24PWB101

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the paper: Core Paper 1 –ICHTHYOLOGY AND HERPETOLOGY					
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**	**Skill**
2024-2026	**I**	**7**	**105**	**5**	**Development**

COURSE OBJECTIVES

1. To understand about the concepts of taxonomy and classification of Pisces, Amphibians and Reptiles.
2. To acquire knowledge on the economic importance of fishes, amphibians and reptiles
3. To understand important physiological functions in various vertebrate forms.
4. To know about the distribution of tortoises, terrapins, marine turtles and its migration
5. To know about the distinctive features, distribution of crocodiles and breeding biology of Indian crocodiles

COURSE OUTCOMES

On successful completion of the course, the students will be able

K5 to K1	CO1	To understand concepts of taxonomy and its classification of pisces and their economic importance
	CO2	To understand concepts of taxonomy, its procedures, classification of amphibians and their economic importance
	CO3	To understand concepts of taxonomy and classification of reptiles and their economic importance
	CO4	To attain knowledge about locomotory organs, methods of locomotion, feeding and Digestion in select vertebrates.
	CO5	To gain knowledge on distinctive features and distribution of turtles, terrapins, tortoise, migration of marine turtles, breeding biology of Indian crocodiles

SYLLABUS

UNIT I **(21 HOURS)**

PRINCIPLES & TAXONOMY OF PISCES: 1) Characteristics and Classification of Pisces up to Order with suitable examples. 2) Biological and Economic importance of fishes: Marine, Estuarine, Lentic, Game and Aquarium fishes 3) Fish migration.

UNIT II **(21 HOURS)**

PRINCIPLES & TAXONOMY OF AMPHIBIANS: 1) Characteristics and Classification of Amphibia up to order with suitable examples, 2) Salient features and distribution of Duttaphrynus melanostictus, Euphlyctis hexadactylaus, Rhacophorus pseudomalabaricus, Tylotriton verrucusosus, Ichthyophis beddomii, 3) Biological and Economic importance of Amphibians.

UNIT III **(21 HOURS)**

PRINCIPLES & TAXONOMY OF REPTILES: 1) Classification and Characteristics features of Reptilia up to Order with suitable examples. 2) Distinctive features and distribution of Common Venomous snakes (Spectacled cobra, Krait, Saw scaled-viper, Russell's Viper) 3) Mildly venomous snakes (Long-nosed whip snake, Cat snake), 4) Non-venomous snakes (checkered keelback, Indian rat snake, Red sand boa, Indian rock python). 5) Biological and economic importance of Reptiles.

24PWB101

UNIT IV **(21 HOURS)**

LOCOMOTION, DIGESTION AND REPRODUCTION: Comparative account of 1) Digestive, 2) Respiratory, 3) Circulatory and 4) Urinogenital system of fishes, amphibians and reptiles.

UNIT V **(21 HOURS)**

INDIAN TURTLES, TERRAPINS, TORTOISES AND CROCODILES: 1**)** Distinctive features and distribution of Indian turtles, Indian tortoise and Indian terrapins, 2) Various aspects of migration in sea turtles* 3) Breeding biology of Marine Turtles 4) Distinctive feature, distribution, breeding biology, status and conservation threats of Indian Crocodiles.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion
*: Self study

TEXT BOOKS

1. Kashyap, V. (2020) a text book of vertebrate zoology
2. Kotpal, R.L. (2024) Chordata and comparative anatomy
3. Moyle, P.B & J.J Cechi, Jr. (2014) Fishes An Introduction to Ichthyology
4. Vitt, J.L and J P. Caldwell (2014) Herpetology: An Introductory Biology of Amphibians and Reptiles

REFERENCES

1. Gupta, S. K., & Gupta, P. C. (2006). General and applied ichthyology: fish and fisheries.
2. Khanna, S.S, and Singh H.R. (2014). Textbook of Fish Biology and Fisheries 3rd Edition
3. Kerridge, R. (2014). Cold blood: adventures with reptiles and amphibians. Random House.
4. McCarthy, (2000). Eyewitness Reptile
5. O'Shea, M. (2011). *Venomous snakes of the world*. Princeton University Press.
6. Pough, F. H., Andrews, R. M., Cadle, J. E., Crump, M. L., Savitzky, A. H., & Wells, K. D. (2016). Herpetology. Sinauer Associates, Incorporated, Publishers.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. Systems Biology (NPTEL) web: https: https://nptel.ac.in/courses/102106035

Mapping

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	H	H	S	H
CO2	S	H	M	S	H
CO3	S	H	M	S	H
CO4	L	S	S	M	M
CO5	S	H	S	H	H

S - Strong H-High M - Medium L-Low

24PWB102

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the paper: Core Paper 2 – ORNITHOLOGY					
Batch 2024-2026	**Semester I**	**Hours / Week 7**	**Total Hours 105**	**Credits 5**	**Skill Development**

COURSE OBJECTIVES

1. To understand the Avian classification, structure, morphology, external modification, economic value and threats.
2. To study about the feeding habits and habitat ecology of birds.
3. To study about the skeletal, nervous, respiratory, digestive and urinogenital system of birds.
4. To know about the migration, mechanism of migration.
5. To understand the egg laying, brooding, parental care and nesting of birds.

COURSE OUTCOMES

On successful completion of the course, the students will be able

K5 to K1	CO1	To understand the classification of birds, structure and morphology of birds, evolutionary adaptations, threats and their economic importance.
	CO2	To analyze the digestive system of birds, various feeding habits and habitat ecology of birds.
	CO3	To understand the skeletal and respiratory system, migration and nesting of birds
	CO4	To understand the urinogenital system, reproduction, breeding season and breeding behavior of birds
	CO5	To gain knowledge about nervous system and sense organs, egg laying, clutch size and parental care of birds

SYLLABUS

UNIT 1 **(21 HOURS)**

TAXONOMY OF BIRDS: 1) Taxonomy and Anatomy Birds: Classification upto order with examples. **2)** Structure and external Morphology of Birds. 3) Modification in birds: Beak, Wing and feet. 4) Evolutionary adaptations in aves: Archaeopteryx -

UNIT II **(21 HOURS)**

PHYSIOLOGY: 1) Digestive system in birds, 2) Circulatory system in birds, 3) Respiratory system in birds, 4) Nervous system in birds, 5) Urinogenital system in birds.

UNIT III **(21 HOURS)**

ADAPTATION OF BIRDS BASED ON FEEDING HABITS: 1) Nectarivores, 2) Frugivores, 3) Graminivores, 4) Insectivores, 5) Carnivores, 6) Omnivores, 7) Scavengers. 8) Habitat ecology of Indian birds: Coastal birds, Inland water birds, Birds of high altitude and deserts birds.

24PWB102

UNIT IV **(21 HOURS)**

BREEDING BIOLOGY AND NESTS: 1) Breeding seasons, factors influencing breeding seasons, 2) Sexual selection, courtship display, pair bond, sexual dimorphism, polymorphism, polyandry, polygamy, promiscuity. 2) Co-operative breeding, brood parasites. 3) Nests: Choices of roost site, choices of nesting site, selection of nesting materials, colonial nesting. 4) Types of nests, and multiple nests structures. 5) Egg laying: Clutch size, incubation patterns in different species, hatching and parental care, Nest sanitation, brooding and defense of young ones**.**

UNIT V **(21 HOURS)**

BIRD MIGRATION AND FLIGHT ADAPTATION: 1) Migration in birds: Kinds of migration, Mechanics of migration, timing of migration, physiology of migration, orientation and navigation, and ringing, 2) Flight adaptation in birds, 4) Bird hazards in airports*, 5) Threats to birds: Habitat loss, hunting and anthropogenic pressure 6) Bird watching, 7) Ecological and economic values of birds, Birds of agricultural importance.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion
*: Self study

TEXT BOOKS

1. Faaborg, J. (2020). Book of Birds: Introduction to Ornithology. Texas A&M University Press.
2. Kashyap, V. (2020) A text book of vertebrate Zoology. Kedar Nath Ram Nath publishers. Meerut
3. Kotpal, R.L. (2024). Chordata and comparative anatomy Rastogi Publications. Meerut.
4. Morrison, M. L., Rodewald, A. D., Voelker, G., Colón, M. R., & Prather, J. F. (Eds.). (2018). Ornithology: foundation, analysis, and application. JHU Press.
5. Salim Ali, (2003) The Book of Indian Birds. BNHS. Mumbai

REFERENCES

1. Colbert, E.H. (1969) Evolution of the vertebrates. John Wiley and Sons Inc., New York.
2. Grimmett, R., Inskipp, C., & Inskipp, T. (2016). Birds of the Indian subcontinent. Chistopher helm, London.
3. Hilderbrand, M (1988). Analysis of vertebrate structure. IV. Ed. John Wiley and Sons Inc., New York.
4. Romer, A.S. (1949) Vertebrate body, III Ed. W.B. Saunders Co., Philadelphia.
5. Montagna, W. (1960) Comparative anatomy. John Wiley and Sons Inc.
6. Walters, H.E. and L.D. Sayles, L.D. (1959) Biology of vertebrates. Macmillan & Co., New York

24PWB102

7. Torrey, T.W. (1963) Morphogenesis of vertebrates. John Wiley and Sons Inc., New York and London

Related Online Contents [MOOC,SWAYAM, NPTEL, Websites etc.]

1. General Human Anatomy (WMA): https://www.mooc-list.com/course/general-human-anatomy-wma
2. Evolutionary Biology: https://onlinecourses.swayam2.ac.in/cec20_bt06/preview

*: Self study

Mapping

PSO/ CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	S	S	M
CO2	S	H	M	S	H
CO3	S	S	H	H	H
CO4	S	S	L	M	M
CO5	M	H	L	S	H

S - Strong H-High M - Medium L-Low

24PWB103

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the paper: Core Paper 3 –MAMMALOGY					
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**	**Skill**
2024-2026	**I**	**7**	**105**	**5**	**Development**

COURSE OBJECTIVES

1. Understand the classification of mammals.
2. Acquire the knowledge of mammalian physiology.
3. Knowledge about different mammalian species.
4. Levels of organization in mammals.
5. Analyze the ecological and evolutionary affinities of mammals.

COURSE OUTCOMES

On successful completion of the course, the students will be able

K5 to K1	CO1	To understand the mammalian classification, physiology of different systems, evolutionary adaptation and their economic importance.
	CO2	To know about the various carnivorous mammals, their distinctive features, distribution, habit and various strategies to protect them.
	CO3	To know about the various herbivorous mammals, their distinctive features, distribution, habit and various strategies to protect them.
	CO4	To acquire a knowledge on life history parameters, population dynamics and various population estimation methods
	CO5	To study the history, adaptations, behavior, social organization, mating systems, communication.

SYLLABUS

UNIT I **(21 HOURS)**

TAXONOMY AND CLASSIFICATION OF MAMMALS: 1) Classification of mammals upto order with suitable examples: Physiology of mammals: 2) Digestion, 3) reproduction, 4) endocrine, 5) excretory and 6) dental formulae.

UNIT II **(21 HOURS)**

CARNIVORES: 1) Big Cats: Tiger, Lion, Leopard, and Snow Leopard. 2) Lesser Cats: Golden cat, Leopard cat, Fishing cat, Jungle cat. 3) Civet: Tiger civet, Large Indian civet, Small Indian civet, Palm civet, Binturong or Bear cat, 4) Hyena: Stripped hyena, 5) Mongoose: Common Mongoose, Small Indian, Stripped necked mongoose, Crab-eating mongoose. 6) Dogs: Wolf, Jackal, Red Fox, Indian Fox, Dhole, 7) Bears: Sloth Bear, Himalayan Black Bear, Brown Bear, 8) Weasels: Common and Smooth Indian Otter. 9) Pholidota- Pangolin.

UNIT III **(21 HOURS)**

HERBIVORES: 1) Order Artiodactyls: Deer- Kashmir stag, brown- antlered deer, swamp deer, hog deer, spotted deer, barking deer, musk deer, mouse deer, sambar deer, antelope –black buck, four horned antelope. Goat- Himalayan tahr, Nilgiri tahr, Oxen, Guar, Pig- Wild Boar. 2) Order Perissodactyls: Horses- wild Ass, Rhinoceros- one horned Rhinoceros. 3) Order Proboscidea: Elephants.

24PWB103

UNIT IV **(21 HOURS)**

POPULATION DYNAMICS: 1) Demographic and life history parameters*, evolution of life history parameters: r & K selection, allometry, aging and sexing, life tables, age and stage structures models, methods of estimation of life history parameters, 2) Population dynamics: exponential, logistic and other forms of growth of population, density dependent and independent growth, population simulation, predator-prey systems, carrying capacity, 4) Sampling designs for population estimation, population estimation methods: Distance based Sampling Methods, Mark-Recapture for Closed Population, Diversity indices, and Estimation of Demographic parameters.

