M.Sc. WildLifeBiology

yllabus

AFFILIATEDCOLLEGES

Program Code:

2026 - 2027 onwards

BHARATHIARUNIVERSITY

(A State University, Accredited with "A" Grade by NAAC,
Ranked 13th among Indian Universities by MHRD-NIRF,
World Ranking: Times - 801-1000, Shanghai - 901-1000, URAP - 982)

Coimbatore – 641 046, Tamil Nadu, India

Program Educational Objectives(PEOs)	
In academic curriculum design (especially under Outcome-Based Education, or OBE), PEOs shouldn't just list *where* graduates can work. Instead, they should describe the **broad professional achievements, skills, and leadership qualities** that graduates are expected to attain 3 to 5 years after graduation.	
PEO1	M. Sc. Graduates will establish successful careers as educators, scientists, researchers, or biologists in academic institutions, research laboratories, and interdisciplinary fields of Zoology and Wildlife Biology, or pursue advanced research (Ph.D.) to contribute to the global body of biological knowledge.
PEO2	Graduates will contribute to national-level biodiversity documentation and ecological research through technical roles in premier institutes like the Wildlife Institute of India (WII), Zoological Survey of India (ZSI), and Botanical Survey of India (BSI).
PEO3	Graduates will successfully clear competitive examinations to enter public service, serving as competent forest officials and administrators within state and national forest departments.
PEO4	Graduates will apply field-based ecological expertise to manage, monitor, and conserve wildlife habitats within Tiger Reserves, National Parks and Wildlife Sanctuaries.
PEO5	Graduates will utilize specialized molecular and analytical techniques to serve effectively in wildlife forensic laboratories, aiding in the mitigation of illegal wildlife trade.
PEO6	Graduates will drive sustainable development by offering expertise in forest ecosystem restoration, environmental impact assessments, and pollution control sectors.
PEO7	Graduates will bridge the gap between wildlife biology and veterinary sciences, contributing technical support to wildlife rehabilitation, veterinary sectors, and animal behavioral training programs.
PEO8	Graduates will design and lead impactful conservation initiatives, community engagement programs, and field projects within non-governmental organizations (NGOs) such as SACON, BNHS, WTI, WWF-India, Wildlife SOS, WNCT and WCS.
PEO9	Graduates will successfully clear competitive examinations to enter public service, serving as competent forest officials and administrators within state and national forest departments.
PEO10	Graduates will address complex environmental challenges by integrating ecological principles into environmental impact assessments, pollution control sectors, forest ecosystem management and sustainable wildlife policy development.

Program Specific Outcomes(PSOs)	
After the successful completion of **Wildlife Biology** program, the students are expected to	
PSO1	**Advanced Disciplinary Knowledge** Demonstrate a comprehensive and deep theoretical understanding of advanced core concepts in taxonomy, ecology, animal behaviour, evolutionary biology and conservation genetics. .
PSO2	**Field craft & Technical Competency** Apply rigorous, standardized field techniques for wildlife monitoring, census taking, population estimation, and natural resource mapping using modern tools like GIS, remote sensing and radio - telemetry. .
PSO3	**Critical Inquiry & Analytical Skills** Formulate research hypotheses, design empirically sound field experiments, and execute quantitative data analysis using specialized statistical packages (such as SBSS, SAS and R-packages) to interpret complex biological data.
PSO4	**Problem Solving & Conflict Management** Analyse and devise scientific mitigation strategies for real-world ecological challenges, including human-wildlife conflict, habitat fragmentation, biological invasions and climate change impacts.
PSO5	**Legal and Policy Literacy** Interpret and apply national and international wildlife frameworks, such as India's Wildlife (Protection) Act, CITES and CBD protocols, to local administrative and conservation management scenarios.
PSO6	**Professional Ethics & Environmental Citizenship** Commit to strict ethical standards in animal handling, field research, and data reporting, while actively promoting environmental justice, sustainability and community-inclusive conservation.
PSO7	**Communication & Scientific Writing** Structure and present complex scientific ideas, research findings, and environmental impact assessment (EIA) reports clearly, both orally and via written peer-reviewed technical publications.
PSO8	**Landscape-Level Biodiversity Evaluation** Develop the capacity to analyse species-habitat relationships, assess ecological niches, and identify drivers of endemism with a sharp focus on fragile biomes, such as tropical rainforests, mountain ecosystems and wetland habitats. .
PSO9	**Protected Area Management Planning** Formulate and critique comprehensive management plans for Biosphere Reserves, National Parks, Wildlife Sanctuaries and eco-sensitive corridors, balancing local community livelihoods with landscape preservation.

PSO10	**Communication & Scientific Writing** Structure and present complex scientific ideas, research findings, and Environmental Impact Assessment (EIA) reports clearly, both orally and via written peer-reviewed technical publications. Focus to prepare them with research - oriented approach in frontier Areas or research in Wildlife Biology and preparing them for carrying out advance research.

Program Outcomes (POs)	
On successful completion of the M.Sc., Wildlife Biology program	
PO1	Demonstrate proficiency in scientific writing through the compilation of structured assignments, comprehensive field reports and independent research projects.
PO2	Deliver impactful professional presentations and effectively communicate complex biological research findings to both scientific communities and public stakeholders.
PO3	To attain analytical skills like understanding & Interpreting the results
PO4	Evaluate quantitative and qualitative data by applying analytical methods to interpret and validate ecological research outcomes.
PO5	Operate advanced laboratory instrumentation and specialized field equipment essential for modern wildlife and biological research.
PO6	Apply professional taxonomic keys and field methodologies to accurately identify, classify and inventory diverse animal species.
PO7	Analyze the complex dynamics of animal biodiversity, population ecology, and forest ecosystem functions across varied landscapes.
PO8	Examine the anatomical, physiological, behavioral, and evolutionary adaptations of wildlife species to understand their survival mechanisms.
PO9	Classify biological taxa from lower invertebrates to advanced chordates utilizing morphometric data, digital models and phylogenetic frameworks.
PO10	Cultivate a rigorous scientific mindset, critical thinking, and a lifelong commitment to advancing innovative research in wildlife sciences.

BHARATHIAR UNIVERSITY: COIMBATORE - 641 046

M.Sc., WILDLIFE BIOLOGY DEGREE COURSE (COLLEGES - CBCS PATTERN) REVISED SCHEME OF EXAMINATION

(For the students admitted during the academic year 2026 – 27 onwards)

Course Code	Paper	Title of the Course	Credits	Hours		MaximumMarks		
				Theory	Practical	CIA	ESE	Total
		FIRSTSEMESTER						
13A	Core I	Ichthyology and Herpetology	4	5	-	25	75	100
13B	Core II	Ornithology	4	5	-	25	75	100
13C	Core III	Mammalogy	4	5	-	25	75	100
13EA	Elective I	Forestry, Silviculture and Forest Entomology	3	3	-	25	75	100
13EB	Elective II	Wildlife Crime	3	3	-	25	75	100
13SEC	SEC I	Biodiversity Conservation	3	3	-	25	75	100
13P	Core Practical	I (Covering core papers I-III)	5	-	6	25	75	100
		Total	**25**	24	6			**700**
		SECONDSEMESTER						
23A	Core IV	Ecology	4	5	-	25	75	100
23B	Core V	Ethology of Wildlife	4	5	-	25	75	100
23C	Core VI	Conservation Genetics and Evolution	4	5	-	25	75	100
2EA	Elective III	GIS and Data Visualization	3	3	-	25	75	100
2EB	Elective IV	Climate Change and Wildlife Conservation	3	3		25	75	100
23SEC	SEC II	Wetland conservation	3	3		25	75	100
23Q	Core Practical	II (covering core papers IV-VII)	5		6	25	75	100
		Total	**26**	24	6			**700**
		THIRDSEMESTER						
33A	Core VIII	Physiology and Health care of Wildlife	4	5	-	25	75	100
33B	Core IX	Management of Zoos, Sanctuaries & National Parks	4	5	-	25	75	100
33C	Core X	Wildlife Management Techniques	4	5	-	25	75	100
33SEC	SEC III	Landscape Ecology	3	3	-	25	75	100
3EA	Elective V	Biostatistics and Data Sciences	3	3	-	25	75	100
3EB	Elective VI	Research Methodology, Application of Computing and Artificial Intelligence 4.0	3	3	-	25	75	100
33R	Core Practical	Practical III (Covering core papers VIII-X)	5	-	5	25	75	100
25WB133		Health and Wellness	1	1	-	25	25	50
39SI		Summer Internship	2	-	-	25	75	100
310EA		Extension activity	1	-	-	25	25	50
		Total	**30**	25	5			**900**
		FOURTHSEMESTER						
47V	Paper XV	Project& viva-voce	10	-		100	100	200
		Total	**91**	73	22			**200**
		Grand Total	**91**	73	22			**2500**

E – Elective SEC – Skill Enhanced Course

Guidelines for awarding 100 marks of the summer Internship programme:

After the second semester the student should attend a summer internship programme in any government or non-government institutions

Internal marks will be given by the host institution out of 25

External marks will be given by HOD and the concern guide of the student by evaluating his/her summer internship report out of 75

Guidelines for awarding 50 marks of Extension Activities:

Based on the certificate produced by the student on his/her participation in any wildlife population estimation activities, participation/presentation of workshop/seminar/conference/symposia, short-term training, etc. pertaining to wildlife studies

Guidelines for awarding 50 marks of Health and Wellness

Based on the health, attendance percentage and his/her attitudes in the classes both internal and external marks will be given by the HOD and concern class tutors

Guidelines for awarding 200 marks of the Project:

*For Project 200 marks (Project work=100 marks and Viva-voce= 100 marks).

Internal and external examiners will evaluate the project work and award marks out of 100.

Internal and external examiners will conduct viva-voce examination and award marks out of 100.

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Course code	13A	ICHTHYOLOGY AND HERPETOLOGY	L	T	P	C
Core/Elective/Supportive		Core Paper I	6	0	0	4
Pre-requisite		Basic knowledge about Fishes, Amphibians and Reptiles and their functions	Syllabus Version	2026 – 2027		

Course Objectives:

The main objectives of this course are:
To understand about the procedures and trends in taxonomy.
To understand important physiological functions in various vertebrate forms.
To know about the breeding behaviour of Fishes, Amphibians and Reptiles.
To know about the organization of Phylum Pisces, Amphibians and Reptiles and its characters.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	To understand concepts of the Taxonomy, its procedures, methods in collection and preservation Of animals as well as classification of animals.	K2
2	To attain knowledge about locomotory organs, methods of locomotion, Feeding and Digestion in various Vertebrates.	K3
3	To understand about organs of respiration, respiratory pigments, their mechanism, organs and Products of excretion, mechanism and its relation to osmoregulation.	K2
4	To understand the organization and function of nervous system and its Evolutionary advances.	K4
5	Integrate the strategies and evolutionary significance of free living and parasitic larval forms of Invertebrates on Fishes, Reptiles and Amphibians.	K5

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate

Unit:1	Ichthyology: Anatomy, Adaptation, Evolutionary Ecology, and Conservation	15hours

1. Taxonomic Principles, Morphometrics and Systematic Classification of Pisces Accessory respiratory organs-Air breathing fishes.
2. Comparative Respiratory Physiology, Accessory Organs, and Biomechanics of Fins.
3. Osmoregulation, Ionoregulation and Environmental Adaptations Across Aquatic Systems.
4. Migratory Dynamics, Reproductive Strategies and Behavioral Ethology in Teleosts.
5. Fish Integument, Scale Morphology and the Evolutionary Origin of Vertebrates.
6. Economic Ichthyology, Fisheries Management and Indian Threatened Fish Conservation.

Unit:2	Indian Ichthyofaunal Diversity, Biogeography, Fish Ecology and Marine Conservation	15hours

1. Major Taxonomic Groups, Systematic Diversity and Distributional Frameworks of Indian Fishes.
2. Ichthyogeography of India: Biogeographic Zones, Endemism and Evolutionary Radiation.
3. Marine Fishery Resources of India: Stock Architecture, Exclusive Economic Zone (EEZ) and Pelagic/Demersal Dynamics.
4. Fish Community Structure: Assembly Rules, Microhabitat Selection and Resource Partitioning.
5. Biology, Eco-Hydrology and Movement Dynamics of Threatened Indian Ichthyofauna.
6. Threat Dynamics, Invasive Mechanics and Conservation Frameworks for Fish Biodiversity.

Unit:3	Amphibian Biology, Evolutionary Physiology, Metamorphosis and Western Ghats Endemism	15hours

1. Taxonomic Principles, Systematics, and Structural Diversity of Modern Amphibia
2. Biogeography, Habitat Specialization, and Taxon Diversity of South Indian Amphibians.
3. Comparative Respiratory Systems: Branchial, Cutaneous, Buccopharyngeal, and Pulmocutaneous Mechanics.
4. Adaptive Radiation, Thyroid-Mediated Metamorphosis, and Parental Care Strategies.
5. Evolutionary Milestones, Ecological Bio-Indicators, and Economic Contributions of Amphibia.
6. Endemic Amphibians of the Western Ghats: Radiation, Evolutionary Relicts, and Conservation Threats.

Unit:4	Herpetology: Reptolian Taxonomy, Evolutionary Morphology, Adaptation and Indian Diversity	15hours

1. Taxonomic Principles, Morphometric and Systematic Classification of Reptiles.
2. Cranial Morphology, Temporal Fenestration, and Evolutionary Significance of Reptilia.
3. Macro-Evolutionary Radiation, Reproductive Strategies and Regenerative Mechanics.
4. Eco physiological Mechanisms, Thermoregulation, and Locomotory Adaptations.
5. Chelonian Morphological Radiation and Endemic Reptilian Fauna of India.
6. Venom Mechanics in Snakes and Crocodilian Distribution, Status, and Management.

Unit:5	Conservation Biology and Ecology of Indian Herpetofauna	15hours

1. Major Taxonomic Groups, Systematic Diversity, and Distributional Frameworks of Indian Herpetofauna.
2. Endemic Radiations, Living Fossils, and Threatened Species of the Western Ghats Biodiversity Hotspot.
3. Wildlife Trade Mechanics, Legal Frameworks, and Exploitation of Amphibians and Reptiles.
4. Anthropogenic Drivers of Herpetofaunal Declines: Land Use, Pollution, Climate Shifts and Invasive.
5. Pelagic Ecology, Navigational Mechanisms, and Nesting Biology of Marine Turtles.
6. Distribution of Indian Snakes, Ecosystem Services, and Conservation Policy Frameworks.

Unit:6	Contemporary Issues	2hours

Expert lectures, online seminars –webinars, Conferences and Workshops Field trips/Field visit

	Total Lecture hours	77hours

Text Book(s)

1	Fishes An Introduction to Ichthyology, Moyle & Cechi.
2	John Richardson, Ichthyology
3	A Text book of Modern Chordata, Kothpal.
4	Herpetology: An Introductory Biology of Amphibians and Reptiles, Laurie J. Vitt, Janalee P. Caldwell,

Reference Books

1	General & Applied Ichthyology: Fish and Fisheries June 2006, Gupta.
2	Textbook of Fish Biology and Fisheries 3rd Edition, SS Khanna.
3	Herpetology: An Introductory Biology of Amphibians and Reptiles, Laurie J. Vitt, Janalee P. Caldwell.
4	Cold Blood: Adventures with Reptiles and Amphibians
5	Reptile, McCarthy.
6	Herpetology, Pough.
7	Venomous Snakes of the World, Mark O'Shea.

