Silage making, Diet formulation for newborn, growing, pregnant, lactating and sick animals; Milking techniques and clean milk production- Sanitation and hygiene practices, Common health problems and their prevention. 14h-

Unit II:Zoonoses: Introduction to Zoonoses- Viral Zoonoses, Signs, symptoms, diagnosis and treatment of (Rabies, Japanese encephalitis, Dengue, SARS, Swine Influenza and Yellow fever)- Bacterial Zoonoses (Anthrax, Borreliosis, leptospiroses, plague, vibrioses, tuberculosis and Tetanus)- Rickettsioses (Scrub Typhus, Murine Typhus; Tick Typhus)- Parasitic Zoonoses (Toxoplasmosis, leishmaniases and Filariasis)- Fungal Zoonoses (Aspergillosis, Candidiasis, Histoplasmosis and blastomycosis)- Zoonoses associated with meat, fish and milk- Prevention and control measures of Zoonotic diseases. -14h

Unit III:**Epidemiology:** Principles of epidemiology, surveillance, forecasting and monitoring of diseases- Public health considerations of Disposal of cadaver and clinical waste- Guidelines for control of contagious diseases and infectious diseases, disease outbreaks- Prevention of cruelty to animals (CSPSCEA guidelines)- Introduction of Pharmacology, Nature and sources of drugs, Routes of drug administration, Dosage forms, Antiseptics and disinfectants- Handling of Hazardous substances. -12h

Unit IV :Poultry disease and Management: Chicken breeds, Duck breeds, Goose breeds and Turkey breeds- Poultry Nutrition- Diseases of poultry: Common poultry diseases, Different types of poultry diseases, Signs, symptoms, diagnosis and treatment of Bacterial, Viral, Parasitic diseases in poultry- Importance of water in poultry health- Integrated diseases prevention management in poultry- Epidemic threat from poultry farming- Epidemiology of Newcastle disease and economics of its control- Transmission, infection, pathogenesis and prevention of H5NI, Avian flu and Fowlpox- Flu vaccines- Probiotics in the Poultry industry. -10h

Unit V:Cattle Disease and Management: Dairy Breeds: Indigenous breeds of Cow, Buffalo, Goat ad Sheep-Dairy products- Common Dairy diseases; Signs, symptoms, diagnosis and treatment of Bacterial, Viral, Fungal, Parasitic diseases in Dairy- Integrated diseases prevention management in Dairy- Epidemiology of Foot and mouth diseases- Anthrax disease, Bluetongue, Bovine ephemeral fever, transmission,

infection, pathogenesis and prevention- Vaccines- Artificial insemination for Live stock improvement. -10h

---

60h

Reference Books:

1. Naresh Mahajan. 2014. Hand book of Poultry of Diseases. Random Publications, New Delhi.
2. Sumen kumara Joshi 2015.A text book of Zoonotic Diseases. Satish Serial publishing house,Delhi
3. Divyesh Pandey .2014. Poultry Husbandry. Random Publications, New Delhi.

(OR)

MZOE4: ELECTIVE – APPLIED ZOOLOGY

L	P	T	C
4	0	0	4

Course Objective: To provide knowledge on vermiculture techniques, harmful insects related to agriculture, infectious and communicable diseases, live stocks diseases and farming also on the significance and economic importance of sericulture and apiculture.

Learning outcome:

- Know the importance of productive insects and their conservation strategies.
- Learn the management and control of causative agents.

Unit I:**Apiculture and Sericulture**: APICCULTURE: Types of honey bees, social organization, Life history of honey-bee, Bee keeping, Economic importance of honey bee, Bee Hive, Management of Bee Hive, Swarming, Pests and diseases. SERICULTURE: Silk moth, silk farming-cocoon processing-other farm of silk:-Tasar silk, Muga silk and Eri silk-Pests and Diseases in silkworm. -12h

Unit II**: Agricultural Zoology**: Beneficial Insects: Mantis-lady bird beetle-damsel fly-Predators-Parasitoids. Harmful Insects: Migratory locust, Rhinoceros beetle-Aphids-Economic Importance of rodents, snakes and bates. -10h

Unit III:**Medical Zoology:** Infectious and communicable diseases: Small box, AIDS, Influenza, Tuberculosis, Plaque, Cholera, Amoebiasis, Malaria, Dengue, Chicgunkunya, Trypanosomiasis and Elephantiasis. Vectors - definition, types of vector. Arthropod vector of medical importance. -12 h

Unit IV: **Veterinary Zoology**: Importance of live stock, cattle, coat, sheep and rabbit-live stock diseases: Anthrax, Ranikhet-Live stock parasites: Helminthes- Arthropod vector of veterinary importance – sand flies, mosquitoes, horse flies and Rat flea, ticks, mites and vector control. Diary and Poultry farming. -12h

Unit V: **Vermiculture**: Vermiculture – definition, scope and importance. Exotic species of earthworm-Biology of *Eisenia fetida* &*Eudrilus eugeniae*-Taxonomy Anatomy, physiology and reproduction .Culture methods: indoors and out door; Monoculture and polyculture. Applications of Vermiculture /Vermiculture Bio-technology. Vermicomposting, Chemical composition of vermicastings. Use of Earthworms as feed/bait for capture/culture fisheries. Role of earthworms in agro-ecosystems Land reclamation and sustainable soil fertility; forest regeneration Earthworms for management of municipal/selected biomedical solid wastes. -14h

---

60h

Reference Books:

1. Edwards CA & Bater JE. 1977. Biology of Earthworms. Chapman & Hall.
2.Edwards CA. 1998. Earthworm Ecology. CRC Press.
3.Sultan Ahmed Ismail,2005. The Earthworm Book, Second Revised Edition. Other India Press, Goa, India.

4.Shukla, G.S. and V.B.Upandhyya.2017. Economic Zoology, 5th Edition. Rev.Edn.Rastogi Publ., Meerut.

5. Kotpal , R.L.2000. Modern text of Zoology. Rastogi Publication.

6. Ashok Kumar ,2000. Text book of Animal Disease, Sonali Publication

7. Pradip,V.Jabde.2005. Text book of Applied Zoology.

8.Ashok Kumar and Prem Mohan Nigam.1991. Economic and Applied Entomology. Emjkay Publications, New Delhi.

SEMESTER-II: MZOP5-PROJECT WORK