UNIT V **(21 HOURS)**

ADAPTATION, BEHAVIOUR AND IMPORTANCE OF MAMMALS: 1) History of mammalogy: Adaptations in mammals, hibernation, torpor, aestivation, locomotion and water regulation. 2) Metabolism and thermoregulation: Ectothermy, homeothermy and cold stress, body size versus homeothermy. 3) Body size variation in mammals and its influence on life history: Metabolic rate, weight constraints, feeding behaviour, niche width and reproduction. 4) Mammalian skin and its derivatives. 5) Evolutionary adaptations in mammals. 6) Biological and economic importance of Mammals.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

*: Self study

TEXT BOOKS

1. Attenborough, D. (2002). The life of mammals (Vol. 2). Random House.
2. Egambaranathar Iyyer and T.N. Ananthakrishnan. (2021). Manual of Zoology.
3. Feldhamer, G. A. (2007). Mammalogy: adaptation, diversity, ecology. JHU press.
4. Hall, K. (2016). Mammals: A Compare and Contrast Book. Arbordale Publishing.
5. Menon, V. (2023). Indian mammals: a field guide. Hachette India.
6. McNab, C. (2016). Mammals: 300 Amazing Animals.
7. Prater, S. H. (1997). The book of Indian mammals. Bombay Natural History Society.

REFERENCES

1. Genoways, H. H. (Ed.). (2013). Current Mammalogy: Volume 1 (Vol. 1). Springer Science & Business Media.
2. Martin, R. E., Pine, R. H., & DeBlase, A. F. (2011). A manual of mammalogy: with keys to families of the world. Waveland Press.
3. Ryan, J. M. (2018). Mammalogy techniques lab manual. Johns Hopkins University Press.
4. Ronald, M. (1999). Walkers Mammals of the World-v. 1. John Hopkins University Press.
5. Christian, J. J., Mayer, W. V., & Van Gelder, R. G. (1963). Physiological Mammalogy Volume I.
6. Mayer, W. V., & Van Gelder, R. G. (1965). Mammalian reactions to stressful environments Volume 2.

24PWB103

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. Ecology and Wildlife Conservation (Future Learn): https://www.mooc-list.com/course/ecology-and-wildlife-conservation
2. WildlifeConservation:https://nptel.ac.in/courses/102/104/102104068/
3. Wildlife Ecology: https://swayam.gov.in/nd1_noc20_bt38/preview

*: Self study

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	M	S	H
CO2	S	L	S	H	S
CO3	S	L	S	H	S
CO4	H	S	M	M	S
CO5	M	S	H	S	H

S - Strong H-High M - Medium L-Low

24PWB1CL

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the Practical: Core Practical 1 – ICHTHYOLOGY & HERPETOLOGY, ORNITHOLOGY AND MAMMALOGY					
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**	**Skill**
2024-2026	**I**	**4**	**60**	**2**	**Development**

Pre-requisite: Fundamental knowledge on animal anatomy and biodiversity

COURSE OBJECTIVES

1. To understand important physiological functions in various vertebrate forms.
2. To understand the functions of nervous system and sense organs.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K5 to K3	CO1	Know morphometric character of fishes and reptiles
	CO2	Attain knowledge about locomotory organs, locomotion, feeding and digestion of some vertebrates
	CO3	Gain knowledge about vertebrate classification, as well as structure and function of some vertebrates
	CO4	Know about mist net techniques and methods of bird ringing
	CO5	Understand the evolutionary modifications of fore limb from fishes to mammals

SYLLABUS

MAJOR

1. Identification of Amphibians
2. Identification of venomous and non-venomous snakes
3. Identification of Bird in the field
4. Demographical structure of Asian elephants
5. Study of epidermal derivatives: Skins, Nails, Scales, Claws, Feathers

MINOR

1. Identification of scales in the Fishes
2. Types of feathers in the birds
3. Types of beak in the birds
4. Types of feet in the birds
5. Dentition in mammals

SPOTTERS

1. Skull of frog (Amphibians), Skull of birds (Aves), Skull of rabbit (Mammals)
2. Different types of horns in mammals
3. Digit structure of mammals
4. Identification of Asian elephants and African elephants
5. Tongue of different vertebrates

24PWB1CL

SUBMISSIONS

1. Submit an album of amphibians, reptiles, birds and mammals of classification and ecological importance / field trip.
2. Bonafide Record

TEXT BOOKS

1. Khanna, S.S, and Singh H.R. (2014). Textbook of Fish Biology and Fisheries 3rd Edition
2. Prater, S. H. (1997). The book of Indian mammals. Bombay Natural History Society.
3. Sinha, J., Chatterjeee A.K., Chattopadhyay P. (2011). Advanced Practical Zoology Arunabha Sen Publishers.
4. Kashyap, V. (2020) A text book of vertebrate Zoology. Kedar Nath Ram Nath publishers
5. Whitaker, R and A. Captain (2006). Common Indian snakes: a field guide. Macmillan.
6. Daniels, R. R. (2005). Amphibians of peninsular India. Universities Press.268

REFERENCES

1. Menon, V. (2023). Indian mammals: a field guide. Hachette India.544p.
2. Menon, V and A.Kumar (1999) Wildlife Crime: An Enforcement Guide. Natraj Publisher, Delhi. 110p.
3. Grimmett, R., Inskipp, C., & Inskipp, T. (2016). Birds of the Indian subcontinent. Chistopher helm, London.
4. Salim Ali, (2003) The Book of Indian Birds. BNHS. Mumbai
5. Preeti Guptha and Mridula Chaturvedi. (2000). Modern Experimental Zoology
6. Verma. (2000). Manual of Practical Zoology: *Chordates* S. Chand Publishing
7. Pough, F. H., Andrews, R. M., Cadle, J. E., Crump, M. L., Savitzky, A. H., & Wells, K. D. (2016). Herpetology. Sinauer Associates, Incorporated, Publishers.

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	M	M	S
CO2	S	S	S	S	S
CO3	S	S	S	M	S
CO4	M	S	M	M	S
CO5	S	S	M	S	S

S - Strong H-High M - Medium L-Low

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
Coimbatore – 641029
Model Question Paper (Practical)

End of Semester Examination Question paper pattern
(For the candidates admitted from the academic year 2024-2025 onwards)

Duration: 3 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

Core Practical 1: Ichthyology & Herpetology, Ornithology and Mammalogy

S. No	Distribution Component	Marks
1.	Major Experiments	20
2.	Minor Experiments	10
3.	Spotters	15
4.	Submission	05
5.	Record Work	10
	TOTAL	60 Marks

24PWB204

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the paper: Core Paper 4 – ECOLOGY AND EVOLUTION					
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**	**Skill**
2024-2026	**II**	**6**	**90**	**5**	**Development**

COURSE OBJECTIVES

1. To understand basics of ecology.
2. To elucidate the interaction of animals with ecosystem.
3. To know about the various pollution
4. To understand the evolution, fossils and fossilization
5. To understand the basic phylogeny of animals.

COURSE OUTCOMES

On successful completion of the course, the students will be able

K5 to K1	CO1	To learn various limiting factors in ecology, population ecology and community ecology
	CO2	To understand about the structure and functions of various ecosystems and biogeochemical cycles
	CO3	To learn about various pollutions, Environmental Impact Assessment, remote sensing and Geographical Information System
	CO4	To understand the origin of life on earth, evolutionary time scale, concepts of evolution, fossil and fossilization
	CO5	To know about the concepts of phylogenetics, DNA hybridization, molecular clocks and DNA barcoding

SYLLABUS

UNIT I **(18 HOURS)**

LIMITING FACTORS IN ECOLOGY: 1) Light, Temperature, Soil, Law of minimum, Law of tolerance. 2) Population ecology: Density, Natality, Mortality, Growth curves, Equilibrium fluctuation, Biotic potential, Regulation. 3) Community ecology: Structure, Stratification, Ecotone and Edge effect, Ecological niche, Ecological succession.

UNIT II **(18 HOURS)**

ECOLOGICAL FACTORS: 1) Ecosystem structure, dynamics, energy flow, Primary production and decomposition. 2) Structure and function of ecosystems: Terrestrial (forest, grassland) and aquatic (freshwater, estuarine, marine), 3) Biogeochemical cycles: gaseous (Carbon, Nitrogen, Oxygen), Sedimentary (Sulphur, Phosphorus).

UNIT III **(18 HOURS)**

POLLUTION IN THE ECOSYSTEM: 1) Air, Water, Land, Noise, Thermal, Radioactive, 2) Conservation of Natural Resources. 3) Environmental Impact Assessment (EIA). 4) Remote Sensing, Aerial Photography, Satellite images, Thermal, Infra Red, Radar Images. 5) Geographical Information System (GIS) and its application, 6) Space Ecology.

24PWB204

UNIT IV **(18 HOURS)**

THEORIES OF ORGANIC EVOLUTION: 1) Origin of life on earth, Abiotic synthesis of organic monomers and polymers, concept of Oparin and Haldane 2) Lamrkism 3) Darwinism 4) Neodarwinism 5) Mutation

UNIT V **(18 HOURS)**

POPULATION GENETICS AND EVOLUTION: 1) Biological Evolution 2) Cultural Evolution of man 3) Future evolution of man, 4) Variations and its concept; Hardy Weinberg Law-Genetic drift, 5) Speciation- Isolation, Evolution of man-Fossil records of man, Cultural evolution of man, Future evolution of man. 6) Fossils and Fossilization: Ariyalur and Siwalik*.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

*: Self study

TEXT BOOKS

1. Verma, P.S. and V.K. Agarwal, (1983). Environmental Biology (Principles of Ecology), S. Chand & Co., New Delhi.
2. Odum, E. P. (1971). Fundamentals of Ecology. Third Edition. Nataraj Publishers, Dehradun.
3. Clarke, G.L., (1954). Elements of Ecology. John Wiley & Sons. Inc Toppan Company Ltd.
4. Ananad, P.H. and Rajesh Kumar, V. (2003). Principles of Remote Sensing and GIS Sri Venkateswara Publishers, Kumbakonam.

REFERENCES

1. Yadav, P. R. (2003). Fossils. Discovery Publishers
2. Arora, M. P. (1992). An Introduction to paleontology. Himalaya Publishers.

Mapping

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	L	H	M	S
CO2	S	S	L	M	H
CO3	S	H	H	H	S
CO4	S	H	L	S	H
CO5	S	H	M	S	S

S - Strong H-High M - Medium L-Low

24PWB205

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the paper: Core Paper 5 –ETHOLOGY OF WILDLIFE					
Batch 2024-2026	**Semester II**	**Hours / Week 5**	**Total Hours 75**	**Credits 5**	**Skill Development**

COURSE OBJECTIVES

1. To provide overview of introduction to behaviour in wild animals.
2. To make aware of pheromones and hormonal actions in animal behaviour.
3. To understand the biological rhythms and communication systems.
4. To narrate the breeding and parental care of wildlife.
5. To understand the social behaviour of mammals.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K5 to K1	CO1	To understand the concepts, types and analysis of animal behaviour
	CO2	To know about the physiological mechanism of animal behavior, role of hormones and pheromones, and various methods of studying behaviour
	CO3	To analyze the biological rhythms, various communication system of animals, foraging behavior of mammals and birds
	CO4	To gain knowledge about the breeding behavior of animals and parental care in amphibians, reptiles and mammals
	CO5	To understand the social commensalism and social behaviour of selected mammals.

SYLLABUS

UNIT I **(15 HOURS)**

BEHAVIOURS IN ANIMALS: 1) Types of Behaviours: classical and modern concepts, 2) Fixed action pattern and ritualization, 3) Learning, Imprinting, habituation, 4) Analysis of behaviour pattern: taxis, kinesis and reflexes, 5) Analysis of behaviour, 6) Methods of studying behavior and 7) Ethogram.

UNIT II **(15 HOURS)**

HORMONES AND PHEROMONES: 1) Physiological mechanism of behaviour 2) Neural behaviour 3) Perceptual mechanism, 4) Role of hormones and pheromones in behaviour of Animals, Predator detection, predator tactics, altruism and evolution

UNIT III **(15 HOURS)**

BEHAVIOURAL PATTERN: 1) Biological rhythms: Circadian, Lunar, Tidal and animal rhythms. 2) Animal communication: Visual, Auditory, Chemical and Vocalization in Mammals, Birds and Insects. 3) Foraging Behaviour in Mammals and Birds*, 4) Origin and significance of play.

UNIT IV **(15 HOURS)**

BREEDING BEHAVIOUR OF ANIMALS: 1) Courtship display, 2) Sexual selection, pair bond, 3) Sexual dimorphism, polymorphism, 4) Polyandry, polygamy, promiscuity, 5) Cooperative breeding, brood parasites, 6) Parental care in Amphibians, Reptiles and Mammals.

24PWB205

UNIT V **(15 HOURS)**

SOCIAL BEHAVIOURS IN ANIMALS: 1) Aggression, Competition, Social spacing, 2) Territory, Dominance. 3) Animal association: Mutualism, parasitism, commensalism, symbiosis, predation and amensalism. 4) Social behavior of Primates, Elephants and Lion.