Related Online Contents[MOOC,SWAYAM, NPTEL, Websites etc.]	
1	SystemsBiology(NPTEL)webhttps://nptel.ac.in/courses/102/106/102106035/
Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. J. Pandiyan, Associate Professor, A.V.C. College (Autonomous), Mayiladuthurai	

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	M	S	S	L	S	M	S	S	M	L
CO2	S	M	M	L	S	S	S	M	S	M
CO3	S	M	M	L	S	S	S	M	S	M
CO4	L	L	L	L	S	M	S	M	S	S
CO5	M	M	S	L	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code	13B	ORNITHOLOGY	L	T	P	C
Core/Elective/Supportive		Core Paper II	6	0	0	4
Pre-requisite		Basic knowledge about Birds, Anatomy and Physiology	Syllabus Version		2026 – 2027	

Course Objectives:

The main objectives of this course are

1. Understand the evolutionary origin, phylogenetic history, and morphological diversity of class Aves.
2. Examine the structural and functional adaptations of the avian integumentary, skeletal, and digestive systems.
3. Evaluate the comparative anatomy and physiology of the respiratory, circulatory, and urogenital systems in birds.
4. Analyze complex avian behaviors, including foraging ecology, migration strategies, orientation mechanisms, and nesting behaviors.
5. Comprehend the neurological adaptations, sensory biology, mating systems, reproductive physiology, and dynamics of parental care in birds.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Explain the evolutionary origins of birds, morpho-functional adaptations of avian structures, and patterns of regional endemism..	K2
2	Classify global and Indian avifauna up to the family level and describe the anatomical modifications of the avian integument and its derivatives.	K2
3	Analyze the anatomical and physiological mechanisms governing avian respiration, circulation, and nutritional foraging ecology across diverse trophic guilds.	K4
4	Evaluate the biomechanics of avian skeletal systems, flight evolution, and the complex physiological and behavioral mechanics of migration.	K2& K5
5	Assess the behavioral ecology of avian reproduction, mating systems, sensory processing, and the ecological trade-offs of parental investment.	K4

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate

Unit:1	Systematics, Evolutionary Paleontology, Functional Topography and Avian Conservation Dynamics	15hours

1. Avian Systematics, Diagnostic Taxonomy, and Family-Level Classification.
2. External Topography, Integument, and Feather Micro-Architecture.
   - **Structural Topography**
   - **Pterylosis & Feather Micro-Structure**
   - **Coloration Mechanisms**
3. Biomechanics and Functional Modifications of Beaks, Wings, and Feet.
   - **Beak Functional Diversity:**
   - **Wing Aerodynamics & Modifications:**
   - **Podotheca & Foot Adaptations:**
4. Avian Paleobiology, Theropod Lineage, and the Significance of Archaeopteryx.
   - **Theropod Origin Hypothesis**
   - **Phylogenetic Significance of *Archaeopteryx lithographica***
   - **Key Evolutionary Milestones**
5. Biogeographic Patterns, Endemic Bird Areas and Conservation Networks in India.
   - **Endemism in Indian Avifauna:**

- **Important Bird and Biodiversity Areas (IBAs):**
- **Key Indian IBA Case Studies:**

6. Ecosystem Services, Airport Bird Hazard Management and Anthropogenic Pressures.

Unit:2	Avian Digestive Physiology, Adaptive Radiation, Foraging Ecology and Indian Avifaunal Habitat Systems	15hours

1. Avian Alimentary Tract Architecture, Functional Histology, and Digestive Physiology.
2. Adaptive Radiation of Bill Mechanics, Sensory Systems, and Digestive Specializations Across Trophic Guilds.
3. Avian Foraging Dynamics, Eco-Energetics, and Decision-Making Models.
   - **Optimal Foraging Theory (OFT) Marginal Value Theorem (MVT)**
   - **Foraging Techniques & Tactics**
   - **Risk-Sensitive Foraging & Trade**
4. Avifaunal Community Structure, Eco-Biogeography, and Habitat Associations Across Indian Biomes.
5. Altitudinal Zonation, Hypoxia Adaptation, and Himalayan-Western Ghats Montane Guilds.
6. Xeric Guilds, Grassland Specialists, and Water-Conservation Ecology.
   - **Arid Specialists & Grassland Guilds:**
   - **Water-Conservation Physiology**
   - **Spatial Dynamics & Nomadic Tracking:**

Unit:3	Avian Respiratory Physiology, Biomechanics, Aerodynamics, Navigation and Nest Architecture	15hours

1. Anatomical Architecture and Respiratory Physiology of the Avian Gas-Exchange System.
   - **Tracheo-Bronchial Architecture:** Trachea structural variations (loops, elongations), syrinx structure (vocal organ), primary bronchi, mesobronchi, dorsobronchi, and ventrobronchi.
   - **Lung Histology & Parabronchial System:** Non-expansible, rigid lungs; paleopulmonic vs. neopulmonic parabronchi; structural design of air capillaries interdigitating with blood capillaries for minimal diffusion distance.
   - **Gas Exchange Dynamics:** High surface area and ultra-thin blood-gas barrier; continuous unidirectionality of airflow through parabronchi during both inhalation and exhalation.
2. Air Sac Biomechanics, Cross-Current Gas Exchange, and Skeletal Flight Architecture.
3. Aerodynamic Physics, Wing Kinematics, and Evolutionary Models of Flight
4. Migratory Physiology, Endogenous Timing Mechanisms, and Multimodal Navigation Systems.
5. Evolutionary Drivers, Material Selection, and Structural Engineering of Nests.
6. Site Selection, Colonial Nesting Dynamics and Extreme Nesting Adaptations
   - **Site Selection & Nesting Ecology**
   - **Colonial Nesting Dynamics**
   - **Specialized Nesting Profiles:**

Unit:4	Avian Urogenital Physiology, Reproductive Endocrinology, Behavioral Ecology and Breeding Systems	15hours

1. Urogenital Architecture, Renal Micro-Structure, and Reproductive Anatomy.
2. Renal-Salt Glands Osmoregulation, Nitrogen Excretion, and Neuroendocrine Cascades.
3. Breeding Phenology, Reproductive Cycles, and Environmental Regulation.
4. Courtship Displays, Sexual Selection, Pair-Bond Mechanics, and Polymorphism.
5. Evolutionary Ecology of Mating Systems, Extra-Pair Paternity, and Lekking.
6. Kin Selection, Social Cooperation, and Avian Brood Parasitism.

Unit:5	Avian Neurobiology, Sensory Ecology, Oology and Developmental Life-Histories	15hours

1. Avian Neuroanatomy, Pallial Evolution, and Advanced Cognition.
   - **Macroscopic Brain Architecture**
   - **Pallial Organization & The Avian "Neocortex": hyperpallium** and **nidopallium** (the avian pallium).

- **Cognitive Neurobiology** (song control system, HVC, and RA nuclei in oscine passerines).

2. Ocular Architecture, Photoreception, and Tetrachromatic Visual Ecology.
   - **Structural Anatomy of the Eye**
   - **Retinal Topography & Visual Acuity**
   - **Tetrachromatic Vision**
3. Auditory Pathways, Sound Localization, and Avian Echolocation.
   - **Auditory Anatomy**
   - **Sound Localization Specializations**
   - **Avian Echolocation**.
4. Olfaction, Gustation, and Tactile Foraging Organs.
5. Egg Architecture, Laying Strategies, and Evolutionary Clutch Dynamics.
6. Incubation Mechanics, Developmental Spectra, and Post-Hatching Dynamics.
   - **Physiology of Incubation**
   - **Hatching Dynamics & Ontogeny**
   - **Parental Care & Dispersal**

Unit:6	**Contemporary Issues**	**2hours**
Expert lectures, Online seminars, webinars		
	Total Lecture hours	**77hours**

Text Book(s)

1	Kotpal, A Textbook of Chordata
2	Morrison, Rodewald, Voelker & Colon, Ornithology, 2018.
3	Faaborg & Faaborg, Book of Birds, Introduction to Ornithology, 2020
4	Salim Ali, The Book of Indian Birds, 2003
5	

Reference Books

1	Grimmet & Inskipp, Birds of Indian Subcontinent: India, Pakistan, Sri Lanka
2	Millton Hilderbrand. Analysis of vertebrate structure(1988). IV. Ed. John Wiley and Sons Inc., New York.
3	Romer, A.S. Vertebrate body (1949), IIIrd Ed. W.B. Saunders Co., Philadelphia.
4	Montagna, W. Comparative anatomy (1960). John Wiley and Sons Inc.
5	Walters, H.E. and Sayles, L.D. Biology of vertebrates (1959). Macmillan & Co., New York
6	Torrey, T.W. Morphogenesis of vertebrates (1963), John Wiley and Sons Inc., New York and London
7	Colbert, E.H. Evolution of the vertebrates (1969), John Wiley and Sons Inc., New York.

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

1	GeneralHumanAnatomy(WMA):https://www.mooc-list.com/course/general-human-anatomy-wma
2	EvolutionaryBiology:https://onlinecourses.swayam2.ac.in/cec20_bt06/preview

Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam, Dr. S Vidya, Government Arts College, Udhagamandalam.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	M	L	S	S	S	L	S	M

CO2	S	M	L	L	S	S	S	S	S	M
CO3	M	L	M	L	S	S	S	S	S	M
CO4	S	M	M	L	S	S	S	S	S	M
CO5	S	M	M	L	S	S	S	S	S	M

*S-Strong; M-Medium; L-Low

Course code	13C	MAMMALOGY	L	T	P	C
Core/Elective/Supportive		Core Paper III	6	0	0	4
Pre-requisite		Basic knowledge about Mammal bio diversity and conservation	S	Syllabus version	2026-2027	

Course Objectives:

The main objectives of this course are to:
Understand the classification of Mammals.
Acquire the knowledge of mammalian physiology.
Knowledge about different mammalian species.
Levels of organization in Mammals.
Analyze the ecological and evolutionary affinities of mammals.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1.	To understand the significance of Mammals and its Classification.	K2
2.	To appreciate the various strategies to protect the Endemic and Endangered Mammals.	K4
3.	To know the comparative anatomy and evolutionary affinities of various Mammals.	K2
4.	To acquire knowledge about ecological and evolutionary aspects.	K3
5.	To develop awareness about conservation of mammals.	K5

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate

Unit:1	Mammalogy: Evolutionary Morphology, Physiology, Systematics, and Adaptive Radiation	15hours

1. Mammalian Systematics, Diagnostic Criteria, and Taxonomic Field Identification
2. Systematic Classification of Mammalia: Prototheria, Metatheria, and Eutherian Orders.
3. Synapsid Evolution, Mammal-like Reptiles, and Macro-Evolutionary Radiation.
4. Comparative Organ System Physiology: Digestion, Reproduction, and Endocrine Integration.
5. Excretory Mechanisms, Cranial Morphology, Dental Specializations, and Functional Adaptations.
6. Conservation Biology of Mammalia: Threat Dynamics, Human-Wildlife Conflict, and Recovery Frameworks.

Unit:2	Natural History, Comparative Anatomy, Ethology and Conservation of Non-Primate Indian Mammals	15hours

1. Comparative Cranial Morphology, Dentition, and Masticatory Mechanics.
2. Trophic Ecology, Foraging Strategies, and Digestive Adaptations.
3. Locomotory Mechanics, Kinematics, and Social System Evolution.
4. Sensory Communication Systems, Bioacoustics, and Life-History Strategies.
    - Taxonomic Overview, Auto-Ecology, and Distribution of Key Non-Primate Mammalian Taxa. • **Proboscidea & Ungulates:** Asian Elephant (*Elephas maximus*); Indian Rhinoceros (*Rhinoceros unicornis*); Artiodactyls (Cervids, Bovids, Suids, Tragulids). • **Small Mammals & Insectivores:** Indian Lagomorphs (Hispid Hare, Indian Hare, Pikas); Pangolins (Indian Pangolin *Manis crassicaudata*, Chinese Pangolin *Manis pentadactyla*); Scandentia & Tree Shrews (*Anathana ellioti*); Eulipotyphla (Hedgehogs, Shrews, Moles); Rodentia (Squirrels, Porcupines, Murids, Voles). **Chiropterons:** Bats
5. Conservation Biology, Anthropogenic Pressures, Legal Protections, and Mitigation Strategies.

Unit:3	Comparative Carnivore Biology: Osteology, Ethology, Sociobiology, and Conservation	15hours

1. Comparative Cranial Osteology, Dental Specializations, and Carnassial Mechanics.
2. Dietary Ecophysiology, Hunting Tactics and Trophic Niche Dynamics.
3. Locomotory Adaptations, Kinematics and Spatial Social Organization.
4. Sensory Communication Protocols, Bioacoustics and Reproductive Strategies.
5. Systematics, Auto-Ecology, and Distribution of Indian Carnivoran Families.
   - **Felidae:** Panthera (Tiger, Leopard, Snow Leopard, Clouded Leopard, Lion) and Small Cats (Fishing Cat, Leopard Cat, Marbled Cat, Desert Cat, etc.).
   - **Canidae:** Dhole (*Cuon alpinus*), Indian Grey Wolf, Golden Jackal, Bengal Fox, Indian Desert Fox.
   - **Hyaenidae:** Striped Hyaena (*Hyaena hyaena*).
   - **Viverridae & Prionodontidae:** Large & Small Indian Civets, Palm Civets, and Linsangs.
   - **Herpestidae:** Grey Mongoose, Small Indian Mongoose, Ruddy Mongoose, Crab-eating Mongoose, Stripe-necked Mongoose.
   - **Mustelidae:** Otters (Smooth-coated, Eurasian, Asian Small-clawed), Martens (Nilgiri Marten), Weasels, and Badgers (Hog Badger, Honey Badger/Ratel).
   - **Ursidae:** Sloth Bear (*Melursus ursinus*), Himalayan Black Bear, Brown Bear, Sun Bear.
   - **Ailuridae:** Red Panda (*Ailurus fulgens*).
6. Threat Mechanics, Human-Carnivore Conflict, Anti-Poaching Enforcement, and Policy.

Unit:4	Advanced Mammalian Biology: Primates, Hominids, Suids, Mustelids, and Aquatic Mammals	15hours

1. Cranial Morphology, Dental Adaptations, and Masticatory Biomechanics.
2. Systematics, Auto-Ecology, and Distribution of Indian Primate species. Trophic Ecology, Foraging Mechanics, and Energetic Strategies.
   - **Gibbons, Langurs, Macaque species**
3. Locomotory Kinematics, Biomechanics, and Social Organization.
4. Communication Systems, Bioacoustics, and Sensory Integration.
   - **Acoustic Communication:** Complex vocal repertoire, pant-hoots, and dialectal vocalizations in Hominids; infrasonic vocalizations and baleen whale "songs" in **Mysticetes**; high-frequency echolocation clicks, whistles, and signature calls via the melon structure in **Odontocetes**; underwater barks, roars, and trills in **Pinnipedia**.
   - **Olfactory & Visual Signaling:** Integumentary scent marking, facial expressions, and posture displays in Primates, Mustelids, and Suids; pheromonal signaling via tarsal/preorbital/anal glands; reduced reliance on olfaction in fully aquatic Cetaceans and Sirenians.
5. Evolutionary tradeoffs in reproductive investment (r vs. K selection continua):
   - **Primate & Hominid Strategies:** Single births, prolonged infant dependency, sexual bimorphism vs. monogamy, menstrual cycles, and concealed ovulation vs. sexual swellings.
   - **Mustelid Physiology:** Embryonic diapause (delayed implantation), induced ovulation, altricial litters, and maternal-only parental investment.
   - **Suid Dynamics:** High fecundity among ungulates, large litters (polytochous), nest-building behavior, and precocial neonates with stripes.
   - **Aquatic Mammal Adaptations:** Prolonged lactation with high-fat milk composition, capital vs. income breeding in Pinnipeds, single calf/pup investment, delayed implantation in Pinnipeds, and underwater birthing adaptations in Cetaceans and Sirenians.
6. Conservation Biology, Anthropogenic Impacts, and Species Recovery Protocols

Unit:5	Advanced Mammalogy: History, Evolutionary Mechanics, Ecophysiology, Allometry and Behavioral Architecture	15hours

1. Evolutionary Paleontology, Mammalian Phylomics and Taxonomic History.
2. Extreme Ecophysiology, Locomotory Physics and Osmo-Metabolic Homeostasis.
3. Bioenergetics, Endothermy Mechanics and Thermal Stress Adaptations.
4. Mammalian Scaling Laws, Macroecology and Life-History Strategies.
   - **llometric Scaling Laws: Kleiber's Law**

- **Macroecological Rules**
- **Life-History Constellations:** Body size constraints on reproduction, gestation length, lactation period, age at first maturity, and population growth rate (r_{max}); the r/K selection spectrum and fast-slow life history continuum.