Teaching Methods

Smart Class Room/PowerPoint Presentation/Seminar/Quiz/Discussion

*: Self study

TEXT BOOKS

1. Agarwal V.K.(2009). Animal Behaviour (ETHOLOGY). S. Chand Publishing.
2. Mathur, R. (2022). Animal behaviour. Rastogi Publications.
3. Leshner A.I. (1978). An Introduction to Behavioural Endocrinology, Oxford University Press, New York.
4. McFarland D (ed.),1981.The Oxford Companion to Animal Behaviour, Oxford University Press, Oxford.
5. Ridley M, (1968). Animal Behaviour–A concise Introduction, Blackwell Scientific Publications, Oxford.

REFERENCES

1. Slater PJB. (1985). An Introduction to Ethology, Cambridge University Press, Cambridge.
2. Natarajan P and Arumugam N. (2018). Animal Behaviour–Ethology. Saras Publication
3. Wallace R.A, (1979).The Ecology and Evolution of Animal Behaviour, Goodyear Publishing Company Inc., Santa Monica, California.
4. Wilson E.O, (1978). Sociobiology, The Belknap Press, Harvard University Press, Cambridge, MA.
5. Wyatt. T.D (2003). Pheromones and Animal Behaviour. Cambridge University Press

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	H	S
CO2	M	H	M	S	S
CO3	H	S	H	S	S
CO4	H	H	M	S	H
CO5	S	H	H	S	S

S - Strong H-High M - Medium L-Low

24PWB206

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the paper: Core Paper 6 – FOREST ENTOMOLOGY					
Batch 2024-2026	**Semester II**	**Hours / Week 5**	**Total Hours 75**	**Credits 5**	**Skill Development**

COURSE OBJECTIVES

1. To learn the classification and taxonomy of insects.
2. To study the digestive, reproductive, excretory system of insects.
3. To study about biology and economic importance of insects.
4. To study the pest of teak, sandalwood and bamboo.
5. To learn the insect infestation, survey and control measures.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K5 to K1	CO1	Gain knowledge on classification, taxonomy, morphology, anatomy, structure and various mouthparts of insects
	CO2	Elucidate physiology, digestion, muscular system, excretory system and reproductive system of insects
	CO3	Gain knowledge on biology of honey bee, silk moth, lac insect, culture methods of selected insects and various beneficial insects
	CO4	Understand the destructive insects, biology, pests of teak, sandalwood and bamboo, damage caused and control measures
	CO5	Understand the detection and estimation of insect infestation and their control methods

SYLLABUS

UNIT I **(15 HOURS)**

TAXONOMY AND ANATOMY: Classification and taxonomy- Classification of insects up to order with examples. Morphology and anatomy of insects-segmentation and divisions of the body. Head-Mouth parts and its types. Thorax-legs-Modifications of the basic leg structure. Exoskeleton-integument-Basic structure of cuticle-wings and flight. Life cycle of Insects – Silk worm.

UNIT II **(15 HOURS)**

PHYSIOLOGY OF INSECTS: Physiology of Insects: Digestion - transport and regulation; respiratory – physiology of gas exchange*; execratory system – osmoregulation; muscular system – types; integument system – structure, function and formation, growth and moulting, reproductive system.

UNIT III **(15 HOURS)**

BENEFICIAL INSECTS: Biology of Honey bee, silk moth and Lac insect –Culture methods for honey bee and silk worm -Appliances used and problems related to these cultures. Beneficial insects -Pollinators, predators, parasitoids -scavengers -weed killers.

24PWB 206

UNIT IV **(15 HOURS)**

DESTRUCTIVE INSECTS: Biology – control measures – damages caused – Insect Pest of a) Teak, b) Sandalwood, c) Bamboo. Mode of Insect attack on trees: Leaf eaters, sapsuckers – Meristematic Tissue feeders, Wood destroyers, Insect collection, preservation.

UNIT V **(15 HOURS)**

DETECTION AND EVALUATION OF INSECT PEST: Detection and evaluation methods of insect infestation: Survey – estimation of insect abundance – devices for evaluation method for determining degree of hazards – Biological evaluation – control of forest insects, direct and indirect methods.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

*: Self study

TEXT BOOKS

1. Kotpal, R.L (2020). Modern Text Book of Zoology –Invertebrates
2. Nalinasundari M.S. and R. Santhi. (2008). Entomology, MJP Publishers, Chennai
3. Ambrose, P. D. (2004). The Insects; Structure, function and Biodiversity. Kalyani publishers, Ludhiana, New Delhi, Chennai.
4. Nayar, K.K., Ananthakrishnan, T.N. and David, B.V. (1986). General and applied entomology, Tata McGraw Hill Publications, New Delhi.
5. Vasantharaj David, B. (2001). Elements of Economic Entomology, Popular Book Depot. Chennai – 15.
6. Chapman.R.F.(1998). The insects structure and function .4th edition, Cambridge University Press, UK.
7. Pedigo, L. P., Rice, M. E., & Krell, R. K. (2021). *Entomology and pest management*. Waveland Press**.**

REFERENCES

1. Imms, A.D. (1965). A General Textbook of Entomology, ELBS, London.
2. Metcalfe C Land Flint WP (1973). Destructive and Useful Insects, McGraw-Hill, New York.
3. Snodgrass, R.E. (1985). Principles of Insect Morphology, McGraw Hill and Co., New York.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://canterbury. libguides.com/biol

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	M	S	H
CO2	M	S	M	L	M
CO3	S	H	H	M	H
CO4	S	H	H	H	H
CO5	H	M	S	H	S

S – Strong H-High M - Medium L-Low

24PWB207

Programme Code: 27	**M.Sc. WILDLIFE BIOLOGY**				
Title of the paper: Core Paper 7 – CONSERVATION OF BIODIVERSITY					
Batch 2024-2026	**Semester II**	**Hours / Week 5**	**Total Hours 75**	**Credits 5**	**Skill Development**

COURSE OBJECTIVES

1. To understand the significance of biodiversity.
2. To understand the conservation of natural resources.
3. To make understand the wildlife organizations.
4. To gain knowledge about protected areas and its conservation.
5. To understand the wildlife laws and legislation.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K5 to K1	CO1	Learn the significance of biodiversity, biogeographical classification of India, loss of biodiversity, hotspots, *in-situ* and *ex-situ* conservation.
	CO2	Understand the natural resources, distribution and conservation of forests, types of wetlands and their importance.
	CO3	To make understand the state, national and international organizations, wildlife policies and biodiversity acts.
	CO4	Understand the concept of protected area, wildlife wealth and their depletion, wildlife conservation approaches and limitations.
	CO5	Understand the wildlife trade, wildlife laws and legislation, human-wildlife conflict and mitigation measures, project tiger and elephant.

SYLLABUS

UNIT I **(15 HOURS)**

BIODIVERSITY: 1) Definition, Types, Genetic, Species and Ecosystem diversity. 2) Values of biodiversity. 3) Biogeographical classification of India. 4) Biodiversity measurements, mega diversity centers. 5) Loss of biodiversity. 6) Hotspots, Biosphere Reserves, Threats, Endangered and Endemic species. 7) Conservation strategies: *In-situ* - National Parks, Wildlife Sanctuaries, Community Reserve and conservation Reserves. 8) *Ex-situ* – Cryopreservation, gene banks, sperm banks, DNA banks and tissue culture, Zoo, Zoological Park, Arboretum.

UNIT II **(15 HOURS)**

CONSERVATION OF NATURAL RESOURCES: 1) Resources types: Food, water, energy and minerals. 2) Human impact on Terrestrial and Aquatic resources, 3) Distribution and conservation of Forest, Grasslands and semi-arid habitats of India. 4) Wetland Habitats of India: Definition and types of wetlands, important wetlands of India and their conservation issues.

UNIT III **(15 HOURS)**

ORGANIZATIONS IN WILDLIFE CONSERVATION: 1) Organization at State level: State Biodiversity Board, 2) National level: WCCB, NBA, ZSI, BSI, FRI, FSI, 3) International level: CITES, IUCN, CBD, WWF, 4) NGOs: BNHS, Zoo outreach organization, WCT and WPSI. 4) International agreements for conserving marine life, 5) Convention on wetlands of International Importance (Ramsar convention).

24PWB207

UNIT IV **(15 HOURS)**

WILDLIFE IN INDIA: 1) Protected Areas concept: National parks, Wildlife Sanctuaries, 2) Biosphere Reserves: Core, buffer and tourism zones, Exclusive Economic Zone, 3) Wildlife wealth of India and threatened wildlife. 4) Reasons for wildlife depletion in India. 5) Wildlife conservation approaches and limitations, 6) Wildlife Habitat: Characteristics, Fauna and Adaptation with special reference to Tropical.

UNIT V **(15 HOURS)**

MANAGEMENT OF WILDLIFE: 1) Wildlife Trade and legislation: Assessment, documentation, Prevention of trade. 2) Wildlife laws and ethics. 3) Human – wildlife conflict management: Human death, cattle lifting, crop damage, Mitigation measures and role of corridor. 4) Important projects for the conservation of wildlife: Project Tiger and Project Elephant. 5) Wildlife (Protection) Act, 1972 and its Amendments. 6) National Forest Policy –1988*, 7) Biodiversity Act - 2002.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

*: Self study

TEXT BOOKS

1. Asthana. D.K. and Meera Asthana. (2010). A text book of Environmental Studies. S. Chand and Company LTD, New Delhi.
2. Saharia, V.B. (1982) Wildlife in India, Nataraj Publishers, Dehradun.
3. Seshadri, B. (1986) India's Wildlife Reserves, Sterling Publishers Pvt. Ltd., New Delhi.
4. Giles, R.H. Jr. (Ed) 1984. Wildlife Management Techniques 3rd edition. The wildlife Society, Washington. D.C. Nataraj Publishers, Dehradun. India.
5. Manikandank & Prabhu S. (2019). Indian Forestry A Breakthrough Approach to Forest Service. Jain Brother Publishers.
6. Robinson, Wl. and Eric, G. Bolen, (1984). Wildlife Ecology and Management Mac Millan Publishing Co, New York. Pp 478.
7. Dasmann R F, (1964). Wildlife Biology, John Wiley & Sons, New York, p231

REFERENCES

1. Warning RH and Schlesinger WH, (1985). Forest Ecosystems: Concepts and Management. Academic Press, New York.
2. Robinson, Wl. and Eric, G. Bolen, (1984). Wildlife Ecology and Management Mac Millan Publishing Co, New York.
3. Seshadri, B. (1986) India's Wildlife Reserves, Sterling Publishers Pvt. Ltd., New Delhi.
4. Menon.V. *et al*, 2017. Right of passage: elephant corridors of India, Conservation reference series no. 3, 2nd edition, Wildlife Trust of India, New Delhi

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://swayam.gov.in/
2. https://www.mooc.org/
3. https://nptel.ac.in/

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	H	S
CO2	S	H	H	S	H
CO3	S	L	S	S	M
CO4	S	L	S	S	H
CO5	H	M	S	S	M

S - Strong H-High M - Medium L-Low

24PWB2CM

Programme Code: 27	**M.Sc. WILDLIFE BIOLOGY**				
Title of the paper: Core Practical 2 ECOLOGY & EVOLUTION AND ETHOLOGY OF WILDLIFE					
Batch 2024-2026	**Semester II**	**Hours / Week 2**	**Total Hours 30**	**Credits 2**	**Skill Development**

COURSE OBJECTIVES

1. Explain core concepts in ecology and summarize our ecological understanding of environmental problems
2. To train how the biological data are processed and interpretations are made.
3. To provide an overview of mapping techniques.
4. To teach various behaviors of wild animals

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3 to K5	CO1	Classify the ecosystem
	CO2	Calculate various species diversity measures
	CO3	Understand the physical and chemical concepts in biology.
	CO4	Understand how to study the behaviour
	CO5	Understand communal ecology in mammals.

SYLLABUS

MAJOR

1. Estimation of dissolved Corban dioxide (CO2)
2. Estimation of dissolved Oxygen (O2)
3. Prey-predator relationship (Demonstration only).
4. Population Viability Analysis (PVA).
5. Focal animal sampling
6. Scan sampling

MINOR

1. Determination of: pH and Temperature
2. Food web and Nutrient Cycling (Demonstration only).
3. Paleo-evolution of mammoths (Demonstration only).
4. Animal Communication
5. Parental care

SPOTTERS

1. Types of Ecosystems
2. Fossil and its types
3. Identification of planktons
4. Communication

Submission at the time of Practical Examination

1. Report on the field trips
2. Bonafide Record

24PWB2CM

TEXT BOOKS

1. Agarwal V.K.(2009). Animal Behaviour (ETHOLOGY). S. Chand Publishing.
2. Egambaranathar Iyyer and T.N. Ananthakrishnan. (2021). Manual of Zoology.
3. Mathur, R. (2022). Animal behaviour. Rastogi Publications.
4. Odum, E. P. (1971). Fundamentals of Ecology. Third Edition. Nataraj Publishers, Dehradun.
5. Prater, S. H. (1997). The book of Indian mammals. Bombay Natural History Society.
6. Sinha,J., Chatterjeee. A.K., and Chattopadhyay P.2011. Advanced Practical Zoology Arunabha Sen Publishers.
7. Verma, P.S. and V.K. Agarwal, (1983). Environmental Biology (Principles of Ecology), S. Chand & Co., New Delhi.

REFERENCES

1. Guptha P and Chaturvedi, M. (2000). Modern Experimental Zoology
2. Jain J.L, Sunjay Jain S and Nitin Jain. (2007). Fundamentals of Biochemistry
3. Oberdorster Eva. (2009). Toxicology Laboratory Lab Manual. Kendall Hunt Publishing
4. Verma. P.S. (2000). Manual of Practical Zoology: Chordates S. Chand Publishing

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	H
CO2	S	M	S	S	H
CO3	S	S	H	S	S
CO4	S	H	M	S	S
CO5	S	H	S	S	H

S - Strong H-High M - Medium L-Low

24PWB2CN

Programme Code: 27	**M.Sc. WILDLIFE BIOLOGY**				
Title of the paper: Core Practical 3 **FOREST ENTOMOLOGY AND CONSERVATION OF BIODIVERSITY**					
Batch **2024-2026**	**Semester** **II**	**Hours / Week** **2**	**Total Hours** **30**	**Credits** **2**	**Skill Development**

COURSE OBJECTIVES

1. To know the insects and its role
2. To study the life cycle of select insect species
3. To know the *In-situ* and *Ex-situ* conservation of wildlife
4. To address and evaluate the human wildlife conflict
5. Assessment of illegal wildlife trade

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K5 to K3	CO1	Understand various methods in forest conservation
	CO2	Gain knowledge on damages caused by the destructive insects.
	CO3	Know about the beneficial insects.
	CO4	Gain knowledge on *in-situ* and *ex-situ* conservation of wild animals
	CO5	Understand about wildlife and its management

SYLLABUS

MAJOR

1. Study the life cycle of Bee
2. Study the life cycle of Lac
3. Study the life cycle of Silkworm
4. Types of conservation areas of wildlife: National Parks, Wildlife Sanctuaries, Zoological gardens, and Biosphere Reserves
5. Estimation of species richness
6. Invasive alien species: Prosopis, Lantana, Chromolaena, Senna and Wattle

MINOR

1. Mode of insect attack on trees
2. Identification of an Elephant Corridor
3. Wildlife crimes: tusk, skin, nail, hair, meat, feather and beak
4. Human-wildlife conflict: elephant, leopard, tiger, primates, wild boar, deer, antelope and birds

SPOTTERS

1. Butterflies: red helen, common crow, common pierrot, common emigrant and yellow orange tip
2. Gall insects, wood boring insects, bark beetle and fluid feeding insect
3. Plant species: Teak, bamboo, sandal, amla, and sissoo
4. Beneficial organisms
5. Economic importance

24PWB2CN

Submission at the time of Practical Examination

1. Report on the field trips (museums, wildlife census, herbarium etc.)
2. Bonafide Record

TEXT BOOKS

1. Gopal, R. (1992). Wildlife management techniques
2. Verma P. S. (2000). A Manual of Practical Zoology S. Chand Publication
3. Dasmann R F. (1964). Wildlife Biology, John Wiley & Sons, New York,

   Publishing Company, New York
4. Giles RH Jr. (ed.). (1984). Wildlife Management Techniques, 3rd ed. The Wildlife Society, Washington D.C., Nataraj Publishers, Dehra Dun.
5. Robinson WL and Eric G Bolen, (1984). Wildlife Ecology and Management, Maxmillan Publishing Company, New York
6. Rodgers W.A. (1991). Techniques for Wildlife Census in India-A field Manual: Technical Manual-T M -2. WII.

REFERENCES

1. Kotpal. R.L. (2007). Modern Text Book of Zoology: Vertebrates
2. Saharia, V.B, (1982) Wildlife of India, Natraj Publishers, Dehra Dun
3. Teague RD (ed.), (1987). A Manual of Wildlife Conservation (The Wildlife Society Washington D.C.). Nataraj Publishers, Dehra Dun
4. WII. A Guide to Chemical Restraint of Animals

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	M	H
CO2	S	M	S	H	S
CO3	S	M	S	M	M
CO4	M	M	M	S	M
CO5	M	M	M	S	S

S - Strong H-High M - Medium L-Low

24PWB308

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the paper: Core Paper 8 PHYSIOLOGY OF WILDLIFE					
Batch 2024-2026	**Semester III**	**Hours / Week 8**	**Total Hours 120**	**Credits 5**	**Skill Development**

COURSE OBJECTIVES

1. To study about the adaptation of animals in various environments.
2. To acquire knowledge on the osmo and thermo regulatory mechanisms.
3. Understand the respiratory organs, structure and functions.
4. To understand the excretory physiology and the role of hormones in the biological activities such as gestation and lactation
5. To acquire knowledge on the neural and muscular physiology.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K5 to K1	CO1	Acquire the knowledge on the concepts of adaptation, homeostasis and organisms surviving in various environments
	CO2	Learn about mechanism of thermo and osmoregulation, osmoregulation in aquatic and terrestrial environment and the importance of physiological activities
	CO3	Understand the respiratory organs, function and transportation of respiratory gases
	CO4	Gain knowledge on excretory organs, mechanism, adaptation, excretory products, endocrine glands, role of reproductive hormones, gamete formation, fertilization, embryonic development, parturition and lactation
	CO5	Understand about the neuron structure and types, nerve impulse transmission, neuro degenerative diseases, muscular physiology and muscle contraction

SYLLABUS

UNIT I **(24 HOURS)**

ADAPTATION AND HOMEOSTASIS: 1) Adaptation - Levels and Mechanism of adaptation - Significance of body size – Adaptation, acclimation and acclimatization - Concepts of homeostasis. Physiological adaptations of different environments: Marine - Shores and Estuaries – Freshwater - Extreme aquatic environments -Terrestrial life. Extreme terrestrial environments - Parasitic habitats. Stress Physiology – Basic concept of environmental stress and strain; concept of elastic and plastic strain; stress resistance, stress avoidance and stress tolerance.

UNIT II **(24 HOURS)**

MECHANISM OF THERMO AND OSMOREGULATIONS: Physiological mechanism of thermo regulation. Physiological adaptation to osmatic and ionic stress; mechanism of cell volume regulation. Osmoregulation in aquatic and terrestrial environments. Physiological response to oxygen deficient stress. Meditation &Yoga*.

UNIT III **(24 HOURS)**

RESPIRATORY PHYSIOLOGY: Respiratory physiology–Respiratory organs-Structure and function. Respiratory gases–uptake – respiratory pigments – O2 & CO2 dissociation curves – transport of respiratory gases.

24PWB308

UNIT IV **(24 HOURS)**

EXCRETORY PHYSIOLOGY AND ENDOCRINOLOGY: Excretory physiology –Excretory organs– mechanism of excretion– physiology – adaptations of excretion to environment – Excretory products: synthesis and elimination. Endocrine glands – Feedback regulation–Pituitary–gonadal axis. Role of reproductive hormones –gamete formation – fertilization-embryonic development – parturition–lactation-neuroendocrine regulation. (Carnivore, Herbivore like ruminant and non-ruminant).

UNIT V **(24 HOURS)**

NEURAL AND MUSCULAR PHYSIOLOGY: Neural physiology –Neurons structure and types. Nerve impulse transmission - resting and action potential — neuro transmitters – mechanism of neural transmission. Neuro-degenerative diseases. Muscular physiology-Muscle contraction–theories – molecular mechanism of muscle contraction.

Teaching Methods

Smart Class Room/ PowerPoint presentation/ Seminar/ Quiz/ Discussion

*: Self study

TEXT BOOKS

1. Verma, P. S., Tyagi, B. S., & Agarwal, V. K. (2000). Animal physiology. S. Chand Publishing.
2. Rastogi, S.C. (2019). Essentials of Animal Physiology
3. Moyes C, D and P.M Schulte (2013) Principles of Animal Physiology
4. Chatterjee Animal Physiology Vol I & II

REFERENCES

1. Withers, P., & Withers, P. C. (1992). Comparative animal physiology.
2. Schmidt-Nielsen, K. (1997). Animal physiology: adaptation and environment. 5th edition.
3. Wang (eds) (1989). Advances in Comparative and Environmental Physiology: Animal Adaptation to Cold.
4. Gilles(eds) (1988) Advances in Comparative and Environmental Physiology
5. Arumugam, N and A Mariakuttikan (2019). Animal Physiology
6. Arora, M.P. (2018). Animal Physiology for B.Sc. and M.Sc.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://swayam.gov.in/
2. https://www.mooc.org/
3. https://nptel.ac.in/

Mapping

PSO/ CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M
CO2	S	S	M	L	M
CO3	H	S	M	L	M
CO4	M	S	S	M	H
CO5	M	S	L	M	S

S - Strong H-High M - Medium L-Low

24PWB309

Programme Code: 27			**M.Sc. WILDLIFE BIOLOGY**		
Title of the paper: Core Paper 9 **MANAGEMENT OF ZOOS, SANCTUARIES AND NATIONAL PARKS**					
Batch **2024-2026**	**Semester** **III**	**Hours / Week** **8**	**Total Hours** **120**	**Credits** **5**	**Employable**

COURSE OBJECTIVES

1. To know the Sanctuaries, National Parks, Biosphere Reserves and Wildlife Projects.
2. To know the captive animal breeding and management.
3. To gain knowledge about habitat restoration, corridor management, introduction and reintroduction of species.
4. Techniques of tranquilization and translocation of animals, wildlife diseases

COURSE OUTCOMES

On successful completion of the course, the students will be able

K5 to K3	CO1	To know the concepts, formation and management of the Wildlife Sanctuaries
	CO2	To know the concepts, formation and management of Biosphere Reserves the National Parks and Wildlife Projects
	CO3	To understand the definition, aim, formation and management of the Zoos
	CO4	To gain knowledge on habitat restoration, corridor management, exotic and invasive species, introduction and reintroduction of species
	CO5	To understand the diseases of wild animals, tranquilization and transportation of problematic animals

SYLLABUS

UNIT 1 **(24 HOURS)**

WILDLIFE SANTUARIES: 1) Definition, formation, management and administration. 2) Point Calimere WLS, 3) Vedanthangal WLS. 4) Vellode WLS, 5) Nellai WLS, 6) Uthayamarthandapuram WLS 7) Thanthai Periyar WLS, 8) Koundinya WLS 9) Sri Venkateswara WLS, 10) Cauvery WLS.

UNIT II **(24 HOURS)**

NATIONAL PARKS AND TIGER RESERVES: 1) National Parks' definition, formation, management and administration: Guindy NP, Mukuruthi NP, Eravikulam NP, Silent Valley NP, Kaziranga NP, Gir NP. 2) Marine National Parks: Rann of Kutch, Gulf of Mannar, 3) Tiger Reserves' definition, formation, management and administration: Mudumalai Tiger Reserve, Sathyamangalam Tiger Reserve, Parambikulam Tiger Reserve, Bandipur Tiger Reserve, Badra Tiger Reserve, Manas Tiger Reserve, Kanha Tiger Reserve, Corbett Tiger Reserve, 4) Wildlife Projects: Tiger, Lion, Elephant and Rhinoceros.

UNIT III **(24 HOURS)**

ZOOS AND ZOOLOGICAL PARKS: 1) Definition, Aims of Zoos, Formation and Management of Zoos and Zoological Parks, 2) Central Zoo Authority of India. 3) Enclosures: Designing, Engineering and Enrichment. 4) Zoo animal nutrition: Food and feeding management. 5) Zoo sanitation: Principles and Management of Zoo. 6) Zoo veterinary services. 7) Animal restraint: Principles and Methods, release of restrained animals. 8) Transportation of animals. 9) Pests and Parasites, nutritional disorders 10) Zoo education, 11) Captive breeding: Aims, Principles, methods and case studies.