5. Integumentary Histology, Glandular Biology and Epidermal Derivatives.
   - **Histological Architecture**
   - **Epidermal Glands: sebaceous** (holocrine), **eccrine** (merocrine), **apocrine** (scent and thermal) and **mammary glands** (modified apocrine sweat glands); lactation physiology and milk composition across taxa.
   - **Keratinous Derivatives**
6. Sociality (Elephants), Communication Networks (Predator and Antipredator strategies), Behavioral Ecology (Parental care in Primates) and Socio-Economic Drivers

Unit:6	**Contemporary Issues**	**2hour**
Expert lectures, online seminars, webinars,		
	Total Lecture hours	**77hours**

TextBook(s)

1.	Mammals of India, Vivek Menon, 2009.
2.	The life of Mammals, David Attenborough, 2002.
3.	Mammals: 300 Amazing Animals, Chris McNab, 2016
4.	Mammals: A compare and Contrast Book, Katharine Hall, Kindle Edition,
5.	Mammalogy: Adaptation, Diversity& Ecology, Feldhamer, Merritt, Krajewski,Rachlow and Stewart, 2020
6.	Manualof Zoology–EgambaranathaIyyer

Reference Books

1.	Current Mammalogy, Genoways, 2013
2.	Mammalogy Techniques, Ryan, 2018
3.	Mammals of the World, Ronald, 1999
4.	A manual of Mammalogy, Martin, Pine &Deblase, 1974
5.	Physiological Mammalogy, Mayer1963

Related Online Contents[MOOC,SWAYAM, NPTEL, Websitesetc.]

1	EcologyandWildlifeConservation(FutureLearn):https://www.mooc-list.com/course/ecology-and-wildlife-conservation
2	WildlifeConservation:https://nptel.ac.in/courses/102/104/102104068/
3	WildlifeEcology:https://swayam.gov.in/nd1_noc20_bt38/preview

Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. N. Ezhilarasi, Associate Professor, Government Arts College (Autonomous), Coimbatore

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	S	S	M	M	M	S
CO2	S	S	S	L	S	S	M	M	M	S
CO3	S	S	S	L	S	S	S	S	S	S
CO4	S	S	S	L	S	M	M	M	S	S

CO5	S	S	S	L	S	S	S	S	S	S

*S-Strong;M-Medium;L-Low

Course code	13EA	FORESTRY, SILVICULTURE& FOREST ENTOMOLOGY	L	T	P	C
Core/Elective/Supportive		Elective Paper I	6	0	0	4
Pre-requisite		Basic understanding about Forest, Silvicultural aspects and importance of entomology	Syllabus version		2026-2027	

Course Objectives:

The main objectives of this course are,
To explain the core concepts of ecology for a better understanding of the environment.
To motivate, identify and solve the problem regarding habitat loss.
To create awareness about the improvement and protection of the environment.
To make understand the need for conservation of biodiversity and natural resources.
To help understand the concepts of exobiology.
To develop awareness about the Forest Insects
To learn the taxonomy and classification of Insects

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the ecological dynamics and the significance of environmental integrity. Understanding the beneficial role of Insects.	K2
2	Recognize various global and regional environmental concerns that affects the biosphere And analyze the impact of human activities on the environment.	K1
3	Appreciate the significance of the conservation of native biodiversity. The course will give an idea about management of forest insects	K4
4	Scrutinize specific cases of environmental pollution and challenges, and their impacts on ecology.	K5
5	The learners will be trained in handling and preservation of insect specimen.	K3

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate;**K6**–Create

Unit:1	Regeneration Of Forest	15hours

1. Forest Regeneration Systems: Principles of Natural and Artificial Regeneration, Nursery Management, and Plantation Technology.
2. Silvicultural Systems: Operational Mechanics of Clear-Felling, Shelter wood, Selection, Coppice, and Conversion Regimes.
3. Specialized Silviculture: Management Dynamics of Mangrove Forests, Cold Desert Ecosystems, and Industrial Plantations.
4. Forest Genetics and Seed Technology: Plus, Tree Selection, Seed Processing, Storage Protocols, and Stand Tending.
5. Non-Timber Forest Products (NTFPs): Categorization, Sustainable Extraction, Processing, and Value Addition.
6. Wood Science and Technology: Anatomical Structure, Physical Defects, Timber Identification, Seasoning, and Preservation Protocols.

Unit:2	Forest Mensuration	15hours

1. Principles of Forest Management: Yield Calculation, Rotation, Sustained Yield and Working Plan Execution.
2. Individual Tree Mensuration: Measurement Mechanics of Diameter, Girth, Height, Tree Form, and Volume.
3. Forest Stand Mensuration and Inventory Design: Sampling Techniques, Sample Plot Layout & Stand and Log Volume Estimation.
4. Yield Estimation, Growth Dynamics, and Satellite-Based Forest Cover Monitoring.

5. Geographic Information Systems (GIS) in Forestry: Spatial Database Management, Habitat Modeling, and Growth Simulation.
6. Forest Surveying and Cartography: Field Survey Techniques, Map Reading, Orientation, and Boundary Demarcation.

Unit:3	Forest Management & Working Plan	15hours

1. Biogeographical Classification of Indian Forests: Champion and Seth Framework, Field Identification and Dendrological Profiling.
2. Taxonomic Infrastructure: Establishment, Curation, and Management of Herbaria and Arboreta.
3. Applied Agroforestry Systems, Social Forestry Frameworks, and Urban Ecosystem Management.
4. Participatory Forest Management: Joint Forest Management (JFM) Frameworks and Integrated Watershed Management.
5. Forest Degradation Dynamics: Drivers and Impacts of Deforestation, and Forest Inventory Assessment.
6. Forest Working Plan Mechanics: Surveying, Drafting, Content Structure and Regulatory Submission.

Unit:4	Forest Entomology	15hours

1. General Insect Morphology: Structural Organization, Tagmatization, and Anatomical Adaptations.
2. Insect Systematics and Taxonomy I: Diagnostic Characters and Family-Level Classification of Orthoptera, Hemiptera, and Coleoptera.
3. Insect Systematics and Taxonomy II: Diagnostic Characters and Family-Level Classification of Lepidoptera and Hymenoptera.
4. Agricultural Entomology: Bionomics, Damage Patterns, and Management of Major Crop Pests across Key Orders.
5. Insect Reproductive Physiology, Embryogenesis, Development and Metamorphosis Regimes.
6. Insect Behavior and Ethology: Nutritional Strategies, Communication, Mechanisms and Sociality (Honey Bee).

Unit : 5	Destructive Entomology

1. Detection Frameworks and Quantitative Sampling Mechanics for Forest Insect Infestations.
2. Insect Abundance Evaluation, Stand Susceptibility, and Biological Hazard Rating Systems.
3. Integrated Forest Insect Management: Operational Mechanics of Direct and Indirect Control Strategies.
4. Bionomics, Damage Dynamics, and Management of Keystone Timber Pests: Teak, Sandalwood, and Bamboo.
5. Insect Outbreak Dynamics, Predictive Forecasting Models, and Risk Assessment Protocols.
6. Insect–Plant Interactions: Co-evolutionary Dynamics, Host Plant Resistance and Chemical Ecology.

Unit:6	Contemporary Issues	2hours
Expert lectures, online seminars, webinars, workshops		
	Total Lecture hours	**77hours**

Text Book(s)

1	Odum: Fundamentals of Ecology(1953)
2	Odum :Basic Ecology(1983)
3	Turkand Turk: Environmental Science
4	Environmental biology – Dr.P.S.Verma & Dr.V.K.Agarwal
5	Manikandan. K &Prabhu. S (2019). Indian Forestry*: A Break through Approach to Forest Service.* Jain Brother Publishers.

Reference Books

1	Controlled Ecological Life Support system – NASA conference publication (2378) (e-content)

2	Environmental Science: Earthasa Living Planet by Daniel B.Botkin, EdwardA.Keller
3	EnvironmentalScience:Systemsandsolutions–MichaelL.McKinney&RobertM.Schoch.
4	Ecologyand Environment-P.D. Sharma
RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]	
1	Primark:A Primerof ConservationBiology
2	Calabrese:PollutantsandHigh – RiskGroups
3	ControlledEcologicalLifeSupportsystem –NASAconferencepublication(2378)(e-content)
Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. J. Pandiyan, Associate Professor, A.V.C. College (Autonomous), Mayiladuthurai, Dr. S Vidya, Government Arts College, Udhagamandalam.	

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	L	S	S	S	S	S	S
CO2	S	S	S	L	S	S	M	S	L	S
CO3	S	S	S	L	S	S	M	S	L	S
CO4	S	S	S	L	L	M	L	M	S	S
CO5	S	S	S	L	S	S	S	S	S	S

*S-Strong;M-Medium;L-Low

Course code	**13EB**	**WILDLIFE CRIME**	**L**	**T**	**P**	**C**
Core/Elective/Supportive		**Elective Paper II**	**6**	**0**	**0**	**4**
Pre-requisite		Basic understanding about wildlife crimes in India	**Syllabus version**	**2026-2027**		

Course Objectives:

The main objectives of this course are,

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

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Acquire the knowledge of various types of wildlife crimes such as poaching, illegal wildlife trade, illegal hunting	K2
2	Learn about how the socioeconomic variables influencing wildlife crime in India	K1
3	Know the existing laws and policies to conserve the flora and fauna conservation	K4
4	1. Learn about the concept of wildlife crime, investigation of wildlife crime, intelligence gathering, investigation of organized wildlife crimes and networks	K5
5	Understand the impact of wildlife crimes and law enforcement agencies	K3

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate;**K6**–Create

Unit:1	Dimensions and Consequences of Wildlife Crime	15hours

1. Mechanics of Wildlife Poaching: Illegal Hunting, Trapping Protocols, and Species-Specific Exploitation Patterns.
2. Transnational Illegal Wildlife Trade Dynamics: Trafficking Routes, Syndicates, and High-Value Megafauna Commodities.
3. Trafficking and Forensic Identification of Vertebrate Fauna: Mammals, Birds, Reptiles, Amphibians, and Fishes.
4. Exploitation Dynamics of Invertebrate Fauna and Marine Ecosystem Contraband: Corals, Mollusks, and Butterflies.
5. Floral Contraband and Illegal Timber Trade: Red Sanders (*Pterocarpus santalinus*), Medicinal Plants, and Ornamental Flora.
6. Wildlife Forensic Techniques: Species Identification, Morphometric Diagnostics, and Molecular Tracing of Contraband.

Unit:2	Effectiveness of Existing Laws, Policies and Enforcement Authorities	15hours

1. The Wildlife (Protection) Act, 1972: Statutory Framework, Schedules, and Enforcement Mechanisms.
2. The Indian Forest Act, 1927: Legal Classification of Forests, Resource Rights, and Territorial Offenses.
3. Statutory Cross-Border Legislation: The Foreign Trade (Development and Regulation) Act, 1992 and The Customs Act, 1962.
4. International Wildlife Trade Governance: CITES Frameworks, Appendices, and Global Compliance Mechanics.
5. National and Transnational Enforcement Agencies: WCCB, DRI, and INTERPOL Environmental Crime Frameworks.
6. Global Conservation Networks and Monitoring Frameworks: CITES-MIKE, IUCN, and TRAFFIC.

Unit:3	Socio-Economic Factors that Contribute to Wildlife Crime	15hours

1. Socio-Economic Stratification and the Political Economy of Wildlife Crime in India.
2. llicit Timber Extraction: Mechanics of Illegal Logging, Timber Laundering, and Forest Ecosystem Degradation.
3. Unregulated Mining Operations: Illicit Mineral Extraction, Habitat Destruction, and Protected Area Integrity.
4. Narcotic Agriculture in Protected Landscapes: Illicit Crop Cultivation, Deforestation, and Forest Encroachment.
5. Ethno-Zoology and Cultural Motivations: Traditional Medicine Systems, Ritual Use, and Wildlife Contraband.
6. Mitigation Strategies: Community-Based Conservation, Alternative Livelihoods, and Demand Reduction Frameworks.

Unit:4	Wildlife Crime Investigation	15hours

1. The Concept of Wildlife Crime: Criminological Frameworks, Legal Typologies, and Environmental Harm.
2. Wildlife Crime Scene Investigation: Scene Preservation, Chain of Custody, and Physical Evidence Collection.
3. Intelligence Networks: Covert Operations, Informer Management, and Information Gathering Protocols.
4. Search and Seizure Protocols: Legal Mandates, Arrest Execution, and Evidence Confiscation Mechanics.
5. Criminal Investigation Frameworks: Suspect Interrogation, Case File Construction, and Filing Complaints.
6. Transnational Organized Crime Syndicates: Intelligence Sharing, Financial Tracking, and Counter-Syndicate Operations.

Unit : 5	Wildlife Forensics

1. Wildlife Forensic Science: Principles, Statutory Significance, and Judicial Imperatives.
2. Morphological Diagnostics: Taxonomic Profiling of Wildlife Contraband and Derived Products.
3. Molecular Forensics: DNA Isolation, Amplification, Marker Selection, and Barcoding Frameworks.
4. Wildlife Forensic Protocols: Chain of Custody, Sample Processing, and Laboratory Reporting.
5. Institutional Mechanics of the Wildlife Crime Control Bureau (WCCB): Mandates, Operations, and Intelligence

Networks.

6. Case Studies in Wildlife Crime Interdiction: Intelligence Operations, Forensic Applications, and Judicial Precedents

Unit:6	**Contemporary Issues**	**2hours**
Expert lectures, online seminars, webinars, workshops		
	Total Lecture hours	**77hours**

TextBook(s)

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. and A. Kumar, 1999. Wildlife Crime "An enforcement guide". Natraj publishers, New Delhi
5	Anon., A Manual on Wildlife Species in Trade, 2011. Wildlife Crime Control Bureau, Ministry of Environment, Forests and Climate Change, Govt. of India

Reference Books

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

Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. S. Vidya, Guest Lecturer, Government Arts College, Udhagamandalam

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

Course code	13SEC	BIODIVERSITY CONSERVATION	L	T	P	C
Core/Elective/Supportive		Skill Enhanced Course	6	0	0	4
Pre-requisite		Basic knowledge about Techniques Conservation of biodiversity in Wildlife	Syllabus version		2026-2027	

Course Objectives:

The main objectives of this course are to:
To make understand the basic wildlife organizations.
To understand the significance of Biodiversity.
To gain knowledge about conservation of wildlife.
To understand the wildlife laws and legislation.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	To make understand the basic wildlife organizations.	K4
2	Learn the significance of biodiversity	K3
3	Understanding the different conservation methods	K2
4	To understand the wildlife laws and legislation	K2

K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**–Create

Unit:1	Fundamentals & Levels of Biological Diversity	18hours

1. Levels of Biological Diversity: Genetic Structure, Species Richness, and Ecosystem Heterogeneity.
2. Valuation of Biodiversity and Biogeographical Classification of the Indian Subcontinent.
3. Quantifying Biological Diversity: Alpha, Beta, and Gamma Metrics and Megadiverse Realms.
4. Extinction Drivers, Global Biodiversity Hotspots, and the UNESCO Biosphere Reserve Framework.
5. Threat Dynamics: Endemism, Extinction Trajectories, and IUCN Threat Classification.
6. Conservation Strategies: In-Situ Landscapes & Ex-Situ Technologies. Integrated Conservation Frameworks: In-Situ Protected Area Networks and Ex-Situ Biotechnologies.

Unit:2	Global Climate Change, Ecosystem Vulnerability and Wetland Ecology	18hours

1. Spatio-Temporal Patterns of Climate Change: Drivers, Modeling, and Broad-Scale Ecological Impacts.
2. Species-Level Climate Responses: Physiological Stress, Behavioral Shifts, Phenological Mismatches and Range Shifts.
3. Community-Level Dynamics: Ecosystem Restructuring, Invasive Species Synergies and Extinction Trajectories.
4. Habitat Disturbances: Loss of Critical Wildlife Refugia, Altered Disturbance Regimes and Human–Wildlife Conflicts.
5. Ecosystem Vulnerability: Differential Impacts Across Tropical, Montane, Coastal and Marine Biomes.
6. Wetland Ecology of India: Hydro-Dynamics, Classification, Ecological Functions and Conservation Frameworks.

Unit:3	Climatology, Carbon Dynamics and Global Climate Policy	16hours

1. Palaeo climatology: Earth System History, Proxy Indicators, CO, Reconstruction Frameworks.
2. Dendroclimatology, Climate Modeling, and Ecological Vulnerability Assessment.
3. Resource Exploitation Dynamics, Ecosystem Pollution, and Carbon Sequestration Chemistry.
4. Evolutionary Eco-Dynamics, Climate Feedbacks, and Human Agro-Ecosystem Vulnerability.
5. Extreme Weather Dynamics, Climate Justice, and Indian Subcontinental Scenarios.
6. Global Climate Architecture: UNFCCC Protocols, IPCC Frameworks and Conservation Research.

Unit:4	**Institutional Frameworks, Conservation Bodies and International Environmental Treaties**	**18hours**

1. Institutional Architecture for Biodiversity Governance and Forestry Research in India.
2. Global Intergovernmental Organizations: Policy Formulation, Species Status, and Trade Regulation.
3. The Role of Civil Society and Non-Governmental Organizations in Wildlife Defense and Advocacy.
4. Global legal frameworks protecting marine life and oceanic ecosystems:
5. The Ramsar Convention on Wetlands: International Criteria, Wise Use, and Management Dynamics.
6. Inter-Agency Synergies, Policy Integration, and Transnational Enforcement Mechanics.

Unit:5	**Indian Wildlife Legislation, Zoo Governance, Forensics and Anti-Trafficking Frameworks**	**18hours**

1. Statutory History of Wildlife Legislation: The Wild Life (Protection) Act, 1972, Amendments, and Protected Area Frameworks.
2. Ex-Situ Conservation Architecture: Central Zoo Authority, Species Schedule Restructuring, CITES, and IUCN Protocols.
3. The Bio-Diversity Act, 2002, Access and Benefit Sharing (ABS) and Fundamentals of Wildlife Forensics.
4. Tactical enforcement strategies, covert operations, and combating illegal international trade networks.
5. The operational structure, statutory mandate, and functions of the Wildlife Crime Control Bureau.
6. The intersection of forensic science, legal standards, and court admissibility of evidence.

Unit:6	**Contemporary Issues**	**2hours**
Expert lectures, online seminars, webinars, workshops and conferences		
	Total Lecture hours	**90hours**

Text Book(s)

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, Dehra Dun
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	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*, JohnWiley&Sons, New York, p231

ReferenceBooks

1	Warning, R. HandSchlesinger, W. H, 1985. *Forest Ecosystems:Conceptsand Management*. AcademicPress,New York.

2	Robinson, W. l. and Eric, G. Bolen, 1984. Wildlife Ecology and Management Mac Millan Publishing Co, New York. Pp 478.
3	Seshadri, B.1986.India's Wildlife Reserves , Sterling Publishers Pvt. Ltd., New Delhi
RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websites, etc.]	
1	https://swayam.gov.in/
2	https://www.mooc.org/
4	https://nptel.ac.in/
CourseDesignedBy: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam andDr. J. Pandiyan, Associate Professor, A.V.C. College (Autonomous), Mayiladuthurai	

MappingwithProgrammeOutcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	L	S	S	M	S	S	S
CO2	S	S	S	L	S	S	M	S	S	S
CO3	S	S	S	L	S	S	M	S	S	S
CO4	S	S	S	L	S	S	M	S	S	S
CO5	S	S	S	L	S	S	M	S	S	S

*S-Strong;M-Medium;L-Low

Course code	23P	ICTHYOLOGY & HERPETOLOGY, ORNITHOLOGY AND MAMMALOGY	L	T	P	C
Core/Elective/Supportive		CORE PRACTICAL–I	0	0	2	4
Pre-requisite		Fundamental knowledge on animal anatomy and Biodiversity	Syllabus Version		2026-2027	

Course Objectives:

The main objectives of this course are to:
To understand important physiological functions in various vertebrate forms.
To understand the working of nervous system and sense organs.
Acquire the knowledge of biodiversity in different geographical areas.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Attain knowledge about locomotory organs, locomotion in Various vertebrates.	K2
2	Understand the origin of Chordata, concept of Protochordata, importanceof Vertebrate morphology and biology of some chordates.	K1
3	**Gain knowledge about Vertebrate classification, as well as structure and function Of integument and its derivatives.**	**K2**
4	Appreciatethevariousconservationstrategiestoprotectbiodiversity.	K4

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate;**K6**–Create

Major Experiments & Field Biology Techniques	**12hours**

Major

1. Detailed morphometric and meristic study of select teleost fishes to assess growth patterns and phenotypic variations.
2. Identification and differentiation of sympatric frogs and toads based on their unique acoustic signals, frequencies, and calls.
3. Morphological identification and ecological classification of venomous vs. non-venomous snakes using scale patterns and head shields.
4. Dietary analysis and evaluation of predator-prey relationships through mammalian scat analysis (extraction of hair, bone fragments, and prey remains).
5. Assessment and construction of the demographic age-sex structure in Asian Elephant (*Elephas maximus*) populations using field data indices.
6. Audio-visual identification of a minimum of 10 regional bird species based on vocalizations (calls/songs) and documentation of their diagnostic ecological profiles.

Minor: Experiments & Morpho-Anatomical Studies	**12hours**

Minor

1. Detailed morphometric and meristic study of select teleost fishes to assess growth patterns and phenotypic variations.
2. Comparative morphological study, macro-structural analysis, and classification of avian eggs *(Demonstration only).*
3. Macroscopic and microscopic study of diverse vertebrate epidermal structures: skin variants, nails, claws, scales, and feathers.
4. Study of structural adaptations in avian podotheca and digits: zygodactyl (Parrots), anisodactyl scratchers (Partridges), and raptorial grasping/perching (Kites).Functional analysis of adaptive beak modifications in relation to foraging guilds: nectar-probing (Sunbirds), raptorial tearing (Kites), and seed/nut-cracking (Hornbills).
5. Comparative study of dental formulas and jaw modifications across distinct trophic mammalian niches: Proboscideans (Elephants), Herbivorous ruminants (Deer), Omnivorous suids (Wild Boar), and Hyper-carnivorous felids (Leopards).

SPOTTERS

1. Cranial structures and jaw suspensions using diagnostic skulls: Anura (Frog), Aves (Bird), and Lagomorpha (Rabbit).
2. Identification and comparative anatomy of different types of horns and antlers in wild mammals (true horns, pronghorns, rhinoceroid horns, and deciduous antlers).
3. Digit structure of mammals
4. Identification of Asian elephants and African elephants
5. Tongue of different vertebrates
6. Identification of tiger and leopard skin

SUBMISSIONS

1. Submit an album of amphibians, reptiles, birds and mammals at least one per order of classification and ecological importance
2. Field trip to Biodiversity Hotspot Area (Submission of Biodiversity Assessment of an Area).
3. 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. PreetiGuptha 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

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

BREAK UP OF MARKS

Core Practical 1: Ichthyology & Herpetology, Ornithology and Mammalogy

S. No	Distribution Component	Marks
1.	Major Experiment (1No)	20
2.	Minor Experiment (2 Nos)	20
3.	Spotters (5 Nos)	15
4.	Submissions	10
5.	Record Work	10
	TOTAL	75 Marks

Second Semester

Course code	23A	ECOLOGY	L	T	P	C
Core/Elective/Supportive		Core Paper IV	6	0	0	4
Pre-requisite		Basic knowledge about Ecology	Syllabus version		2026 - 2027	

Course Objectives:

The main objectives of this course are to:
To understand basics of Ecology.
To elucidate the interaction of animals with ecosystem.

Expected Course Outcomes:

On the successful completion of the course student will be able to:

1	To understand the Ecological concepts in Wildlife Biology.	K2
2	To learn the properties and functions of Eco-system.	K2
3	To analyze the concept of Ecological factors.	K3
4	To understand the various methods in pollution control.	K4

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate;**K6**–Create

Unit:1	Habitat Ecology, Structural Heterogeneity, and Landscape Restoration	15hours

1. Foundations of Habitat Ecology: Biotic Interactions, Abiotic Matrices, and Niche Space.
2. Spatial Multi-Scaling, Structural Complexity, and Vegetation Physiognomy.
3. Edge Effects, Ecotone Dynamics, Patch Metrics, and Habitat Selection Frameworks.
4. Disturbance Regimes, Habitat Fragmentation, and Quantitative Monitoring Protocols.
5. Biome-Level Habitat Ecology: Structure, Dynamics, and Wildlife Associations.
6. Specialized Micro-Habitats: Cave Ecosystems, Arboreal Cavities, Subterranean Systems and Biogenic Structures

Unit:2	Community Ecology, Niche Theory and Macroecology	15hours

1. The Nature of Communities: Scale, Assemblage Paradigms, and Methodological Approaches.
2. Quantifying Diversity Metrics, Guild Architecture, and Niche Differentiation.
3. Drivers of Species Diversity, Competition Models, Trophic Cascades, and Null Model Testing.
4. Energy Flow, Ecosystem Productivity, Functional Diversity and Food Web Architecture.
5. Community Assembly Dynamics: Hubbell's Neutral Theory and Island Biogeography.
6. Macroecology: Global Diversity Gradients, Body Size Rules and Diversity–Productivity–Stability Dynamics.

Unit:3	Behavioral Ecology, Sociobiology and Ethological Methods	15hours

1. Tinbergen's Four Questions: Proximate Mechanisms, Ontogeny, Adaptive Value, and Phylogeny.
2. Sociobiology of Group Living: Cost-Benefit Trade-offs, Selfishness, and Optimal Group Dynamics.
3. Evolutionary Game Theory: Evolutionary Stable Strategies (ESS) and Predator–Prey Arms Races.
4. Mechanisms of Resource Competition: Ideal Free Distributions and Territorial Defense.
5. Optimality in Animal Decision-Making: Foraging Models, Currency Maximization, and Risk Sensitivity.
6. Hypothesis Testing in Ethology: Altruistic Cooperation, Signal Evolution, and Captive Animal Welfare.

Unit:4	Population Ecology, Quantitative Sampling and Hierarchical Modeling	15hours

1. Life History Evolution, Matrix Population Models and Age-Structured Demography.
2. Single-Species Population Dynamics: Continuous/Discrete Models and Density Dependence.
3. Intra & Interspecific Interactions: Lotka-Volterra Mechanics, Functional Responses and Trophic Cascades.
4. Quantitative Sampling Protocols: Distance Sampling, Transects, and Unbiased Abundance Estimation.
5. Capture-Mark-Recapture (CMR) Models: Closed and Open Population Parameter Estimation.
6. Hierarchical Modeling: Site-Occupancy Dynamics and Bayesian Statistical Frameworks.

Unit:5	Spatial Ecology, Remote Sensing and Landscape Analysis	15hours

1. Geodesy, Coordinate Reference Systems and Fundamental Cartographic Design.
2. Principles of Airborne and Satellite Remote Sensing: Sensor Systems and Digital Image Processing.
3. GNSS Architecture, High-Precision Field Positioning and Spatial Field Surveys.
4. GIS Data Architectures: Vector and Raster Data Models, Preparation and Spatial Databases.
5. Spatial Analytics: Surface Analysis, Species Distribution Modeling and Dynamic Visualization.
6. Landscape Ecology: Spatial Heterogeneity, Fragmentation Dynamics and Connectivity Metrics.

Unit:6	Contemporary Issues	2hours
Expert lectures, online seminars, webinars		
	Total Lecture hours	**77hours**

Textbook(s)

1	Verma, P.S. and V.K. Agarwal, 1983. Environmental Biology (Principles of Ecology), S. Chand & Co., New Delhi.
2	Eugene Odum, 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 palaeontology. Himalaya Publishers.

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

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Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. N. Ezhilarasi Associate Professor, Government Arts College (Autonomous), Coimbatore

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	L	L	M	M	L	S
CO2	S	S	S	M	L	L	M	M	L	S
CO3	S	S	S	M	L	L	M	M	L	S
CO4	S	S	S	M	L	L	M	M	L	S

CO5	S	S	S	M	L	L	M	M	L	S

*S-Strong;M-Medium;L-Low

Course code	23B	ETHOLOGY OF WILDLIFE	L	T	P	C
Core/Elective/Supportive		Core Paper V	6	0	0	4
Pre-requisite		Basic knowledge about Animal Behaviour	Syllabus version	2026-2027		

Course Objectives:

1. Comprehend the foundational concepts, historical paradigms, and fundamental classification of animal behaviors.
2. Examine the neurophysiological and endocrinological mechanisms, including hormonal and pheromonal regulations, driving animal actions.
3. Evaluate chronobiological patterns, multi-modal communication pathways, and foraging strategies across diverse animal taxa.
4. Analyze reproductive behavioral ecology, mating systems, and the evolutionary trade-offs of parental investment.
5. Investigate the sociobiology, dominance hierarchies, and collective group dynamics of wild mammals, specifically apex carnivores, megaherbivores, and non-human primates.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	**Apply** quantitative ethological methodologies, including the design and implementation of ethograms, to analyze complex animal behaviors.	K3
2	**Explain** the neuro-endocrine cascades, pheromonal pathways, and physiological mechanisms that regulate instinctive and learned behaviors.	K2
3	**Analyze** the operational mechanics of biological rhythms and multi-modal communication channels across insects, birds, and mammals.	K4
4	**Analyze** the evolutionary drivers behind courtship displays, sexual selection, mating systems, and cooperative breeding across diverse vertebrate groups..	K4

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate;**K6**–Create

Unit:1	Ethology, Behavioral Mechanics, and Quantitative Ethomics	15hours

1. Genetic, physiological, and neural bases of unlearned animal behaviors.
2. Evolutionary transformations of non-communicative actions into formal display signals.
3. Mechanisms and environmental cues utilized by animals to navigate physical space.
4. Classifications, physiological constraints, and cognitive models of behavioral modification.
5. Systematic categorization, structural definition, and automated profiling of animal behavior portfolios.
6. Statistical methodologies, observational sampling rules, and recording protocols in ethological research.