24PWB309

UNIT IV **(24 HOURS)**

HABITAT RESTORATION AND ANIMAL CONSERVATION: 1) Identifying the key species, 2) Assessment of Carrying capacity, 3) Exotic and Invasive Species: Principles and Problems- Case Studies. 4) Introduction and re-introduction of a species: Case Studies, Tiger, Lion, Rhinoceros. 5) Role of Government, NGO's and Educational Institutes involved in Wildlife Conservation***.**

UNIT V **(24 HOURS)**

WILDLIFE MORTALITY AND DISEASES: 1. Infectious and non-infectious diseases: 2) Viral, 3) bacterial 4) fungal diseases 5) Electrocution 5) Vehicular Mortality 6) Techniques of tranquilization and translocation of problematic animals.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion
*: Self study

TEXT BOOKS

1. Saharia, V.B. (1982) Wildlife in India, Nataraj Publishers, Dehra Dun.
2. Seshadri, B (1986) India's Wildlife reserves , Sterling Pub'rs Pvt. Ltd., New Delhi
3. Hosey and Melfe (2013) Zoo Animals: Behaviour, Management and welfare

REFERENCES

1. Kleiman, D. G., Thompson, K. V., & Baer, C. K. (Eds.). (2010). Wild mammals in captivity: principles and techniques for zoo management. University of Chicago Press.
2. Cheeran.J.V. (2007) Textbook of Wild and Zoo Animals: Care and Management. Enlarged Edition.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://swayam.gov.in/
2. https://www.mooc.org/
3. https://nptel.ac.in/

Mapping

PSO/ CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M
CO2	M	M	S	S	M
CO3	S	H	S	S	H
CO4	H	M	S	S	H
CO5	S	H	S	M	H

S - Strong H-High M - Medium L-Low

24PWB3CO

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the Practical: Core Practical 4 PHYSIOLOGY OF WILDLIFE					
Batch 2024-2026	**Semester III**	**Hours / Week 4**	**Total Hours 60**	**Credits 2**	**Skill Development**

COURSE OBJECTIVES

1. To understand the physiology of wildlife through practical

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1 to K5	CO1	Understand the effect of temperature
	CO2	Know the gravity of blood
	CO3	Gain the knowledge on the effect of salinity on oxygen intake
	CO4	Estimation of ammonia, urea and Uric acid from excreta
	CO5	Estimation of haemoglobin content

SYLLABUS

Major:

1. Identification of Endoparasites parasite and ectoparasites of wildlife
2. Effect of temperature on the opercular movement of fish and calculation of Q10.
3. Determination of the specific gravity of the blood in vertebrate animal by copper sulphate method.
4. Active uptake of Na+ and Cl-of a fish from the environmental water.
5. Effects of salinity on oxygen consumption of fishes and plot on graph.

Minor:

1. Analysis of ammonia, urea and uric acid from excretory product of animals.
2. Estimation of Haemoglobin content in fish blood.
3. Determination of LD-50 and LC-50

SPOTTERS

1. pH meter
2. Centrifuge
3. Haemoglobino meter
4. Spectrophoto meter
5. Sphygmomano meter
6. ECG Recorded strip
7. X-ray machine
8. Thermo meter
9. Stop watch

SUBMISSIONS

1. Report on the field trips
2. Bonafide Record

24PWB3CO

TEXT BOOKS

1. Verma, P. S., Tyagi, B. S., & Agarwal, V. K. (2000). *Animal physiology*. S. Chand Publishing.
2. Rastogi, S.C. (2019). Animal Physiology
3. Moyes, C.D and P.M Schulte (2013) Principles of Animal Physiology

REFERENCES

1. Withers, P., & Withers, P. C. (1992). Comparative animal physiology.
2. Schmidt-Nielsen, K. (1997). Animal physiology: adaptation and environment. 5th edition.
3. Wang (eds) (1989). Advances in Comparative and Environmental Physiology: Animal Adaptation to Cold.
4. Gilles(eds) 1988 Advances in Comparative and Environmental Physiology
5. Arumugam, N and A Mariakuttikan. (2019). Animal Physiology
6. Arora, M.P. (2018). Animal Physiology for B.Sc. and M.Sc.

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	M	S
CO2	S	H	H	M	S
CO3	S	H	H	M	S
CO4	S	H	H	M	S
CO5	S	H	H	M	S

S - Strong H-High M - Medium L-Low

24PWB3CP

Programme Code: 27	**M.Sc. WILDLIFE BIOLOGY**				
Title of the Practical: Core Practical 5 MANAGEMENT OF ZOOS, SANCTUARIES AND NATIONAL PARKS					
Batch 2024-2026	**Semester III**	**Hours / Week 4**	**Total Hours 60**	**Credits 2**	**Employable**

COURSE OBJECTIVES

The main objectives of this course are to:

1. Know the various Protected Areas (PAs)
2. Feed Preparation for zoo and tamed animals
3. Designing animal cages
4. Restraining animals using drugs and equipments

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3 to K5	CO1	Understand various Protected Areas
	CO2	Understand about the feeding of zoo animals
	CO3	Know about the captive breeding.
	CO4	Knowledge about wildlife diseases
	CO5	Analyse about the conflict

SYLLABUS

Major

1. Marking major Wildlife Sanctuaries of Tamil Nadu
2. Marking major National Parks and Tiger Reserves of India
3. Marking Biodiversity Hotspots
4. Estimation of carrying capacity of an area
5. Food preparation for zoo and captive animals

Minor

1. Designing of animal cages (animal enclosures, moat/ Island)
2. Restraining of animals using drugs and equipments
3. Ectoparasite in wild animals
4. Endoparasite in wild animals
5. Captive Breeding (LTM)
6. Re Introduction of animals (Cheetah)

SPOTTERS

1. Tranquilizing equipments
2. Invasive species

FIELD TRIPS

1. Field trip to Protected Areas

Submission at the time of Practical Examination

1. Report on the field trips
2. Bonafide Record

24PWB3CP

TEXT BOOKS

1. Saharia, V.B. (1982) Wildlife in India, Nataraj Publishers, Dehra Dun.
2. Seshadri, B.(1986) India's Wildlife reserves, Sterling Publisher Pvt. Ltd., New Delhi
3. Hosey and Melfe (2013) Zoo Animals: Behaviour, Management and welfare

REFERENCES

1. Cheeran.J.V. (2007) Textbook of Wild and Zoo Animals: Care and Management. Enlarged Edition.

2. Kleiman *et al*, (2010) Wild Mammals in Captivity; Principles and Techniques for Zoo Management., University of Chicago Press.

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	H	M
CO2	H	S	H	M	H
CO3	H	H	S	S	H
CO4	H	S	S	H	S
CO5	M	M	S	H	S

S - Strong H-High M - Medium L-Low

24PWB410

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the paper: Core Paper 10 – WILDLIFE MANAGEMENT TECHNIQUES					
Batch 2024-2026	**Semester IV**	**Hours / Week 8**	**Total Hours 120**	**Credits 5**	**Employable**

COURSE OBJECTIVES

1. To make understand the applications and basic wildlife equipments.
2. To acquire the knowledge of GPS and mapping techniques
3. To sensitize the students on wildlife population estimation techniques.
4. To understand the survey and mapping of water resources and conservation.
5. To understand plant-insect interaction and management

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K5 to K1	CO1	Acquire the knowledge on uses of various field equipments
	CO2	Gain the mechanism of GPS, GIS, Remote sensing and Radio Collaring methods
	CO3	Learn the wildlife population estimation methods and tools used in estimation
	CO4	Know the survey and mapping of water resources, wildlife conflicts, wildlife damage control, anti-poaching operations
	CO5	Feeding and reproductive behaviour of insects, insect plant interaction and insect management

SYLLABUS

UNIT I **(24 HOURS)**

EQUIPMENT IN WILDLIFE: 1) Making observations and records, field notes & datasheets, 2) Planning wildlife management 3) Investigations and projects, funding agencies. 4) Wildlife Photography: types of cameras & binoculars - camera trap – 5) Altimeter, pedometer, field compass. 6) Sound recording & Media players - activity recording, weight measurement.

UNIT II **(24 HOURS)**

TRACKING OF ANIMALS: 1) Radio isotopes - radio collaring – GPS – GIS & Remote sensing. 2) Q GIS – Map Info –Arc view (outlines only). 3) Molecular methods in Wildlife; 4) Impact and removal of invasive alien species; 5) Habitat manipulation: food, water and shade improvement. 6) Use of GIS and Remote sensing in Wildlife.

UNIT III **(24 HOURS)**

ESTIMATION OF POPULATION: 1) Planning census, sample counts, Block counts – Road side counts – Dung count – Pugmark & Waterhole census, 2) Identifying animals based on indirect signs 3) Capture recapture techniques 4) tiger, co-predator monitoring census methods. 5) Distance software, Creation of capture matrix and softwares used in wildlife sciences.

UNIT IV **(24 HOURS)**

CONSERVATION OF FOREST: 1) Survey and mapping water sources* 2) rain gauge setting, supplementary water source, providing access to natural & artificial water sources, 3) Fire as a tool. 4) Wildlife damage control, assessment methods, reasons for conflicts, trench fences, trenches & other methods 5) Anthropogenic pressure, Trail survey in boundary, Antipoaching operations.

24PWB410

UNIT V **(24 HOURS)**

RESCUE AND REHABILITATION OF PROBLEMATIC ANIMALS: 1) Identification of problematic individuals. 2) Capturing methods. 3) Translocation. 4) Release of problematic animals. 5) Captive management. 6) Monitoring activities.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

*: Self study

TEXT BOOKS

1. Agarwala V P, 1980. Forests in India. Oxford and IBH Publishing Co., New Delhi.
2. Puri G S, Meher V M, Gupta R K and Puri S, 1981. *Forest Ecology*. Oxford and IBH Publishing Co., New York.
3. Stebbin E P, 1977. A Manual of Elementary Forest Zoology for India. International Book Distributors, Dehra Dun.
4. Tiwari K M and Singh R V, 1980. Social Forestry Plantations. Oxford and IBH Publishing Co., New Delhi.
5. Manikandan K & Prabhu S. (2019). Indian Forestry A Breakthrough Approach to Forest Service. Jain Brother Publishers.
6. Vasanthraj David. B & Ramamurthy V.V. (2016). Elements of Economic Entomology. Brillion Publishing.

REFERENCES

1. Giles RH Jr. (ed.),1984. Wildlife Management Techniques, 3rd ed. The Wildlife Society, Washington D.C., Nataraj Publishers, Dehra Dun.
2. Warning R H and Schlesinger W H, 1985. Forest Ecosystems: Concepts and Management. Academic Press, New York.
3. Imms A D, 1965. A General Textbook of Entomology, ELBS, London.
4. Metcalfe C L and Flint W P, 1973. Destructive and Useful Insects, McGraw-Hill, New York.
5. Nair, K. S. 2007. Tropical forest insect pests: ecology, impact, and management. Cambridge University Press.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://swayam.gov.in/
2. https://www.mooc.org/
3. https://nptel.ac.in/

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	L	S	L	S
CO2	S	L	S	M	S
CO3	S	H	S	S	S
CO4	S	M	S	S	H
CO5	H	M	S	M	S

S - Strong H-High M - Medium L-Low

24PWB4CQ

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the paper: Core Practical 6 –WILDLIFE MANAGEMENT TECHNIQUES					
Batch 2024-2026	**Semester IV**	**Hours / Week 4**	**Total Hours 60**	**Credits 2**	**Employable**

COURSE OBJECTIVES

The main objectives of this course are:

1. To make understand the applications and basic wildlife equipments.
2. To acquire the knowledge on handling the equipment related to wildlife.
3. To learn GIS and Remote sensing uses and its applications on wildlife management.
4. To sensitize the students on wildlife population estimation techniques.
5. To know the monitoring of tigers and their habitats.

COURSE OUTCOME

On successful completion of the course, the students will be able to

K5 to K3	CO1	Acquire the knowledge in wildlife and equipments usage in the field
	CO2	Learn the significance of various field equipments
	CO3	Appreciate the mechanism of GIS, Remote sensing and Radio Collaring methods in wildlife
	CO4	Evaluate various types of population estimation, mapping techniques and wild animals health monitoring and postmortem techniques
	CO5	Understand the monitoring methods of wildlife

SYLLABUS

Major

1. Preparation of Quadrats and estimation of population (Amphibians and Reptiles)
2. Laying line transects in an area and estimation of population (Birds and Mammals)
3. Point Count for birds
4. Block count / Dung density estimation
5. Capture recapture method
6. Identification birds calls and write in detail about the bird species
7. Identification mammals
8. Mist-net techniques and methods of ringing in birds (Demonstration only).

Minor

1. Block count
2. Forest cover monitoring, map reading and surveying techniques of forest area
3. Marking geo-coordinates using softwares
4. Monitoring Tiger population using M-STrIPES software
5. Usage of drone Cameras in Wildlife management
6. Taxidermy (Demonstration only).

Spotters

1. GPS
2. Altimeter
3. Binoculars

24PWB4CQ

4. Field Compass
5. Range finder
6. Camera Trap
7. Rain gauge
8. Radio collar

Submission at the time of Practical Examination

1. Report on the field trips
2. Bonafide Record

TEXT BOOKS

1. Agarwala V P, 1980. Forests in India. Oxford and IBH Publishing Co., New Delhi.
2. Manikandan K & Prabhu S. 2019. Indian Forestry A Breakthrough Approach to Forest Service. Jain Brother Publishers.
3. Puri G S, Meher V M, Gupta R K and Puri S, 1981. *Forest Ecology*. Oxford and IBH Publishing Co., New York.
4. Stebbin E P, 1977. A Manual of Elementary Forest Zoology For India. International Book Distributors, Dehra Dun.

REFERENCE BOOKS

1. Giles, R.H. Jr. (Ed) 1984. Wildlife Management Techniques 3rd edition. The wildlife Society, Washington. D.C. Nataraj Publishers, Dehradun. India
2. Menon.V. *et al*, 2017. Right of passage: elephant corridors of India, Conservation reference series no. 3, 2nd edition, Wildlife Trust of India, New Delhi
3. Warning R H and Schlesinger W H, 1985. Forest Ecosystems: Concepts and Management. Academic Press, New York.

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	H	H	S
CO2	H	M	H	H	S
CO3	H	S	S	M	S
CO4	H	M	M	S	S
CO5	S	H	H	M	5

S - Strong H-High M - Medium L-Low

24PWB4Z1

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the paper: PROJECT & VIVA – VOCE					
Batch 2024-2026	**Semester IV**	**Hours / Week 14**	**Total Hours 210**	**Credits 8**	**Skill Development**

COURSE OBJECTIVES

1. To acquire inherent knowledge and exposures on relevant practical problems in various fields.
2. To understand the data interpretation
3. To acquire the knowledge on thesis writing.

COURSE OUTCOMES

On successful completion of the project work, the students will be able to

K1 to K5	CO1	Apply theoretical knowledge in the real field of wildlife research
	CO2	Analyze the importance of tasks in collecting the data
	CO3	Evaluate relationships existing between theories and experiments
	CO4	Provide problem solving skills on selected problems in any disciplines of animal sciences
	CO5	Execute appropriate statistical tools and interpretation of appropriate results

Individual project work will be allotted to each students under the supervision and guidance of the Faculty members during IV Semester. Project works will be given based on the various fields of specialization of the supervisors under whom the students are allotted. They are allotted based on the lot system. The fields of specialization include Herpetology, Ornithology, Mammalogy, on ecological and conservation related topics. The students shall do their projects under their supervisors and submit their dissertations at the end of IV Semester. During their Viva-Voce examination, both the Internal and External Examiners shall jointly evaluate the project reports submitted by the students and marks will be awarded on the basis as mentioned below.

Guidelines for the Distribution of Marks:

CIA	Project Review	15	**20**
	Regularity	05	
ESE	Project Report Present	60	**80**
	Viva – Voce	20	
	Grand Total		**100**

Mapping

PSO/ CO	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	S	S	S	S
CO2	S	S	H	S	S
CO3	S	M	S	S	S
CO4	S	M	S	H	S
CO5	S	M	S	S	S

S - Strong H-High M - Medium L-Low

MAJOR ELECTIVE PAPERS

1. Forestry and Silviculture
2. Ethnobiology
3. Biotechnology and Genetic Engineering
4. Wildlife Crime

Programme Code: 27		M.Sc. WILDLIFE BIOLOGY			
Title of the paper: Major Elective: FORESTRY AND SILVICULTURE					
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**	**Skill**
2024-2026	**I/II**	**5**	**75**	**5**	**Development**

COURSE OBJECTIVES

1. To explain the core concepts of ecology for a better understanding of the environment.
2. To motivate, identify and solve environmental problems.
3. To create awareness about the improvement and protection of the environment.
4. To make understand the need for conservation of biodiversity and natural resources.
5. To help understand the concepts of exobiology.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K5 to K1	CO1	Understand the ecological dynamics and the significance of environmental integrity
	CO2	Recognize various global and regional environmental concerns that affect the biosphere and analyze the impact of human activities on the environment.
	CO3	Appreciate the significance of the conservation of native biodiversity.
	CO4	Scrutinize specific cases of environmental pollution and challenges, and their impacts on ecology.
	CO5	Apply knowledge of chemistry, biology, molecular biology and microbiology to arrive at innovative solutions to environment issues and extra-terrestrial habitats.

SYLLABUS

UNIT I **(15 HOURS)**

FOREST MANAGEMENT: 1) Forest types in India, identification, 2) Establishment of herbaria and arboreta. 3) Agro forestry systems, Social forestry system, Urban forestry system 4) Joint Forest Management and Water shed management 5) Deforestation and Impacts. 6) Forest Inventory.

UNIT II **(15 HOURS)**

REGENERATION OF FOREST: 1) Natural and artificial regeneration of forests. 2) Nursery and planting techniques. 3) Clear felling, Uniform shelter wood selection, coppice and conversion systems. 4) Silviculture management: mangroves, cold desert & plantations. 5) Tree improvement & Seed Technology: Collection, storage, pre-treatment and germination, establishment and tendings. 6) Non-Timber Forest Products (NTFP) 7) Wood seasoning and preservation 8) Anatomical structure of wood, defects and abnormalities of wood, timber identification*.

UNIT III **(15 HOURS)**

FOREST MENSURATION: 1) Forest management techniques: Methods of measuring diameter, girth, height and volume of trees, - form-factor- volume estimation of stand Sampling methods and sample plots. 2) Yield calculation- 3) forest cover monitoring through remote sensing – 3) GIS management and modeling- 4) Forest survey-map reading.

UNIT IV **(15 HOURS)**

FOREST WORKING PLAN AND ACTS: 1) Forest Working Plan: Planning, evaluation, monitoring and forest industries. 2) Silvicultural systems – 3) Indian forest Act 1927), 4) Forest Conservation Act (1980); 5) Biodiversity Act 2002, 6) HACA.

UNIT V **(15 HOURS)**

SOIL CONSERVATION: 1) Role of Forest in soil Conservation: erosion-reclamation - role of microorganisms, 2) Watershed management, forest hydrology, river channel stabilization, avalanche and landslide control, ground water recharge. 3) Check dam and Percolation pond, 4) Impact of invasive alien species in Forest Management.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

***:** Self study

TEXT BOOKS

1. Odum E, O. (1996) Fundamentals of Ecology
2. P.S.Verma & V.K.Agarwal (2000) Environmental biology
3. Giles, R.H. Jr. (Ed) 1984. Wildlife Management Techniques 3rd edition. The wildlife Society, Washington. D.C. Nataraj Publishers, Dehradun. India.
4. Manikandank & Prabhu S. (2019). Indian Forestry A Breakthrough Approach to Forest Service. Jain Brother Publishers.
5. Robinson, Wl. and Eric, G. Bolen, (1984). Wildlife Ecology and Management Mac Millan Publishing Co, New York. Pp 478.
6. Dasmann R F, (1964). Wildlife Biology, John Wiley & Sons, New York, p231

REFERENCES

1. Controlled Ecological Life Support system –NASA conference publication (2378) (e-content)
2. Botkin D.B, and E. A. Keller (2009) Environmental Science: Earth as a Living Planet
3. McKinney, M. L., & Schoch, R. M. (2003). Environmental science: systems and solutions. Jones & Bartlett Learning.
4. Sharma, P.D (2019) Ecology Sand Environment
5. Turk, J and A. Turk (1984) Environmental Science

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. Primark: A Primer of Conservation Biology
2. Calabrese: Pollutants and High-Risk Groups
3. Controlled Ecological Life Support system –NASA conference publication (2378) (e-content)

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	S	H	S	H
CO2	M	S	M	H	M
CO3	H	H	S	M	H
CO4	S	H	S	H	H
CO5	S	M	S	S	H

S - Strong H-High M - Medium L-Low

Programme Code: 27		M.Sc. WILDLIFE BIOLOGY			
Title of the paper: Major Elective: ETHNOBIOLOGY					
Batch	**Semester**	**Hours/Week**	**Total Hours**	**Credits**	**Skill**
2024-2026	**I/II**	**5**	**75**	**5**	**Development**

COURSE OBJECTIVES

1. To provide the history and concepts of ethnobiology
2. To understand the folk biological classification and nomenclature
3. To impart ethics in ethnobotany, ethnozoology, ethnomycology and ethnoecology
4. To understand the inherent knowledge on traditional system of herbal medicine

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1 to K5	CO1	To learn the history and concepts of ethnobiology
	CO2	To know indigenous intellectual property and rights
	CO3	To learn ethnobotany and ethnozoology,
	CO4	To learn ethnomycology and ethnoecology
	CO5	To understand the inherent knowledge on traditional system of medicine

SYLLABUS

UNIT I: **(15 HOURS)**

Ethnobiology: 1) Overview of a growing field-definition of a field, an interdisciplinary field, local biology as science, ethnobiology spreads out, ethnobiology goes international, traditional ecological knowledge and its sorrows, moving toward more local participation, interfacing with political ecology, ethnobiology as future, History of Ethnobiology: the beginning, ethnobotany, ethnozoology, stages of ethnobiology, stage 1. ethnoecology, stage 2. Traditional ecological knowledge stage 3. Indigenous intellectual property and rights

UNIT II: **(15 HOURS)**

Ethics in Ethnobiology: 1) History, International Law and Policy, and Contemporary Issues: Introduction, 2) History of research ethics as related to ethnobiology, International Law and Policy debates and negotiations, key concepts, terms and definitions, 3) United Nations Treaties, (I) Convention on Biological Diversity, (II) World Intellectual Property Organization, International regime on access and benefit sharing, 4) Intergovernmental Committee on Genetic Resources, 5) Traditional knowledge and folklore (IGC), 6) Contemporary issues for ethnobiologists

UNIT III. **(15 HOURS)**

Ethnozoology: Definition of Terms and Scope of the field, A brief history of ethnozoological investigations, case studies and theoretical issues, folk biological classification and nomenclature, general principles of classification and nomenclature, “the hunting hypothesis” versus “woman the gatherer”, the dietary role of meat in farming societies, the role of animals among pastoralists, conservation, animals are “good to think”, animism

UNIT IV. **(15 HOURS)**

Ethnobotany: The study of people-plant relationships: introduction, the development of ethnobotany, methods in ethnobotany, classic case studies and their contributions to ethnobotanical praxis, intergenerational research in medical ethnobotany, using paleoethnobotany to understand the past, solving the mystery of a notorious illness: ethnobotany and cycad toxicity*.

UNIT V **(15 HOURS)**

Ethnomycology: Fungi and mushrooms in cultural entanglements, subjects of the third kingdom, the beginnings and foundational principles of ethnomycology, methods in ethnomycology, the many rewards of the third hunt, mushrooms in art and material culture, all in one: medicine, poison, and food

TEXT BOOKS

Anderson, E. N. (2011). Ethnobiology: overview of a growing field. Ethnobiology. John Wiley & Sons, Inc., Hoboken, New Jersey

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

*: Self study

REFERENCE BOOKS

Abbasi, A. M., & Bussmann, R. W. (Eds.). (2021). *Ethnobiology of mountain communities in Asia* (p. 439). Cham, Switzerland, Pp: Springer International Publishing.

Albuquerque, U. P., De Medeiros, P. M., & Casas, A. (2015). *Evolutionary ethnobiology*. Springer International Publishing.

Walters, B. B., Rönnbäck, P., Kovacs, J. M., Crona, B., Hussain, S. A., Badola, R., & Dahdouh-Guebas, F. (2008). Ethnobiology, socio-economics and management of mangrove forests: A review. *Aquatic Botany*, *89*(2), 220-236.

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	S	H	M
CO2	S	M	M	H	M
CO3	S	H	H	M	H
CO4	S	M	H	H	S
CO5	S	H	M	M	S

S - Strong H-High M - Medium L-Low

Programme Code: 27		M.Sc. WILDLIFE BIOLOGY			
Title of the paper: Major Elective: BIOTECHNOLOGY AND GENETIC ENGINEERING					
Batch 2024-2026	**Semester I/II**	**Hours / Week 5**	**Total Hours 75**	**Credits 5**	**Employable**

COURSE OBJECTIVES

1. To make aware of the students about the theories, concepts and basics of Biotechnology.
2. To provide knowledge about tissue culture.
3. To acquire knowledge about molecular methods involved in genetic engineering.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1 to K5	CO1	Understand methodological approach to the study of Biotechnology.
	CO2	Identify contamination and understand preservation
	CO3	Develop an idea, how to arrange sequences of DNA.
	CO4	Understand the Recombinant Techniques.
	CO5	Attain a basic conceptual knowledge of the principle Mechanisms of the genetic and molecular elements that are involved.

SYLLABUS

UNIT I **(15 HOURS)**

TISSUE CULTURE AND MEDIA PREPARATION: 1) Introduction to Animal Tissue Culture: Background, Advantages, Limitations and applications. 2) Culture Environment, Essential Equipment's required for animal tissue culture, 3) Aseptic Technique and general safety. 4) Media: Physicochemical properties, Balanced Salt Solutions, Complete media, serum, Advantage and Disadvantages of serum, free media.

UNIT II **(15 HOURS)**

PRESERVATION OF CULTURE: 1) Contamination: Source of contamination, Types of Microbial contamination, Monitoring, Eradication of contamination, Cross-contamination. 2) Cryopreservation: Need of cryopreservation, Apoptosis and its determination: cytotoxicity assays. 3) Application of animal cell culture, Vaccine production, 4) Tissue engineering.

UNIT III **(15 HOURS)**

RECOMBINANT TECHNIQUES: 1) In vitro Fertilization and Embryo Transfer: Composition of IVF media, steps involved in IVF, 2) Fertilization by means of micro insemination, PZD, ICSI, SUZI, MESA, stem cell culture, embryonic stem cell and their applications. 3) Ethical issues in animal biotechnology*.