Unit:2	Neuro-Endocrine Mechanisms, Pheromones, and Anti-Predatory Strategies	15hours

1. **Neurobiological Foundations:** Neurophysiological processing of external stimuli, examining how sensory organs filter environmental information to drive behavioral loops.
2. **Endocrinological Regulation:** The dual role of hormones in behavioral modulation, contrasting organizational effects during development with activational triggers in adulthood.
3. **Semiochemical Communication:** Chemical signaling networks, detailing the functional and behavioral differences between volatile releaser pheromones and slow-acting primer pheromones.
4. **Anti-Predator Vigilance:** Structural mechanics of predator detection, analyzing spatial flight initiation distances (FID) and group-size vigilance effects.

5. **Evolutionary Altruism:** Mathematical and genetic boundaries of self-sacrificing behavior, evaluated through kin selection, inclusive fitness, and Hamilton's Rule (rB > C).
6. **Ethological Field Methodologies:** Modern technological approaches for tracking cryptic wildlife behavior, utilizing satellite telemetry, acoustic monitoring, and camera-trap matrices

Unit:3	Chronobiology, Multi-Modal Communication, and Foraging Ecology	15hours

1. **Chronobiological Mechanics:** Endogenous pacemakers and entrainment, analyzing the environmental regulation of circadian, circalunidian (lunar), circatidal, and circannual rhythms.
2. **Sensory Ecology of Signaling:** Physical properties governing signal transmission, assessing the trade-offs of visual, auditory, and chemical channels across varied habitats.
3. **Bioacoustics and Vocalization:** Structural mechanics of acoustic communication, mapping structural vocal signatures and echolocation systems in insects, birds, and mammals.
4. **Optimal Foraging Paradigm:** Behavioral economics of food acquisition, applying Optimal Foraging Theory (OFT) and diet-breadth models to calculate energetic net gains.
5. **Patch Exploitation Dynamics:** Mathematical modeling of resource exploitation, utilizing Charnov's Marginal Value Theorem (MVT) to predict optimal patch residence times.
6. **Ontogeny and Function of Play:** Evolutionary drivers behind juvenile play, examining how social, locomotor, and object play calibrate adult motor skills and survival tactics.

Unit:4	Reproductive Behavior, Mating Systems, and Parental Investment	15hours

1. **Epigamic Courtship Dynamics:** The behavioral ecology of courtship displays, investigating how intricate auditory and visual signals facilitate species recognition and mate assessment.
2. **Sexual Selection Frameworks:** Intra-sexual competition (male-male combat) versus inter-sexual choice (female choice) as evolutionary drivers of extreme phenotypic traits.
3. **Morphological Expressions of Selection:** The evolutionary maintenance of sexual dimorphism and color polymorphism within highly competitive wildlife populations.
4. **Mating System Classification:** Ecological determinants shaping animal mating structures, defining the adaptive boundaries of monogamy, polygyny, polyandry, and promiscuity.
5. **Alternative Reproductive Strategies:** Complex reproductive behaviors, exploring the sociobiology of lekking systems, cooperative breeding networks, and obligate brood parasitism.
6. **Comparative Parental Investment:** Energetic trade-offs and survival dynamics of parental care allocations across amphibians, reptiles, and mammals.

Unit:5	Sociobiology, Aggression, and Mammalian Case Studies	15hours

1. **Sociobiology of Aggression:** Proximate and ultimate mechanisms of intraspecific aggression, resource competition, and localized social spacing.
2. **Territorial Economics:** Mathematical boundaries of spatial defense, evaluating the economic defendability model of home ranges versus active territorial borders.
3. **Dominance Hierarchy Matrices:** The structural organization of animal societies, detailing linear (peck-order) and despotic dominance hierarchies.
4. **Proboscidean Sociobiology:** Structural kinship and communication within elephant herds, highlighting matriarchal governance, multi-generational bonding, and infrasonic signaling networks.

5. **Felid Pride Dynamics:** Social architecture of the African lion (*Panthera leo*), evaluating cooperative hunting, communal cub-rearing, and territorial defense coalitions.
6. **Primate Social Complexity:** Sociobiological systems of non-human primates, focusing on matrilineal coalitions, grooming alliances, social hierarchies, and the evolution of tool-use behavior.

Unit:6	**7. Contemporary Issues**	**2hours**
Expert lectures, online seminars, webinars		
	Total Lecture hours	**77hours**

Textbook(s)

1	Agarwal, V.K.(2009).*Animal Behaviour(ETHOLOGY).*S.Chand Publishing.
2	Leshner, A. I. (1978).An Introduction to Behavioural Endocrinology ,Oxford University Press, NewYork.
3	McFarland, D. (ed.),1981.*TheOxfordCompanion toAnimalBehaviour*, OxfordUniversity Press,Oxford.
4	Ridley, M.1968.*AnimalBehaviour–Aconcise Introduction,Blackwell*Scientific Publications,Oxford.

Reference Books

1	Slater, P. J. B.1985.*An Introduction to Ethology*, Cambridge University Press, Cambridge.
2	Natarajan, P and Arumugam, N. *Animal Behaviour–Ethology.* Saras Publication
3	Wallace, R.A.1979.*TheEcology and Evolution of Animal Behaviour*, Good year Publishing Company Inc., Santa Monica, California.
4	Wilson, E.O.1978.*Sociobiology*, TheBelknap Press, Harvard UniversityPress, Cambridge,
5	Tristram, D.Wyatt. *Pheromones and Animal Behaviour*. Cambridge University Press

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

1	
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3	

Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam, Dr. Vidya S, Government Arts College, Udhagamandalam

Mapping with Programme Outcomes

Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	L	L	M	M	L	M
CO2	S	S	S	S	L	L	M	M	L	M
CO3	S	S	S	S	L	L	M	M	L	M
CO4	S	S	S	S	L	L	L	L	L	M
CO5	S	S	S	S	L	L	L	L	L	M

*S-Strong;M-Medium;L-Low

Course code	23C	CONSERVATION GENETICS AND EVOLUTION	L	T	P	C
Core/Elective/Supportive		Core Paper VI	6	0	0	4
Pre-requisite		Basic information on genetics and evolution	Syllabus Version		2026-2027	

Course Objectives:

The main objectives of this course are to:
To make aware of the students about the theories, concepts and basics of conservation genetics.
To provide knowledge about genetics.
To acquire knowledge about evolution.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	The learner will be able to understand methodological approach to the study of genetics	K2
2	The students will be able to identify and understand the sex of the animals.	K5
3	The students will able to develop an idea, how to arrange sequences of DNA.	K4
4	The learner will be able to understand the Recombinant Techniques.	K2
5	The students will attain a basic conceptual knowledge of the principle Mechanisms of the genetic and molecular elements that are involved.	K4

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate;**K6**–Create

Unit:1	POPULATION GENETICS	15hours

1) **Foundations of Population Genetics:** Classical Mendelian inheritance principles (Segregation and Independent Assortment) scaled to Mendelian populations; mathematical tracking of allele and genotype frequencies.
2) **Hardy-Weinberg Equilibrium:** Mathematical formulation of the Hardy-Weinberg Principle ($p^2 + 2pq + q^2 = 1$); comprehensive analysis of evolutionary forces altering equilibrium (mutation, migration, genetic drift, and natural selection).
3) **Mating Topology and Inbreeding Dynamics:** Dynamics of random panmixia vs. non-random assortative mating systems; calculating the Inbreeding Coefficient (F) and evaluating inbreeding depression in fragmented wild populations.
4) **Quantitative Traits and Heritability:** Polygenic inheritance modeling for traits controlled by two, three, and multiple loci; calculating broad-sense and narrow-sense heritability (h^2) and partitioning phenotypic variance.
5) **Heterosis and Introgression:** Genetic mechanics of hybrid vigor (heterosis), transgressive segregation, and the genetic risks associated with anthropogenic hybridization and introgression.
6) **Applied Conservation Genetics:** Mitigation frameworks for the loss of genetic diversity (heterozygosity bottlenecks); applying genetic profiles to resolve taxonomic uncertainties, define Evolutionary Significant Units (ESUs), and guide wildlife anti-poaching forensics.

Unit:2	MOLECULAR GENETICS	15hours

1) **Macromolecular Architecture & Central Dogma:** Structural biology of nucleic acids (DNA, RNA variants) and proteins; molecular kinetics of the Central Dogma: semi-conservative replication, transcription, and translation mechanics.
2) **The Genetic Code:** Triplet codon organization, degeneracy, universality, wobble hypothesis, and evolutionary constraints on codon usage bias.
3) **Genetic Polymorphisms:** Molecular signatures of chromosomal aberrations, single nucleotide polymorphisms (SNPs), balanced polymorphisms, and protein-level electrophoretic variants.
4) **Molecular Marker Typology:** Comparative utility of nuclear markers (microsatellites/STRs, AFLPs) versus mitochondrial markers (mtDNA Control Region, Cytochrome c Oxidase Subunit I) in wildlife assessment.
5) **DNA Barcoding and Forensic Diagnostics:** Technical protocols for using COI markers to generate DNA barcodes; non-invasive species identification, dietary meta barcoding, and detecting illegal wildlife derivatives.
6) **Sequence Alignment Pipelines:** Fundamental mechanics of pairwise sequence alignment; algorithms governing matrix scoring (PAM and BLOSUM) and multiple sequence alignments (MSA). Phylogenetic Tree Construction**:** Utilizing specialized bioinformatics tools and software packages to process aligned sequence datasets, calculate evolutionary distances, and reconstruct robust phylogenetic trees.

Unit:3	BIOLOGICAL DATA BASES AND TOOLS	15hours

1) **Primary Nucleic Acid Repositories:** Structural architecture, entry parsing, and cross-talk among global sequence databases: NCBI-GenBank, EMBL-EBI, and the DNA Data Bank of Japan (DDBJ).
2) **Protein Sequence and Functional Repositories:** Advanced data mining using structured protein databases, structural models, and functional profile annotations including UniProt, Swiss-Prot, and PROSITE.
3) **Local Alignment Search Algorithms:** Computational execution of the Basic Local Alignment Search Tool (BLAST) family (BLASTn, BLASTp, BLASTx); setting E-values and bit scores for homology mapping.
4) **Phylogenetic Reconstruction Tools:** Algorithmic architecture of alignment suites including Clustal Omega and specialized desktop phylogenomic software packages like **MEGA XI** (Molecular Evolutionary Genetics Analysis) and PHYLIP.
5) **Phylogenetic Tree Topology:** Computational construction of evolutionary trees using distance-based matrices (NJ, UPGMA) and character-based optimizations (Maximum Parsimony, Maximum Likelihood, and Bayesian Inference).
6) **Macro-Genomics:** Comparative overview of high-throughput sequencing milestones, structural genomics datasets, and lasting frameworks derived from the Human Genome Project (HGP).

Unit:4	EVOLUTIONARY GENETICS	15hours

1) **Modes and Directives of Selection:** Natural selection acting on phenotypic distributions; directional, stabilizing, disruptive, and negative frequency-dependent selection dynamics.
2) **Evolutionary Equilibrium Points:** Stochastic-deterministic balancing models: analyzing Mutation-Selection Balance, Selection-Drift Balance, and the maintenance of genetic variation via Balancing Selection.

3) **Pre-Zygotic Isolating Mechanisms:** Operational mechanics of reproductive barriers preventing gametic fusion: geographic, ecological (habitat), chronobiological (seasonal), and complex ethological (behavioral) isolation.
4) **Post-Zygotic Isolating Mechanisms:** Physiological and genetic barriers to gene flow following copulation: gametic incompatibility, zygotic mortality, hybrid inviability, and hybrid sterility.
5) **Geographic Models of Speciation:** Divergence models based on spatial orientation: Allopatric speciation (vicariance and founder-flush effects), Parapatric speciation (clinal boundaries), and Sympatric speciation (ecological niche partitioning and polyploidy).
6) **Co-Evolutionary and Adaptive Networks:** Macroevolutionary processes mapping host-parasite cospeciation, sexual selection drives, mutualistic co-evolution, and phenotypic convergence across unconnected geographic lineages.

Unit:5	**EVIDENCES AND THEORIES OF ORGANIC EVOLUTION**	**15hours**

1) **Paleontological and Morphological Evidences:** Documenting evolutionary trajectories through fossil biostratigraphy, transitional forms, structural homologies, analogies, and vestigial structures.
2) **Physio-Biochemical and Embryological Evidences:** Comparative ontogeny, developmental constraints (recapitulation theory), metabolic pathway conservation, and universal genomic conservation as drivers of evolutionary unity.
3) **Biogeographical and Genetic Geodesics:** Mapping macroecological distribution patterns (Gloger's, Bergmann's, and Allen's rules), continental drift vicariance, and experimental real-time microevolutionary changes in wild populations.
4) **Classical Evolutionary Paradigms:** Critical historical evaluation of Lamarckism, Neo-Lamarckism (soft inheritance), and de Vriesian Mutation Theory alongside historical mutation concepts.
5) **Darwinian Selection Paradigm:** Analysis of original Darwinian selection theory using classic evolutionary adaptive radiations, illustrated by the phenotypic divergence of Galápagos geospizine finches.
6) **Modern Synthetic Theory of Evolution:** The modern synthesis uniting neo-Darwinian selection with population genetics, formalizing how mutation, recombination, drift, and selection act in unison on population gene pools.

Unit:6	**Contemporary Issues**	**2hours**
Expert lectures, online seminars, webinars		
	TotalLecturehours	**77hours**

Textbook(s)

1	Hall, B.K. and B.Hallgrimson. 2014. Strickbergers Evolution. Jones and Bartlett Publishers ltd., New Delhi, India.
2	Bergstrom, Carl T. and Lee Alan Dugatkin, 2016. Evolution (Second Edition), W.W. Norton and company, New York, USA.
3	Li. W. and Graur (1990): Fundamental of Molecular evolution. Sinauer associates Sunderland bd, USA.
4	Molecular Biology and Genetic Engineering, N. Arumugam, A.Thangamani, L. M. Narayanan, Padmalatha Singh. Saras Publication. 2012
5.	Pierren Taberlet, Aruelle Bonin and Etienne Petit, Conservation Biology: Evolutionary Perspectives
6.	C. Frank W.Allendorf and Gordon Luikart, Conservation Biology.

Reference Books	
1	Fred W. Allemdorf, W. Chris Funk and Sally N.Aitken, Conservation and Genomics of Population.
2	Charles Darwin, On the Origin of Species.
3	Principle of Genetics. Gardner, Wiley India, 2006
4	Genetic Engineering, Smita Rastogi, Oxford Univerisy Press, 2009
Related Online Contents[MOOC,SWAYAM, NPTEL, Websites, etc.]	
1	NOC: Introduction to Developmental Biology, Prof. SubramaniamK, IIT Madras, https://nptel.ac.in/courses/102/106/102106084/]
Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. J. Pandiyan, Associate Professor, A.V.C. College (Autonomous), Mayiladuthurai	

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	M	L	M	M	L	S
CO2	S	S	S	S	M	L	M	M	L	S
CO3	S	S	S	S	M	L	M	M	L	S
CO4	S	S	S	S	M	L	M	M	L	S
CO5	S	S	S	S	M	L	M	M	L	S

*S-Strong;M-Medium;L-Low

Course code	**23EA**	**GIS AND DATA VISUALISATION**	**L**	**T**	**P**	**C**
Core/Elective/Supportive		**Elective III**	**6**	**0**	**0**	**4**
Pre-requisite		Basic information about GIS and Data Visualization	**Syllabus Version**	**2026-2027**		

Course Objectives:

The main objectives of this course are to:

Master the core components, history, and coordinate frameworks of Geographical Information Systems (GIS) and geospatial technology.

Evaluate the structural architectures, topological relationships, and vector-based spatial analytical tools within desktop GIS environments.