UNIT IV **(15 HOURS)**

GENE MANIPULATION: 1) Genomic and cDNA libraries; 2) PCR: Principle and types; 3) Site directed mutagenesis; DNA sequencing, Microarrays – cDNA and protein chips. 4) DNA fingerprinting; SNPs, VNTRs and microsatellites, Molecular

Marker techniques; RFLP, RAPD, STS, SSR, ISSR, SCAR, SSCPAND AFLP. 5) Importance of molecular markers assisted selection.

UNIT V **(15 HOURS)**

ENZYMES INVOLVED IN GENETICAL ENGINEERING: 1) Definition of enzyme, enzymology and enzyme technology, nature of the enzymes. 2) Enzymes used in manipulation; 3) Polymerases and types, nucleases, endonucleases, exonucleases and restriction enzymes; ligases; topoisomerases, methylases. 4) Applications of enzymes. 5) Electrophoresis.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

*: Self study

TEXT BOOKS

1. Arumugam, N and V. Kumaresan (2019). Animal Biotechnology Saras Publication.
2. Singh, B. S.K.Goutham. M.S. Chauhan and S.K. Singla (2015) Textbook of Animal Biotechnology, The Energy and Resources Institute, TERI, New Delhi.
3. Yamagami T. (2017) Genetic Engineering A Primer. Auris Publishing
4. Arumugam, N & A Thangamani, L M. (2012) Molecular Biology and Genetic Engineering, Narayanan, Padmalatha Singh. Saras Publication.

REFERENCES

1. Verma, A & A. Singh (2020) Animal Biotechnology., 2nd Edition, Academic Press.
2. Gupta. P. K. (2020) Animal Biotechnology. Rastogi Publications
3. Gardner, E. J. (1972). *Principles of genetics* (No. 4). London, UK, John Wiley & Sons, Inc.
4. Rastogi, S (2009) Genetic Engineering. Oxford University Press,

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. NOC: Introduction to Developmental Biology, Prof. Subramaniam.K, IIT Madras, https://nptel.ac.in/courses/102/106/102106084/

Mapping

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	S	H	M	L
CO2	M	S	M	M	S
CO3	M	S	H	H	S
CO4	M	M	H	H	S
CO5	M	M	H	H	S

S - Strong H-High M - Medium L-Low

Programme Code: 27		M.Sc. WILDLIFE BIOLOGY			
Title of the Paper: Major Elective: WILDLIFE CRIME					
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**	**Skill**
2024-2026	**I/II**	**5**	**75**	**5**	**Development**

COURSE OBJECTIVES

1. To study about the types of wildlife crime like, poaching, illegal wildlife trade, illegal hunting
2. To acquire knowledge on the socio-economic factors that contribute to wildlife crime
3. To study about the effectiveness of existing laws, policies, and enforcement measures
4. To acquire knowledge on the wildlife crime and investigation, intelligence gathering, and organized crime
5. To Understand the impact of wildlife crimes, policy and law enforcement agencies

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1 to K5	CO1	Acquire the knowledge of various types of wildlife crimes such as poaching, illegal wildlife trade, illegal hunting
	CO2	Learn about how the socioeconomic variables influencing wildlife crime in India
	CO3	Know the existing laws and policies to conserve the flora and fauna conservation
	CO4	Learn about the concept of wildlife crime, investigation of wildlife crime, intelligence gathering, investigation of organized wildlife crimes and networks
	CO5	Understand the impact of wildlife crimes and law enforcement agencies

SYLLABUS

UNIT I **(15 HOURS)**

Dimensions and consequences of Wildlife Crime: 1) Poaching: Illegal hunting, killing or capturing of wild animals. 2) Illegal wildlife trade: global issue of ivory, tiger parts, leopard parts, rhino horns, 3) Parts of mammal, reptile, amphibian, bird, fish, coral reef, butterfly, molluska, red sander, medicinal plants, ornamental plants.

UNIT II **(15 HOURS)**

Effectiveness of Existing laws, policies, and Enforcement Authorities: 1) Wildlife (Protection) Act 1972, 2) Foreign Trade (Development and Regulation) Act, 1992, 3) Customes Act 1962, 4) Indian Forest Act 1927, 5) WCCB, DRI, Convention of International Trade in Endangered Species of Wild Flora and Fauna (CITES)*, 6) MIKE-IUCN, TRAFFIC.

UNIT III **(15 HOURS)**

Socio-Economic Factors that contribute to Wildlife Crime: 1) Socio-economic aspects of wildlife crime issue in India, Criminal activities like, logging, mining, and growing illicit crops. 2) Cultural norms influence wildlife crime like, traditional medicine and animals' parts.

UNIT IV **(15 HOURS)**

Wildlife Crime Investigation: 1) Concept of wildlife crime, 2) Collection of information, evidence, intelligence network, search and seizure, 3) Criminal investigation and complaints, investigation of organized crime syndicates and transnational networks.

UNIT V **(15 HOURS)**

Wildlife Forensics: 1) Forensic protocols for species identification, molecular markers used in forensics, 2) Species identification: Morphological identification, Molecular identification, 3) Role and functions of WCCB, case studies, 4) Significance of wildlife forensics.

Teaching Methods

Smart Class Room/ PowerPoint presentation/ Seminar/ Quiz/ Discussion
*: Self study

TEXT BOOKS

1. Anon., A Manual on Wildlife Species in Trade, 2011. Wildlife Crime Control Bureau, Ministry of Environment, Forests and Climate Change, Govt. of India
2. Moreto, W.D, 2018. Wildlife Crime from Theory to Practice. Temple University Press
3. Wildlife Crime Investigation "A Hand book for Wildlife Crime Investigation Officers" Wildlife Crime Control Bureau, Government of India (2013). 1st edition
4. Menon,V. and A. Kumar, 1999. Wildlife Crime "An enforcement guide". Natraj publishers, New Delhi

REFERENCE

1. Chandran, A.R. 2023. Wildlife Crime in India: A multi-faced analysis. ILE Monthly Review, 1 (2) of 2023, Pp.38-45.
2. X-Ray images of wildlife products, (2012). A catalogue of Wildlife Contraband Community Carried in personal Personal Baggage. Wildlife Crime Control Bureau, Government of India.
3. Jota Baptista, C.; Seixas, F.; Gonzalo-Orden, J.M.; Oliveira, P.A. Wildlife Forensic Sciences: A Tool to Nature Conservation towards a One Health Approach. Forensic Sci. 2022, 2, 808–817.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://swayam.gov.in/
2. https://www.mooc.org/
3. https://nptel.ac.in/
4. https://doi.org/10.3390/forensicsci2040058

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	S	H
CO2	S	M	S	S	H
CO3	H	M	S	S	H
CO4	H	M	S	S	H
CO5	H	M	S	S	H

S - Strong H-High M - Medium L-Low

NON-MAJOR ELECTIVE PAPERS

1. Research Methodology
2. Biostatistics, Application of computing & Artificial Intelligence 4.0
3. Environmental Science
4. Information Security

5.

Programme Code: 27		M.Sc. WILDLIFE BIOLOGY			
Title of the paper: Non-Major Elective RESEARCH METHODOLOGY					
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**	**Skill**
2024-2026	**III**	**4**	**60**	**4**	**Development**

COURSE OBJECTIVES

1. To understand about research.
2. To acquire the knowledge on thesis writing.
3. To learn the methodology about the research work.
4. To understand the data interpretation.
5. To sensitize the students to study about research.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1 to K5	CO1	Acquire the knowledge on research
	CO2	Learn significance of writing literature.
	CO3	Understanding the data interpretation.
	CO4	Evaluate the results of interpreted data.
	CO5	Understand the significance of research.

SYLLABUS

UNIT I **(12 HOURS)**

BASIC OF RESEARCH: Topic Selection-Planning research–defining objectives-Preparation of work plans. Identification of suitable methodology-Preparation of project proposal–Funding agencies–Student project

UNIT II **(12 HOURS)**

COLLECTION OF LITERATURE: Collection of literature – News articles–Newsletters–Journals. Digital library and search of articles – Keywords and search – Internet–Google Scholar–Pubmed– Inflibnet–Medline– Agricola–Science direct – Open access Journals – virtual sources – other sources.

UNIT III **(12 HOURS)**

DATA ANALYSIS: Collection of samples/data–Data analysis–Microsoft Office – Construction of tables–headings Footer – hypothesis testing –Test of Significance–Tabulation–Presentation of results. Mean, Median, Mode, range, standard deviation, student ‘t’ test, Correlation, Regression, One-way Anova.

UNIT IV **(12 HOURS)**

THESIS STRUCTURE: Thesis structure–Components – Writing Introduction–review of literature–Materials & Methods–Presentation of results – Discussion of Results based on literature–Arrangement of Bibliography and how to quote reference in thesis-Appendix.

UNIT V **(12 HOURS)**

PUBLISHING ARTICLES: Publishing of Articles in newspapers/newsletters – Selection of journals–ISSN Number–Peer Reviewed Journals–Science citation index–impact factor and importance. Manuscripts preparation for Journals–components–Submission and Publication*.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

*: Self study

TEXT BOOKS

1. Anderson, J., & Poole, M. (2009). Assignment and thesis writing. Juta and Company Ltd.
2. Fisher, R. A. (1970). Statistical methods for research workers. In *Breakthroughs in statistics: Methodology and distribution* (pp. 66-70). New York, NY: Springer New York.
3. Freund, J. E. (1988). Modern elementary statistics. Prentice-Hall, Inc..
4. Paneerselvam, R. (2014). Research methodology. PHI Learning Pvt. Ltd..
5. Sansanwal, D. N (2020) Research Methodology and Applied Statistics, Shipra Publications.
6. Zar, J. H. (1999). Biostatistical analysis. Pearson Education India.

REFERENCES

1. Malter K, (1972) Statistical analysis in Biology, Chapmen Hall, London.
2. Rajendrakumar C (2008) Research Methodology SB Nanja for APHA publishing Corporation New Delhi.
3. Kothari S R, (2012) Research Methodology Methods and Techniques, Pragun Publication.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. Research Methodology: https://swayam.gov.in/nd2_cec20_hs17/preview
2. Understanding Research Methods: https://www.mooc-list.com/course/understanding- research-methods-course ra

Mapping

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	H	S	S
CO2	M	H	H	S	S
CO3	H	S	S	M	S
CO4	H	M	H	S	S
CO5	H	S	H	S	S

S - Strong H-High M - Medium L-Low

Programme Code: 27	M.Sc. WILDLIFE BIOLOGY				
Title of the paper: Non-Major Elective BIOSTATISTICS, APPLICATION OF COMPUTING & ARTIFICIAL INTELLIGENCE 4.0					
Batch **2024-2026**	**Semester** **III**	**Hours / Week** **4**	**Total Hours** **60**	**Credits** **4**	**Skill** **Development**

COURSE OBJECTIVES

1. To understand about research.
2. To learn the methodology about the research work.
3. To understand the data interpretation.
4. To sensitize the students to study about research.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1 to K5	CO1	Acquire the knowledge on research
	CO2	Learn significance of data collection
	CO3	Understanding the data interpretation.
	CO4	Evaluate the results of interpreted data.
	CO5	Learn the significance of softwares in research.

Unit 1 **(12 HOURS)**

DATA COLLECTION AND TABULATION: 1) Primary data collection and secondary data collection. 2) Processing data: classification and tabulation. 3) Organizing of data: individual, discrete and continuous series. 4) Diagrammatic representation of data: line diagram, bar diagram and pie diagram. 5) Graphic representation of data: histogram, frequency polygon, frequency curve and ogive.

Unit: 2 **(12 HOURS)**

MEASURES OF CENTRAL TENDENCIES AND DEVIATIONS: 1) Mean, Median, Mode. 2) Measures of dispersion: range, standard deviation, variance, standard error, Skewness and kurtosis. 3) Correlation: Types and methods of correlation, correlation coefficient. 4) Regression analysis: Regression lines and equations.

Unit:3 **(12 HOURS)**

TESTING OF HYPOTHESIS: 1) Null and alternative hypothesis – chi square test, student 't' test, F test (ANOVA) with experimental samples (one way & two way). 2) Probability; Basic Principles - apriori and aposteriori probabilities – addition and multiplication rules of probability - conditional probability.

Unit:4 **(12 HOURS)**

INTRODUCTION TO COMPUTER: 1) Introduction, Advantages of using computer, Generation of computers, Computer codes - BCD code, ASCII code, Functional units of a computer; 2) Types of computers: Desktop, Laptop, palmtop, PDA etc. 3) Definition: Hardware, Software and Firmware, ROM, RAM, CD-ROM, DVD, Pendrive, Hard disc, LCD projector.

Unit 5: **(12 HOURS)**

SOFTWARE PROGRAMS AND TOOLS: 1) MS Word processor, MS Excel for Charts, MS PowerPoint and Multimedia. 2) Viruses and Worms, 3) Software packages in Biostatistics: Applications of MINITAB and SPSS. 4) Communication networking and Computer networking*.