Understand raster data models, digital terrain surfaces, and pixel-based continuous spatial analytics for landscape modeling.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understanding the beneficial role of GIS in Wildlife.	K2
2	To elucidate various aspects of mapping.	K5
3	The course will give an idea about Creating Maps.	K4
4	The students will be capable of interpreting and Understanding the knowledge about the GIS and techniques in Mapping.	K2
5	The learners will be trained in handling the computer based projects.	K4

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate

Unit:1	**GIS APPLICATIONS**	**18hours**

1) **Introduction to Geospatial Technology:** Historical evolution, core components (hardware, software, data, methods, people), and advanced applications of GIS in wildlife management, ecology, and landscape planning.
2) **Mobile and Web GIS Integration:** Operational frameworks of Web 2.0 architectures, cloud GIS services, and mobile-based geospatial data collection technologies.
3) **Geodesy and Coordinate Systems:** Principles of the Geographic Coordinate System (GCS), horizontal datums (WGS84), and ellipsoidal earth models.
4) **Map Projections:** Mathematical properties of map projections (conformal, equivalent, equidistant) and the deployment of Projected Coordinate Systems (PCS) like the Universal Transverse Mercator (UTM).
5) **Geospatial Data Harvesting:** Methods of data acquisition, utilizing existing public repositories, clearinghouses, open-source data layers, and the standardization of metadata catalogs.
6) **Data Digitization and Construction:** Technical protocols for data conversion, scanning, vectorizing historical paper maps, geo referencing raster images, and generating new digital shapefiles.

Unit:2	**VECTOR DATA MODEL**	**18hours**

1) **Vector Geometry and Features:** Representing real-world discrete features using zero-dimensional (points), one-dimensional (lines), and two-dimensional (polygons) vector architectures.
2) **Topological Relationships:** Principles of spatial topology; establishing geometric connectivity, contiguity, and area definition, alongside enforcing topological rules to ensure data integrity.
3) **Georelational and Object-Oriented Models:** Structural comparison between traditional georelational data models (split spatial-attribute files) and modern object-based data models (integrated spatial-attribute tables).
4) **Composite Feature Representation:** Modeling complex landscape entities via multipart features, regions, dynamic segmentation, and multi-point vectors.
5) **Proximity and Overlay Analytics:** Executing vector-based geoprocessing operations, including variable-distance buffering, intersecting, clipping, dissolving, and multi-layer combinatorial overlays.
6) **Spatial Pattern and Desktop Software Suites:** Quantitative spatial pattern analysis, cluster analysis, and distance measurements using industry-standard platforms including ArcGIS Pro and QGIS.

Unit:3	RASTER DATA MODEL	16hours

1) **Raster Matrix Architecture:** Core elements of the raster data model: grid cells (pixels), spatial resolution, orientation, zones, and continuous value fields.
2) **Satellite Imagery and Elevation Models:** Processing optical satellite imagery grids and constructing Digital Elevation Models (DEMs), Digital Terrain Models (DTMs), and Digital Surface Models (DSMs).
3) **Data Compressions and Interoperability:** Algorithmic structures of raster compression methods (Run-length encoding, Quadtrees); protocols for vector-to-raster and raster-to-vector data conversions.
4) **Map Algebra and Analytics Environment:** Setting up bounding extents, processing masks, and cell-size constraints within cell-by-cell mathematical data environments.
5) **Neighborhood and Zonal Operations:** Implementation of local calculations, focal/neighborhood filters (moving windows), zonal summaries, and cost-distance/physical proximity calculations.
6) **Comparative Spatial Analytics:** A rigorous structural and computational evaluation of vector-based versus raster-based spatial data analysis and modeling efficiencies.

Unit:4	DATA VISUALISATION TOOLS AND PRINCIPLES	18hours

1) **Evolution of Information Aesthetics:** Overview, definitions, application spaces, and historical milestones tracing the evolution of data visualization into a modern data science discipline.
2) **Data Typing and Structuring:** Categorizing information into quantitative (discrete, continuous) and qualitative (nominal, ordinal) data scales to inform chart design.
3) **Pre-processing and Data Scrubbing:** Advanced methods for cleaning messy data: handling missing variables, smoothing noise, filtering outliers, and resolving formatting anomalies.
4) **Data Agitation and Aggregation:** Analytical workflows for transforming dataset structures, pivoting tables, down-sampling time series, and computing group summary matrices.
5) **Chromatography and Color Theory:** Applying color theory to interface design; selecting sequential, diverging, and qualitative palettes optimized for accessibility and cartographic legibility.
6) **Grammar of Graphics and Layout Design:** Structural deployment of varied chart architectures, best practices for visual hierarchy, typography selection, and cognitive design principles.

Unit:5	TECHNIQUES IN VISUALIZATION	18hours

1) **The Art of Data Storytelling:** Structuring narrative arcs around raw data; using dynamic dashboards and callout metrics to translate complex spatial-statistical numbers into accessible insights.
2) **Geospatial and Cartographic Visualization:** Constructing thematic maps, choropleths, heatmaps, cartograms, and multidimensional space-time cubes.

3) **Big Data Visual Analytics:** Computational optimization strategies for rendering massive, high-velocity datasets using high-performance graphics pipelines.
4) **Machine Learning Visualization:** Visualizing high-dimensional feature spaces, decision boundaries, cluster assignments, and evaluating machine learning model performance curves.
5) **Web-Based Interactive Architectures:** Developing responsive, web-based visualization interfaces using modern frameworks, client-side rendering engines, and cloud-hosted data portals.
6) **Project Implementation and Collaborative Auditing:** Executing real-world computer projects; peer-review protocols, addressing visualization challenges, and troubleshooting UI/UX errors.

Unit:6	**Contemporary Issues**	**2hours**

Expert lectures, online seminars, webinars, Conferences and Workshops and internship programmes

	Total Lecture hours	**90hours**

Text Book(s)

1	Introduction to Geographic Information Systems – Kang – Tsung Chang –McGrawHill
2	Data visualization: A Hand book for Data Driven Design by Andy Krik
3	The Truthful Art: Data, Chart and maps for communication by Alberto Cairo
4	GIS Fundamentals: A First Text on Geographic Information Systems by BojanSavric.
5	GIS for Environmental Management by Timothy Hodgson.
6	Introduction to Geographic information Systems by Kang-tsung Chang

Reference Books

1	Introduction to Geographic Information Systems – Kang – Tsung Chang – McGrawHill
2	Principles of Geograpic Information Systems: A Guide to the Technology by John A.Longley
3	Mastering ArcGIS by Maribeth Price
4	Effective Visualization: The Right Chart for the Right Data by Stephanie Evergreen.

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

1	https:// Esri Virtual Campus, GIS Lounge, QGIS Tutorials, Flowing Data, Data Camp

Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. J. Pandiyan, Associate Professor, A.V.C. College (Autonomous), Mayiladuthurai

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	L	M	M	L	S
CO2	S	S	S	S	M	L	M	M	L	S
CO3	S	S	S	S	M	L	M	M	L	S
CO4	S	S	S	S	M	L	M	M	L	S
CO5	S	S	S	S	M	L	M	M	L	S

- S-Strong;M-Medium;L-Low

Course code	23EB	CLIMATE CHANGE AND WILDLIFE CONSERVATION	L	T	P	C
Core/Elective/Supportive		Elective IV	6	0	0	4
Pre-requisite		Basic information about climate change and its impact on wildlife	Syllabus Version		2026-2027	

Course Objectives:

The main objectives of this course are to:

Learn the concept of climate change, greenhouse gases and their sources.

Acquire insights on carbon systems, carbon cycle and carbon trading programmes.

Learn the concept of wind, pressures and their significances, and consequences.

Develop idea on the natural and man-made disasters along with mitigation measures on global warming.

Comprehend knowledge about the organizations work with climate change.

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Expected Course Outcomes:

On the successful completion of the course, student will be ableto:

1	Understand the various aspects of climatology and greenhouse effects	K2
2	Comprehend the current evidences of global warming and its consequences.	K5
3	Grasp insights on biogeochemistry, carbon reservoirs and carbon offset projects	K4
4	Realize the growing scientific consensus established by the IPCC and WMO	K2
5	Understand the mechanisms by ecosystems are to be affected by climate change	K4

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate

Unit:1	CLASSIFICATION OF CLIMATES: GENETIC AND EMPIRICAL CLASSIFICATIONS, KOPPEN AND THRONTHWAITE'S SCHEMES	18hours

1. Introduction and concepts of climate change;
2. Global climate change – past and present scenario;
3. Causes of Climate Change- Solar Variability- Volcanic Activity-Tectonic Activity, Orbital Variation Greenhouse Effects- Green House Gases- Water Vapor-
4. Carbon dioxide, Methane, Nitrous oxide, Chlorofluorocarbon,
5. Hydrofluorocarbons; Anthropogenic sources of Green House Gases

Unit:2	BIOGEOCHEMISTRY	18hours

1. Atmospheric Carbon Reservoir - Carbon Cycle-
2. Marine carbon cycle – Blue Carbon- Terrestrial carbon cycle
3. Carbon Sequestration- Physical Carbon Pump- Biological Carbon Pump
4. Carbon Emission- Carbon trading- Carbon Cap Trading Programme-
5. Carbon Offsets- Carbon Offset Projects in India.

Unit:3	CLASSIFICATION OF WIND SYSTEMS	16hours

1. Katabatic – Anabatic – Planetary- Trade-
2. Westerlies-Periodic- Local wind- Significances and consequences
3. Wind systems; Thermohaline Circulations and Ocean Gyres;
4. Atmospheric drivers of marine climate change; Sea Surface Temperature (SST);
5. Ocean acidification; Effects of climate change on marine life;
6. Monsoon and Significances- Erratic monsoon- Direct and indirect effects on wildlife/ biodiversity.

Unit:4	**CLIMATE CHANGE AND NATURAL DISASTERS**	**18hours**

1. Natural and Man-made - cloudburst –
2. hurricanes, cyclones- droughts; El Niño and La Nino effects - tsunami-
3. Himalayan glacier effects and Himalayan tsunami; Elements of climate change:
4. Temperature – precipitation – ice sheet melting – sea level rise - acid rain - ozone depletion;
5. Different concerns of climate changes in developed and developing countries.
6. Mitigation and adaptation of global warming.

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Unit:5	**CLIMATE CHANGE AND FOREST FIRE AND THEIR IMPACT ON INDIAN WILDLIFE**	**18hours**

1. Climate change and diapauses in insects (pollinators);
2. Climate change: Policies and governance;
3. Role of IPCC (Intergovernmental Panel on Climate Change)- IPCC Reports –
4. Working Groups; WMO (World Meteorological Organization) on climate change-
5. WMO and Membership- Climate impacts on society.

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Text books

1. Chophel, Y., 2021. Global Warming and Climate Change (GWCC) Realities. In *The Nature, Causes, Effects and Mitigation of Climate Change on the Environment*. IntechOpen.
2. Sivaramanan, S., 2015. Global Warming and Climate change, causes, impacts and mitigation. *Central Environmental Authority*, *2*.
3. Singh (2010). Global Warming and Climate Change, APH Publications, pp.320.
4. Metz, B., 2009. *Controlling climate change*. Cambridge University Press.

Reference books

1. Tziperman, E., 2022. *Global Warming Science: A Quantitative Introduction to Climate Change and Its Consequences*. Princeton University Press.
2. Harris, S. ed., 2022. *The Nature, Causes, Effects and Mitigation of Climate Change on the Environment*. BoD–Books on Demand.
3. Cracknell, A.P. and Varotsos, C.A., 2021. *Understanding Global Climate Change: Modelling the Climatic System and Human Impacts*. CRC Press.
4. Letcher, T.M., 2021. Global warming—a complex situation. In *Climate Change* (pp. 3-17). Elsevier.
5. Ting, D.K. and Stagner, J.A. eds., 2021. *Climate Change Science: Causes, Effects and Solutions for Global Warming*. Elsevier.
6. Laffoley, D. and Baxter, J.M., 2018. Ocean connections. *An introduction to rising risks from a warming*.
7. Smerdon, J., 2018. *Climate change: the science of global warming and our energy future*. Columbia University Press.
8. Laffoley, D., Baxter, J.M., Turley, C. and Lagos, N.A., (editors). 2017. An introduction to ocean acidification: What it is, what we know, and what may happen. IUCN, Gland, Switzerland, 24 pp.
9. Singh, B.R. ed., 2012. *Global warming: Impacts and future perspective*. BoD–Books on Demand.
10. O'Hare, G., 2002. Global Warming: The science of climate change. *The Geographical Journal*, *168*, p.83.

Related Online Contents[MOOC,SWAYAM, NPTEL, Websites, etc.]	
1	https:// Esri Virtual Campus, GIS Lounge, QGIS Tutorials, Flowing Data, Data Camp

Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. J. Pandiyan, Associate Professor, A.V.C. College (Autonomous), Mayiladuthurai

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	M	L	M	M	L	S
CO2	S	S	S	S	M	L	M	M	L	S
CO3	S	S	S	S	M	L	M	M	L	S
CO4	S	S	S	S	M	L	M	M	L	S
CO5	S	S	S	S	M	L	M	M	L	S

- S-Strong;M-Medium;L-Low

Course code	23SEC	WETLAND CONSERVATION	L	T	P	C
Core/Elective/Supportive		Skill Enhanced Course II		0	0	
Pre-requisite			Syllabus Version	2026-2027		

Course Objectives:

The main objectives of this course are to:
To acquire knowledge about Ramsar Sites.
To understand the significance of wetlands and Environmental biology.
To acknowledge the legislative acts relating to Wetlands.
To realize the environmental pollution and its degradation.
To gain knowledge about various impacts of Environmental health.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Acquire primary knowledge on wetlands and their characteristics.	K
2	Appreciate the legislative laws made for wetland and environment.	K
3	Recognize the significance of Environmental movements in India.	K
4	Realize the environmental pollution and its degradation.	K
5	Gain knowledge about various impacts of Environmental health.	K

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate;**K6**–Create

Unit:1	Wetland Ecology and Conservation Physiology	12 hours

1. Physical, chemical, and biological parameters across diverse aquatic interfaces.
2. Human-wetland interdependencies and societal value systems.
3. Functional valuation of ecosystem benefits and natural capital.
4. Comparative analysis of inland aquatic habitats and human-managed wetlands.
5. High-productivity coastal transition zones and tropical intertidal forests.
6. Global conservation frameworks and regional priority sites.

Unit:2	Environmental Biotechnology and Applied Bioremediation	12 hours

1. **Environmental Biotechnology –** Biotechnological approach of environmental pollution abatement – bio-degradation of pollutants,
2. Toxic site reclamation, reduces environmental impact of herbicides, pesticides and fertilizers, biosensors to detect environmental pollution.
3. **Agricultural production management –** Bio-fertilizer, Bio- pesticides, Vermi-composting technology.
4. **Bio-remediation –** key factors and kinds, solid phase bioremediation, bio-venting, land farming, bio-reactors,
5. In situ and Ex situ bioremediation and phyto remediation.

Unit:3	Environmental Science, Resource Conflicts, and Global Governance	12 hours

1. **Environmental Science:** Man and Environmental interaction;
2. Global environmental problems. Environmental priorities in India; Environmental crisis.
3. **Major Environmental Movements in India –** The Chipko movement and Appiko movement**.**
4. **Conflicts over sharing of water resources** -Interstate conflicts- Tamil Nadu-Karnataka;
5. Punjab-Haryana-Rajasthan;

6. International disputes – India –Pakistan; Indo-Bangaladesh.
7. **Environmental awareness** - Member of NGOs; Conferences and International agreements

Unit:4	**Environmental Degradation, Toxicology, and Pollution Control**	**12 hours**

1. **Environmental degradation:** Wasteland-causes of wasteland formation;
2. Reclamation of wasteland; biogas -energy from wastes; use of biogas.
3. **Environmental Toxicology** - Impact of pesticides; pesticide persistence, bioaccumulation and bio magnifications; case study- DDT in the environment; general effects pollutants.
4. **Pollution –** Monuments damaged by air pollution; water reuse and recycling; incineration at sea;oil pollution;
5. Effects of noise pollution – hearing noise from noise exposure pathological and psychological disorders and noise Mapping.

Unit:5	**Wetland Policy, Environmental Legislation, and Governance**	**12 hours**

1. **Legislation relating to wetland**: 1. The Environment (Protection) Act, 1986;
2. The Tamil Nadu Aquaculture (Regulation) Act: III; Wetland Conservation and Management Rules 2017; 4. National River Conservation Plan (NRCP);
3. National lake Conservation Plan (NLCP).
4. **Environmental Laws**: 1. Biological diversity Act, 2002;
5. Water prevention and control of Pollution Act 1974;
6. Biomedical waste (Management and Handling) Rules, 1998.

Unit:6	**Contemporary Issues**	**2hours**
Expert lectures, online seminars, webinars		
	Total Lecture hours	**hours**

Text Book(s)

1	Santra.S.C.2013.Environmental Science, National Central Book Agency (P) Ltd, London.
2	Zafar Ali, S. 2019, **Environmental Biology,** Akhand Publishing House,

Reference Books

1	Chaudhuri, Daya, A.B. 2018. **Endangered Wetlands.**
2	Abbasi, S.A. 1997. Wetlands of India; Ecology and threats. (Vol I & II). Discovery Publishing Company, New Delhi.
3	Yadav, P.R. and S.R. Mishra. 2004. Environmental Biodiversity. Discovery Publishing, Company, Delhi.
4	Hosetti, B.B. 2002. Glimpses of Biodiversity. Daya Publishing Company, Delhi.
5	Willoughby, L.G. 1976. Freshwater Biology. Hutchinson, London.
6	Wetzel, R.G. 1983. Limnology. Saunders College Publishing, New York.
7	Cowardin. Et al . 1979. Classification of Wetlands and Deepwater habitats of the United States. US. Fish and Wildlife Service

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

1	http://moef.gov.in/wp-content/uploads/2020/01/final-version-and-printed-wetland-guidelines-rules-2017-03.01.20.pdf
2	https://byjus.com/free-ias-prep/wetland-conservation-management-rules-2017/ (Wetland Conservation and Management Rules 2017)
3	http://moef.gov.in/wp-content/uploads/2019/09/Ramsaar-Factsheets_2020-Final-8-May-2020.pdf(Ramsar Sites in India)
4	https://www.youtube.com/watch?v=zMK35FA1BHw(wetland characteristics (UPSC)
5	https://www.youtube.com/watch?v=USA-ZgSKjk (wetland classification)
6	https://lotusarise.com/biosphere-reserves-in-india-upsc/(Biosphererereserves in India (UPSC))

Course Designed By: Dr.B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. J. Pandiyan, Associate Professor, A.V.C. College (Autonomous), Mayiladuthurai

Course code	23Q	ECOLOGY, ETHOLOGY OF WILDLIFE AND CONSERVATION GENETICS AND EVOLUTION	L	T	P	C
Core/Elective/Supportive		PRACTICAL-II	0	0	2	4
Pre-requisite		Basic information on Ecology & Ethology of Wildlife and Conservation Genetic Evolution	Syllabus Version		2026-2027	

Course Objectives:

The main objectives of this course are to:
Explain core concepts in ecology, and summarize our ecological understanding of environmental problems.
To train how the biological data are processed and interpretations are made.
To develop skill in understanding & handling molecular science & instrumentation.
To elucidate its interaction of molecules.
To provide an overview of mapping techniques.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Investigate specific cases of environmental pollution or natural challenges& Their impact molecular issues	K5
2	The students will be capable of interpreting and understanding the basis of molecular biology and will be trained in preparing solutions and handling instruments at basicl level.	K2 &K4
3	Understand the physical and chemical concepts in biology.	K2
4	Understand evolutionary aspects of conservation.	K2
5	Understand and apply the principles and techniques of Behavioural study in animals	K3

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate;**K6**–Create

I **12hours**

MAJOR

1) Quantitative analysis of dissolved free Carbon Dioxide (CO_2) in aquatic ecosystems via titrimetric evaluation using standard sodium hydroxide (NaOH) indicators to assess environmental respiration pressures.
2) Determination of Dissolved Oxygen (DO) vectors in varying aquatic habitats utilizing the Winkler iodometric titration method to calculate ecosystem productivity and biochemical stress indicators.
3) Implementing time-budget ethology using focal-animal sampling rules via HD video macro-models; designing and formatting a standardized ethogram to map individual activity budgets.
4) **Instantaneous Scan Sampling Protocols:** Executing group-level behavioral sampling across social cohorts using instantaneous scan sampling rules; calculating sync-indices and spatial cohesion patterns from video models.
5) Procedural isolation and extraction of total genomic DNA from mammalian or avian tissue matrices using spin-column chromatography or phenol-chloroform isolation protocols *(Demonstration Only)*.

MINOR

1) Estimation of pH and Temperature
2) Food web and Nutrient Cycling (Demonstration only).
3) Analysis of Climate Change and its Impact on Biodiversity (Demonstration only).
4) Foraging Strategies in Mammals.
5) Paleo-evolution of mammoth (Demonstration only)
6) Forelimb modification in chordates
7) Anti-predatory strategies of birds
8) Water quality analysis

SPOTTERS

1. **Ecosystem Typography:** (e.g., Tropical Rain Forests, Wet Grasslands, Mangrove Estuaries, Coral Reefs, Alpine Tundra).
2. **Vertebrate Communication Networks:** illustrating sensory mechanisms behind visual signaling, olfactory scent-marking, and tactical chemical pathways.
3. **Bioacoustic Avian Diagnostics:** Digital audio processing and sonic identification of **10 distinct regional bird calls** utilizing bioacoustic analysis software (**Raven Pro 1.6**) to map frequency spectrograms.
4. **Vertebrate Evolutionary Sociology:** Parental investment models, mapping the protective behaviors and developmental mechanics of egg-brooding, marsupial pouches, and multi-generational mammalian nurseries.
5. **Molecular Diagnostics Instrumentation: Thermal Cyclers (PCR)**, **Horizontal Agarose Gel Electrophoresis Tanks**, **UV Transilluminators**, and high-precision **Micropipettes**.
6. **Biological Plankton Indicators:** Microscopic identification and classification of key freshwater and marine plankton indicators (e.g., *Daphnia*, *Cyclops*, *Rotifers*, *Diatoms*, *Dinoflagellates*) used to determine trophic status and pollution loading.

FIELDTRIPS

Submission at the time of Practical Examination

Report on the Field study and Field trips of different ecosystems
Report on Muesum visit.
Report on Zoo visit.
Bonafide Record

	Total Lecture hours	**88hours**

Text Book(s)

1	Advanced Practical Zoology by Sinha,J., Chatterjeee A.K., ChattopadhyayP.2011. Arunabha Sen Publishers.
2	Environmental biology and ecology laboratory manual byLynn.(2003).Kendall Hunt Publishing

Reference Books

1	Modern Experimental Zoology by Preeti Guptha and Mridula Chaturvedi.2000
2	Fundamentals of Biochemistry by Jain J.L, Sunjay Jain, Nitin Jain. 2007.
3	Toxicology Laboratory Lab Manualby5.OberdorsterEva.2009.KendallHuntPublishing

Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. N. Ezhilarasi, Associate Professor, Government Arts College (Autonomous), Coimbatore

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	L	S	S	S	S	S	S
CO2	S	S	S	L	S	S	M	S	L	S
CO3	S	S	S	L	S	S	M	S	L	S
CO4	S	S	S	L	L	M	L	M	S	S
CO5	S	S	S	L	S	S	S	S	S	S

*S-Strong;M-Medium;L-Low

Third Semester

Course code	33A	PHYSIOLOGY AND HEALTHCARE OF WILDLIFE	L	T	P	C
Core/Elective/Supportive		Core Paper IX	6	0	0	5
Pre-requisite		Basic knowledge about the physiological activities of all the systems in both non-chordates and chordates	Syllabus Version		2025 – 2026	

Course Objectives:

The main objectives of this course are to:
To study about the adaptive characters in animals
To acquire knowledge on the physiological aspects about all organ systems.
To acquire knowledge on the osmo and thermos regulatory mechanisms.
Understand the concepts of hormonal activities
To understand the role of hormones in the biological activities such as pregnancy and lactation

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Acquire the knowledge of organisms surviving in various environments.	K4
2	Learn the significance of osmo and thermoregulations to cope well with the Ecological tress	K3
3	Understand the physiological responses of the meditation practices in human	K2
4	Factors involved in the mechanism of respiratory, excretory physiology, neural And muscular physiology and their influence of hormones in reproduction.	K2
5	Evaluate the various mode of life and adaptive modification of their organ Systems in animals	K6

K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate;**K6**–Create

Unit: I	Environmental, Cellular, and Energetic Foundations of Animal Physiology	18hours

1. Ecophysiology, Environmental Drivers, and Functional Adaptation.
2. Functional Genomics, Proteomics, and Epigenetic Regulation in Animal Physiology.
3. Cellular Transport Architecture, Membrane Dynamics, and Water-Solute Balance.
4. Animal Bioenergetics, Metabolic Scaling, and Cellular Energy Transformations.
5. Energy expenditure during movement and physical exercise.
6. Thermal Relations & Thermoregulation.

Unit: II	Mechanism of Osmoregulation and Respiration	18hours

1. Introduction to Oxygen and Carbon Dioxide Physiology, External Respiration:
2. The Physiology of Breathing Transport of Oxygen and Carbon Dioxide in Body Fluids (with an Introduction to Acid-Base Physiology)
3. Circulation, Oxygen, Carbon Dioxide, and Internal Transport at Work: Diving by Marine Mammals.
4. Water and Salt Physiology: Introduction and Mechanisms, Water and Salt Physiology of Animals in Their Environments,
5. Kidneys and Excretion (with Notes on Nitrogen Excretion) Water, Salts and Excretion at Work: Mammals of Deserts and Dry Savannas

Unit: III	Neural Control, Endocrine Regulation, and Systems Integration	16hours

1. Cellular neurobiology, action potentials, and synaptic communication.
2. Mechanisms by which animals detect, transduce, and process environmental stimuli.
3. Macroscopic neural architecture and temporal coordination of physiology.
4. Hormonal signaling, neurosecretion, and homeostatic integration.
5. Hormonal and physiological regulation of animal reproduction.
6. Spatial Orientation & Animal Navigation.

Unit: IV	Veterinary Pathology, Etiology, and Animal Health Management	18hours

1. Infectious Diseases: Bacterial and Fungal Pathogenesis
2. Viral Etiology, Epidemiology, and Immunopathology in Fauna
3. Veterinary Autoimmunity, Immunopathology, and Inherited Genetic Disorders.
4. Cardiovascular and Gastrointestinal Pathophysiology.
5. Musculoskeletal System Disorders and Dermatological Pathology.
6. Veterinary Diagnostic Pathology, Epidemiology, and Disease Control Frameworks

Unit: V	Clinical Handling, and Wildlife Disease Control	18hours

1. Restraint, Humane Handling, and Safe Administration of Treatment.
2. Wildlife Biosecurity, Field Quarantine, and Contagion Containment Mechanics.
3. Antimicrobial Stewardship and Antiparasitic Pharmacology in Animal Health.
4. Pain Management, Anesthesia, and Anti-Inflammatory Therapeutics
5. Advanced immunological interventions and integrative therapeutic.
6. Critical care methodologies to stabilize compromised animals during illness or post-capture recovery.

Unit: VI	Contemporary Issues	2hours

Expert lectures, online seminars, webinars, workshops and conferences.

	Total Lecture hours	90hours

Textbook(s)

1	Animal Physiology Vol I & II by Chatterjee
2	Animal Physiology by Verma & Agarwal
3	Essential of ANIMAL Physiology by Rastogi
4	Principles of Animal Physiology by Christopher Moyes and Patricia Schulte

Reference Books

1	Comparative Animal physiology by Philip C Withers
2	Comparative Physiology: Primitive Mammals ”byKnutSchmidt-NielsenandLianaBolis
3	Advances in Comparative and Environmental Physiology: Animal Adaptation to Cold”by JA Boulantand RJ Brooks
4	“Advances in Comparative and Environmental Physiology” by J MachinandSHWright

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

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

Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. N. Ezhilarasi, Associate Professor, Government Arts College (Autonomous), Coimbatore

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	M	M	S	S	L	S
CO2	S	S	S	S	M	M	S	S	L	S
CO3	S	S	S	S	M	M	S	S	L	S
CO4	S	S	S	S	M	M	S	S	L	S
CO5	S	S	S	S	M	M	S	S	L	S

*S-Strong;M-Medium;L-Low

SCAA DATED:

Course code	33B	MANAGEMENT OF ZOO'S, SANCTUARIES AND NATIONAL PARKS	L	T	P	C
Core/Elective/Supportive		Core Paper XII	6	0	0	4
Pre-requisite			Syllabus Version	2025-2026		

Course Objectives:

The main objectives of this course are to:
To introduce the evolutionary concepts among various animal groups.
To make them understand how life originated.
To realize the current working of evolution.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	To understand the prehistoric life and its origin of animals.	K2
2	To evaluate the impact of evolution on animals.	K4
3	To analyze how the higher animals evolved.	K5
4	To understand the evolution of genes among animals.	K2
5	To imagine how the future evolution will be	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Unit:1	TECHNIQUES IN WILDLIFE SANTUARIES	18 hours

1. Architectural Principles of Animal Enclosures, Structural Enrichment, and Physical and Chemical Restraint Protocols.
2. Veterinary Wildlife Rehabilitation, Dietary Formulation, and Nutritional Management in Captive Environments.
3. Environmental and Behavioral Enrichment: Cognitive Stimulation, Occupational Enrichment, and Stereotypic Behavior Mitigation.
4. Conservation Breeding Programs: Studbook Management, Genetic Diversity Maintenance, and Species Reintroduction Protocols.
5. Zoo Education Frameworks, Public Outreach Strategies, and Multi-Institutional Research Collaborations.
6. Landscape Conservation Strategies in Distinct Ecosystems: Case Studies of Periyar Wildlife Sanctuary and Sundarbans National Park.

Unit:2	NATIONAL PARKS	16 hours

1. Protected Area Frameworks: Legal Definition, Historical Evolution, and Ecological Significance of National Parks.
2. National Park Administration: Management Planning, Zonation, and Operational Infrastructure.
3. In-Situ Conservation Mechanics: Human-Wildlife Conflict Resolution, Sustainable Development, and Community-Based Ecotourism (CBET).
4. Public Engagement and Conservation Governance: Role of Educational Programs, Governmental Bodies, and Non-Governmental Organizations (NGOs).
5. Public Engagement and Conservation Governance: Role of Educational Programs, Governmental Bodies, and Non-Governmental Organizations (NGOs).
6. Biosphere Reserves: UNESCO MAB Program, Zonation Architecture, and Landscape-Level Conservation Frameworks. Eravikulam, Gir, Bandipur, Kahna, Guindy, Corbett, SilentValley, and Mukkuruthi, Kaziranga. Marine National Park: Rannof Kutch,
7. Biosphere Reserves.

Unit:3	ZOOLOGICAL PARKS	18 hours

1. Zoos and Zoological Parks: Definition- Aims of Zoos-
2. Formation and Management of Zoos and Zoological Parks - Central Zoo Authority of India.

3. Enclosures- Designing, Engineering and Enrichment.
4. Zoo animal nutrition: Food and feeding management. Zoo sanitation: Principles and management of zoo. Zoo veterinary services.
5. Animal restraint: principles and methods, release of restrained animals.
6. Transport of animals. Pests and parasites – nutritional disorders
7. Zoo education: Internship techniques and Zoo research. Captive breeding: Aims, Principles, methods and case studies.