Teaching Methods: Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

*: Self study

TEXT BOOKS

1. Anderson, J., & Poole, M. (2009). Assignment and thesis writing. Juta and Company Ltd.
2. Fisher, R. A. (1970). Statistical methods for research workers.
3. Freund, J. E. (1988). *Modern elementary statistics*. Prentice-Hall, Inc.
4. Paneerselvam, R. (2014). Research methodology. PHI Learning Pvt. Ltd.
5. Sansanwal, D. N (2020) Research Methodology and Applied Statistics, Shipra Publications.

REFERENCES

1. Mather, K. (1943). Statistical analysis in biology.
2. Rajendrakumar C (2008) Research Methodology SB Nanja for APHA publishing Corporation New Delhi
3. Kothari, C. R. (2004). Research methodology: Methods and techniques. New Age International.
4. Zar, J. H. (1999). Biostatistical analysis. Pearson Education India.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

https://swayam.gov.in/
https://www.mooc.org/
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Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	H	S	S
CO2	M	H	H	S	S
CO3	H	S	S	M	S
CO4	H	M	H	S	S
CO5	H	S	H	S	S

S - Strong H-High M - Medium L-Low

Programme Code: 27	M.Sc. WILDLIFE BIOLOGY			
Title of the paper: Non-Major Elective ENVIRONMENTAL SCIENCE				
Batch 2024-2026	Hours / Week 4	Total Hours 60	Credits 4	Skill Development

COURSE OBJECTIVES

1. To study about the need of environmental conservation
2. To acquire knowledge on the natural resources
3. To study about the ecosystem
4. To acquire knowledge on the biodiversity
5. To Understand the environmental pollution

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K5 to K1	CO1	Acquire the knowledge of importance of environmental conservation
	CO2	Learn about the role of natural resources
	CO3	Know the importance of ecosystem, forest ecosystem, grassland ecosystem and aquatic ecosystem
	CO4	Understand about the value of biodiversity, hotspots of biodiversity conservation of biodiversity
	CO5	Learn about various types of the environmental pollution

SYLLABUS

UNIT I **(12 HOURS)**

The Environment – Introduction: 1) Multi-disciplinary nature of environmental studies. 2) Importance of environmental studies and public awareness. 3) Components of environment, atmosphere, hydrosphere, lithosphere. 4) Modification of earth's environment by the biosphere.

UNIT II **(12 HOURS)**

Natural Resources: 1) Forest resources, 1) Dams, 2) Water Resources, 3) Food Resources, 4) Energy Resources And 5) Land Resources*.

UNIT III **(12 HOURS)**

Ecology: 1) Ecosystem, 2) Biome and ecosystem, 3) Energy flow through ecosystem, 4) Food chain and webs, ecological pyramids, biomagnification, 5) Forest ecosystem, grassland ecosystems and aquatic ecosystems.

UNIT IV **(12 Hours)**

Biodiversity and its Conservation: 1) Introduction, definition, species and ecosystem diversity. 2) Biogeographical classification of India. 3) Biodiversity at

global, national and local levels. 4) Hotspots of biodiversity. 5) Threats to biodiversity.

UNIT V **(12 HOURS)**

Environmental pollution: 1) Definition, causes, air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear pollution. Role of an individual in prevention of pollution.

Teaching Methods

Smart Class Room/ PowerPoint presentation/ Seminar/ Quiz/ Discussion
*: Self study

TEXT BOOKS

1. Asthana, D.K and M. Asthana, (2002). A text book of Environmental studies, S.Chand and Company limited, New Delhi.
2. Joseph, B, (2005). Environmental studies. Tata McGraw-Hill Publishing Company Limited, New Delhi.
3. Arumugam, A, (2023). Concept of Ecology – Environmental Biology, Saras publications, Nagercoil.
4. Odum, E.P, (1996). Fundamentals of Ecology. Natraj publishers, Dehradun.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://swayam.gov.in/
2. https://www.mooc.org/
3. https://nptel.ac.in/

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	S
CO2	S	M	H	S	S
CO3	S	H	M	S	S
CO4	S	H	M	S	S
CO5	H	M	L	H	S

S - Strong H-High M - Medium L-Low

24PGI4N2

Programme Code: 27		**M.Sc. WILDLIFE BIOLOGY**			
Title of the paper: Non-Major Elective: INFORMATION SECURITY					
Batch 2024-2026	**Semester IV**	**Hours / Week 4**	**Total Hours 60**	**Credits 4**	**Skill Development**

COURSE OBJECTIVES

1. Students will identify the core concepts of Information security.
2. To examine the concepts of Information Security.
3. To design and implement the security features for IT and Industrial sectors

COURSE OUTCOMES

On successful completion of the course, the students will be able

K1 to K5	CO1	To Learn the principles and fundamentals of information security.
	CO2	To Demonstrate the knowledge of Information security concepts
	CO3	To Understand about Information Security Architecture.
	CO4	To Analyze the various streams of security in IT and Industrial sector.
	CO5	To know about cyber laws and regulations.

SYLLABUS

UNIT I **(12 Hours)**

Information Security basics: Definition of Information Security - History of Information Security - Characteristics of Information Security - Components of Information Security - Security System Development Life Cycle (SDLC). Information Security for technical administrators: Server Security – Network security- Social Media Security.

UNIT II **(12 Hours)**

Cryptography: Basic concepts - plain text - Cipher text - Encryption Principles - CRYPT Analysis - Cryptographic Algorithms - Cryptographic Tools – Authentication -Biometrics* - passwords - Access Control Devices - Physical Security - Security and Personnel. Language-based Security: Analysis of code for security errors, Safe language and sandboxing techniques.

UNIT III **(12 Hours)**

Firewalls, Viruses & Worms & Digital Rights Management: Viruses and Worms-Worms - Digital Rights Management – Firewalls - Application and Circuit Proxies - Stateful Inspection - Design Principles of Firewalls. Logical Design: Access Control Devices- Physical Security-Security and Personnel - NIST Models-VISA International Security Model- Design of Security Architecture-Planning for Continuity.

UNIT IV **(12 Hours)**

Hacking: Introduction – Hacker Hierarchy – Password cracking – Phishing - Network Hacking -Wireless Hacking - Windows Hacking - Web Hacking*- Ethical Hacking. Security Investigation: Need for Security- Business Needs-Threats- Attacks- IP Addressing and Routing - Social Media

24PGI4N2

UNIT V **(12 Hours)**

Cyber Laws: What is Cyber Law? - Need for Cyber laws - Common Cyber Crimes Applicable Legal Provisions: A Snapshot - Cyber Law (IT Law) in India – The Information Technology Act of India 2000 - Cyber Law and Punishments in India - Cyber Crime Prevention guide to users – Regulatory Authorities.

***Self-study questions for examination may be taken from the self-study portions also.**

Teaching Methods:

Chalk and Talk, Power point presentation, Seminar, Brainstorming, Assignment, Google Classroom.

Text book:

1. Information Security –Textbook is prepared by KONGUNADU ARTS AND SCIENCE COLLEGE, Coimbatore -29, 2022.

Reference books:

1 Charles P Pfleeger and Shai Lawrence Pfleeger, "Security in Computing", Fourth & Third Edition, Prentice Hall, 2007 & 2011.

2 Ross J. Anderson and Ross Anderson, "Security Engineering: A guide to building Dependable Distributed System", Wiley,2009.

3 Thomas R. Peltier, Justin Peltier and John Bleckley, "Information Security Fundamentals",2nd Edition, Prentice Hall 1996.

4 Gettier, Urs E. Information Security: Strategies for Understanding and Reducing Risks John Wiley & Sons, 2011.

5 "Principles of information security". Michael Whiteman and Herbert J. Mattord,2012.

6 Information security -Marie wright and John kakalik,2007.

7 Information security Fundamentals- Thomas R. Peltier, Justin Peltier and John Blackley-2005.

8 Information Security theory and practical PHI publication, Dhiren R. Patel-2008.

9 Debby Russell and Sr.G.T. Gangemi," computer Security Basics,2nd edition, O'Reilly Media,2006.

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	H	S	S
CO2	M	H	H	S	H
CO3	H	S	S	M	S
CO4	H	M	H	S	H
CO5	H	S	H	S	S

S - Strong H-High M - Medium L-Low

Question paper pattern

Duration: 3 Hours **Max**.: **75 Marks**

Section – A (10X1=10)
Choose the correct answer

Section – A (5X5=25)
Short answer questions, either or type, one question from each unit

Section – C (5X8=40)
Essay answer questions, either or type, one question from each unit

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CIA EXAMINATION BREAK UP OF MARKS

S. No	Distribution Component	Marks
1.	CIA I - 75 Marks Converted to 30	**30**
2.	CIA II -75 Marks Converted to 30	**30**
3.	Assignment I	**10**
4.	Assignment II	**10**
5.	Attendance	**05**
6.	Any case study related to Information Security	**15**
	TOTAL	**100**

24PWB3X1

Programme Code: 27		**All PG Programmes**			
Extra Departmental Course (EDC) – WILDLIFE CONSERVATION					
Batch 2024-2026	**Semester III**	**Hours / Week 2**	**Total Hours 30**	**Credits 2**	**Skill Development**

COURSE OBJECTIVES

- To learn about the distribution of wild animals.
- To study about importance of wildlife.
- To acquire knowledge on wildlife crime and threats to wildlife.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K5 to K1	CO1	Understand the distribution of wild animal species across India
	CO2	Know the importance of wildlife and their role in forest ecosystem
	CO3	Develop the knowledge on why to conserve wild animals
	CO4	Analyze the knowledge on various wildlife crime and illegal wildlife trade in India
	CO5	Evaluate various threats to wildlife

SYLLABUS

UNIT I **(6 HOURS)**

Status and distribution of wild mammals in India: 1) Herbivores, carnivores, omnivores. 2) Status and distribution of elephant, gaur, tiger, lion, Nilgiri tahr, Himalayan tahr, wild boar, hyena, wild dog, lion-tailed macaque and rhinoceros in India. 3) Role of elephants in the forest ecosystem.

UNIT II **(6 HOURS)**

Status and distribution of birds in India: 1) Terrestrial birds, aquatic birds. 2) Special features of raptors, 3) Ecology of vultures and its importance in the forest ecosystem. 4) Importance of insectivores birds and frugivores birds.

UNIT III **(6 HOURS)**

Human-wildlife conflict management: 1) Address the human-wildlife conflicts. 2) Conflict mitigating strategy in India. 3) Reason behind the human-wildlife conflicts. 4) Standard Operating Procedure (SOP) for translocation of elephants.

UNIT IV **(6 HOURS)**

Wildlife crime: 1) Poaching, killing or capturing of wild animals. 2) Illegal wildlife trade: global issue of ivory, tiger bones and horns*.

24PWB3X1

UNIT V **(6 HOURS)**

Effect of existing laws and Organization in wildlife conservation and: 1) Wildlife (Protection) Act 1972, 2) Indian Forest Act 1927, 3) Biodiversity Act, 2002, 4) HACA, 5) CITES, 6) IUCN.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

*: Self study

TEXTBOOKS

1. Prater, S. H. (1997). The book of Indian mammals. Bombay Natural History Society.
2. Menon, V. (2023). Indian mammals: a field guide. Hachette India.
3. Attenborough, D. (2002). The life of mammals (Vol. 2). Random House.
4. Wildlife Crime Investigation "A Hand book for Wildlife Crime Investigation Officers" Wildlife Crime Control Bureau, Government of India (2013). 1st edition
5. Menon,V. and A. Kumar, 1999. Wildlife Crime "An enforcement guide". Natraj publishers, New Delhi
6. Salim Ali, (2003) The Book of Indian Birds. BNHS. Mumbai
7. Grimmett, R., Inskipp, C., & Inskipp, T. (2016). Birds of the Indian subcontinent. Chistopher helm, London.

REFERENCES

1. Chandran, A.R. (2023). Wildlife Crime in India: A multi-faced analysis. ILE Monthly Review, 1 (2) of 2023, Pg.38-45.
2. X-Ray images of wildlife products, (2012). A catalogue of Wildlife Contraband Community Carried in personal Personal Baggage. Wildlife Crime Control Bureau, Government of India.

Mapping

PSO/ CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	H	S	S
CO2	S	H	H	S	S
CO3	S	M	S	S	H
CO4	M	L	S	H	M
CO5	L	M	H	H	M

S - Strong H-High M - Medium L-Low

Question paper pattern

Duration: 3 Hours **Max**.: **75 Marks**

Section – A (10X1=10)
Choose the correct answer

Section – A (5X5=25)
Short answer questions, either or type, one question from each unit

Section – C (5X8=40)
Essay answer questions, either or type, one question from each unit

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CIA EXAMINATION BREAK UP OF MARKS

(For theory only)

1. CIA I - 75 Marks Converted to 40	**- 40 Marks**
2. CIA II -75 Marks Converted to 40	**- 40Marks**
3. Assignment I	**- 05 Marks**
4. Assignment II	**- 05Marks**
5. Attendance	**- 05 Marks**
6. Others (Seminars, Group Discussion, Flipped Class room, etc.)	**- 05 Marks**
TOTAL	**100 Marks**