Unit:4		**18 hours**

1. Habitat Restoration and Animal Conservation: Identifying the key species,
2. Assessment of Carrying capacity, Corridor management – Case studies.
3. Exotic and Invasive Species:Principles and Problems- Case Studies.
4. Introduction and re-introduction of a species- Case Studies- Lion, Tiger, Rhinoceros.
5. Role of Government, NGO's and Educational Institutes involved in Wildlife Conservation.

Unit:5		**18 hours**

1. Diseases of Zoo animals – viral, bacterial and fungal diseases;
2. Techniques of tranquilization and translocation of problematic animals;
3. Wildlife administration and legislation**:**
4. Administrative set up - Advisory bodies- National Board for Wildlife –
5. Eco-Development, Eco- Restoration and Ecotourism programmes.

Unit:6	**Contemporary Issues**	**2 hours**

Expert lectures, online seminars – webinars, workshops and conferences.

	Total Lecture hours	**90 hours**

Text Book(s)

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	Geoff Hosey, Vicky Melfe., Zoo Animals: Behaviour, Management and welfare, Kindle Edition

Reference Books

1	Devra G. , Katerina V & Charlotte., Wild Mammals in Capitivity; Principles and Rechniques for Zoo Management., University of Chicago Press., 2010.
2	Jacob V. Cheeran., Textbook of Wild and Zoo Animals: Care and Management., Enlarged Edition., 2007

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

1	
2	

Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. J. Pandiyan, Associate Professor, A.V.C. College (Autonomous), Mayiladuthurai

Mapping with Programme Outcomes

Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	L	L	L	M	M	M	S
CO2	S	S	S	L	L	L	M	M	M	S
CO3	S	S	S	L	L	L	M	M	M	S
CO4	S	S	S	L	L	L	M	M	M	S
CO5	S	S	S	L	L	L	M	M	M	S

*S-Strong;M-Medium;L-Low

Course code	33C	WILDLIFE MANAGEMENT TECHNIQUES	L	T	P	C
Core/Elective/Supportive		Core Paper XI	6	0	0	4
Pre-requisite		Basic knowledge about wildlife management practices in India and across the world	Syllabus Version		2025-2026	

Course Objectives:

The main objectives of this course are to:
To make understand the applications and basic wildlife equipments.
To acquire the knowledge on handling the equipment related to wildlife.
To learn GIS and Remote sensing uses and its applications on wildlife management.
To sensitize the students on wildlife population estimation techniques.
To understand drugs related to chemical restraints the animals.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Acquire the knowledge in wildlife and equipments usage in the field	K4
2	Learn the significance of various field equipments	K3
3	Understanding molecular methods in wildlife	K2
4	Appreciate the mechanism of GIS, Remote sensing and Radio Collaring methods in wildlife	K2
5	Evaluate various types of population estimation, mapping techniques and wild animals health monitoring and postmortem techniques	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	EQUIPMENTS USED IN WILDLIFE MANAGEMENT	18 hours

1. Field Data Collection Protocols: Standard Operating Procedures for Field Notes, Datasheet Design, and Digital Data Logging.
2. Design and Execution of Wildlife Research Projects: Experimental Frameworks, Proposal Writing, and Conservation Funding Networks.
3. Wildlife Photography and Remote Sensing Technologies: Optical Mechanics, Digital Cameras, and Camera Trap Deployments.
4. Field Navigation and Micro-Climate Measurement Tools: Principles and Applications of Altimeters, Pedometers, Handheld GPS, and Compass Surveying.
5. Bioacoustics and Soundscape Analysis: Acoustic Equipment, Field Recording Techniques, and Sonogram Diagnostics.
6. Ethological Logging Techniques and Animal Morphometrics: Activity Recording and Field Weighing Instrumentation.

Unit:2	TRACKING OF ANIMALS	18 hours

1. Wildlife Tracking Technologies: Radio-Telemetry, VHF/Satellite Collaring, and Applications of Stable Radioisotopes in Ecological Research.
2. Geospatial Applications in Wildlife Conservation: Global Positioning Systems (GPS), Satellite Remote Sensing, and Spatial Habitat Modeling.
3. Geographic Information Systems (GIS) for Wildlife Biology: Spatial Analysis Frameworks using QGIS, ArcGIS, and MapInfo.
4. Molecular Approaches in Wildlife Biology: Conservation Genetics, Non-Invasive DNA Sampling, and Forensic Species Identification.
5. Invasion Ecology: Ecological Impacts, Risk Assessment, and Eradication Strategies for Invasive Alien Species in Protected Areas.

6. Habitat Manipulation Techniques: Nutritional Enhancement, Water Resource Augmentation, and Canopy/Shade Structure Management.

Unit:3	POPULATION ESTIMATION OF WILD ANIMALS	16 hours

1. Survey Design and Direct Census Methodologies: Planning Frameworks, Sample Counts, Block Counts, and Roadside Strip Transects
2. Indirect Population Indexing: Fecal/Dung Density Analysis, Pugmark Identification, and Waterhole Census Methodologies.
3. Spoor Diagnostic Profiling: Species Identification via Animal Signs, Tracks, Scats, Feeding Signatures, and Scrape Marks
4. Capture-Mark-Recapture (CMR) Frameworks: Camera Trapping Protocols for Tigers, Co-Predators, and Ungulate Prey Density Monitoring.
5. Distance Sampling Theory and Density Estimation: Line Transects, Point Counts, and Applications using DISTANCE Software.
6. Bio-Statistical Software Applications in Wildlife Science: Capture Matrix Construction, Occupancy Modeling, and Population Parameter Estimation.

Unit:4	CONSERVATION OF FOREST	18 hours

1. Hydrological Surveying, Spatial Mapping of Water Sources, Rain Gauge Installation, and Supplementary Water Provisioning for Wildlife.
2. Fire Ecology and Habitat Management: Prescribed Burning as a Tool, Controlled Fire Regimes and Post-Fire Habitat Recovery
3. Quantification and Mitigation of Wildlife-Induced Damage: Crop Depredation, Livestock Loss, and Habitat Degradation Metrics.
4. Etiology of Human-Wildlife Conflict and Engineering Solutions: Design, Deployment, and Assessment of Barriers.
5. Assessment of Anthropogenic Pressures: Trail Surveys, Fringe Village Demographics, and Non-Timber Forest Product (NTFP) Extraction Dynamics.
6. Anti-Poaching Operations, Intelligence-Led Protection, and Community-Based Conservation via Village Forest Committees (VFCs)

Unit:5	Applied Wildlife Capture, Translocation, and Post-Release Management	18 hours

1. Conflict Zone Assessment, Problematic Individual Identification, and Monitoring Systems.
2. Physical, Mechanical, and Chemical Capture Methodologies for Free-Ranging Wildlife.
3. Wildlife Translocation, Transport Physiology, and Stress Management.
4. Post-Capture Management - Soft and Hard Release Strategies and Reintroduction Protocols for Relocated Wildlife
5. Captive Animal Management, Enclosure Design, Husbandry Standards, and Post-Release Post-Locational Monitoring Activities.
6. Ex-Situ Captive Management, Enclosure Architecture, and Animal Welfare Standards.

Unit:6	Contemporary Issues	2 hours
Expert lectures, online seminars – webinars, workshops and conferences		
	Total Lecture hours	**90 hours**

Text Book(s)

1	Agarwal 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

Reference Books

1	Warning R H and Schlesinger W H, 1985. Forest Ecosystems: Concepts and Management. Academic Press, New York.
2	Imms A D, 1965. *A General Textbook of Entomology*, ELBS, London.
3	Metcalfe C L and Flint W P, 1973. *Destructive and Useful Insects*, McGraw-Hill, NewYork.

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

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

Course Designed By: Dr. B. Ramakrishnan, AssociateProfessor in Wildlife Biology, GAC, Ooty.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	L	L	M	S	S
CO2	S	S	S	S	M	L	L	M	S	S
CO3	S	S	S	S	M	L	L	M	S	S
CO4	S	S	S	S	M	L	L	M	S	S
CO5	S	S	S	S	M	L	L	M	S	S

*S-Strong;M-Medium;L-Low

Course code	**33SEC**	**LANDSCAPE ECOLOGY**	**L**	**T**	**P**	**C**
Core/Elective/Supportive		**SKILL ENHANCED COURSE III**		**0**	**0**	
Pre-requisite			**Syllabus Version**		**2025-2026**	

Course Objectives:

The main objectives of this course are to:

To Understand how to define and detect landscape patterns

Learn landscape structure and factors affect ecological processes (population, community, and ecosystem levels).

Inculcate the knowledge of ecosystem process and its importance in biodiversity conservation

Understand the various drivers influence the landscape ecology

Enrich the knowledge of the conservation management of human dominated landscape with proper

methods.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Many of the key concepts in landscape ecology and various issues in the field.	K4
2	Different scale, environmental heterogeneity, and ecological processes at levels of organization from population, to community, to ecosystem processes.	K3
3	Wildlife and metapopulation dynamics and their management	K2
4	Various ecological factors and their impact on landscape ecology	K2
5	Manage the human dominated landscape and wildlife conservation	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	**Foundations of Landscape Ecology, Spatial Heterogeneity and Urban Planning Dynamics**	**9 hours**

1. Historical Trajectory, Epistemology and Scope of Landscape Ecology.
2. Paradigm Transitions: Ecosystem Mechanics to Spatial Landscape Mosaics.
3. The Multi-Scale Paradigm: Grain, Extent, Hierarchy and Scaling Laws.
4. Quantitative Spatial Pattern Analysis and Landscape Metrics.
5. Urban Landscape Ecology: Structural Fragmentation, Microclimates and Eco-Mosaics.
6. Landscape-Based Spatial Planning, Ecological Networks and Land-Use Policy

Unit:2	**Spatial Heterogeneity, Scale Architecture and Patch Dynamics in Landscape Ecology**	**9 hours**

1. Quantifying Spatial Heterogeneity, Pattern-Process Relationships and Landscape Mosaics.
2. Historical Trajectory, Intellectual Lineages and Paradigm Shifts in Landscape Ecology.
3. The Architecture of Scale, Technological Revolutions and Spatial Analytics.
4. Structural Landscape Frameworks: Mechanics of the Patch-Corridor-Matrix Model.
5. Patch Genesis and Typology: Disturbance, Remnant, Environmental and Introduced Patches.
6. Boundary Mechanics, Ecotones, and Vector Fluxes across Landscape Boundaries.

Unit:3	**Land-Use Dynamics, Degradation Mechanics, Ecological Restoration, and Hazard Mitigation**	**9 hours**

1. Spatiotemporal Dynamics, Anthropogenic Drivers, and Modeling of Land-Use/Cover Change.
2. Ecological Impacts of LULCC: Habitat Fragmentation, Defaunation, and Ecosystem Service Loss.
3. Geospatial Inventory, Remote Sensing Assessment, and Wasteland Classification Systems.
4. Mechanistic Pathways of Land Degradation: Aridification, Deforestation, and Soil Impairment.
5. Ecological Restoration Theories, Land Reclamation, and Eco-Engineering Applications.
6. Hazard Mitigation Architecture, Soil Conservation Engineering, and Watershed Management.

Unit:4	**Methodological Approaches, Spatial Patterns, and Landscape Management Dynamics**	**9 hours**

1. Methodological Paradigms, Theoretical Frameworks, and Critical Concepts.
2. Biophysical Templates, Disturbance Regimes, and Socio-Ecological Drivers.
3. Spatial Analytics, Metric Paradigms, and Landscape Pattern Characterization.
4. Metapopulation Dynamics, Landscape Resistance, and Landscape Genetics.
5. Spatial Ecosystem Ecology: Lateral Material Fluxes, Edge Effects, and Biotic Cascades.
6. Landscape Governance, Conservation Design, and Ecosystem Service Management.

Unit:5	**Patch Dynamics, Fragmentation Mechanics, Metapopulations, and Metric Analytics**	**9 hours**

1. Island Biogeography Extensions, Patch Geometry, and Edge Mechanics.
2. Structural Landscape Fragmentation, Matrix Resistance, and Biological Invasions.

3. Metapopulation Dynamics, Source-Sink Systems, and Colonization-Extinction Equilibria.
4. Targeted Landscape Management: Reserve Design, Corridors, and Metapopulation Rescue.
5. Quantitative Spatial Analytics: Composition, Configuration, and Scale-Dependent Metrics.
6. Spatial Analytical Workflows: Fragstats, R `landscapemetrics`, and Metric Interpretation Protocols.

Unit:6	**Contemporary Issues**	**2 hours**

Expert lectures, online seminars – webinars, workshops and conferences

	Total Lecture hours	**hours**

Text Book(s)

1	Turner MG Gardner, RH, 2015. Landscape Ecology in Theory and Practice, 2nd Edition, Springer Nature.
2	Lopez, RD, Frohn, RC, 2017. Remote Sensing for Landscape Ecology: New Metric Indicators CRC Press; 2nd edition 3. Forman RTT, and M Godron. 1986. Landscape ecology. Wiley, New York

Reference Books

1	Turner, M.G., and R.H. Gardner. 2015. Landscape ecology in theory and practice, 2nd edition. Springer, New York. 482 pp.
2	Gergel, S.E., and M.G. Turner (eds.) 2017. Learning Landscape Ecology, 2nd Edition. Springer, New York. 347 pp.
3	Risser PG< JR Karr, and RTT Forman 1984. Landscape ecology: directions and approaches. Special Publ. No. 2, I11. Natural Hist. Surv., Champaign.
4	Forman RTT. 1995. Land mosaics: the ecology of landscapes and regions. Cambridge University Press, Cambridge England.

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

1	https://www.sciencedirect.com/topics/earth-and-planetary-sciences/landscape-ecology
2	https://link.springer.com/book/10.1007/978-1-4939-6374-4
3	https://www.amazon.com/Landscape-Ecology-Theory-Practice-Pattern/dp/1493927930
4	https://link.springer.com/book/10.1007/b97434

Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. J. Pandiyan, Associate Professor, A.V.C. College (Autonomous), Mayiladuthurai

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	L	L	M	S	S
CO2	S	S	S	S	M	L	L	M	S	S
CO3	S	S	S	S	M	L	L	M	S	S
CO4	S	S	S	S	M	L	L	M	S	S
CO5	S	S	S	S	M	L	L	M	S	S

-Strong;M-Medium;L-Low

Course code	3EA	BIOSTATISTICS AND DATA SCIENCES	L	T	P	C
Core/Elective/Supportive		ELECTIVE V	6	0	0	4
Pre-requisite			Syllabus Version		2025-2026	

Course Objectives:

The main objectives of this course are to:
To make the students to understand statistical methods.
To understand the methods of analyzing the raw datas.
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Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	To learn about basics of statistical methods.	K4
2	To understand various aspects in statistics.	K3
3	To learn about interpretation of raw datas in research.	K2
4	To know basic knowledge about datascience.	K2
5	To apply data science in aspects of biology.	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	Applied Biostatistics, Quantitative and Data Analytics	18 hours

1. Central Tendency, Data Distributions, and Exploratory Analytics.
   Biological Mean, Median, Mode and Data Scale Selection.
2. Quantifying Variability: Spread, Variance, and Measurement Uncertainty.
   Range in Biological Studies, Variance (s2) & Standard Deviation (s), Standard Error of the Mean (SE), Coefficient of Variation (CV).
3. Asymmetry, Distribution Tail Weights, and Data Transformations.
   Skewness in Biology (Asymmetry), Kurtosis in Biology (Tail Weights), Data Transformations.
4. Bivariate Association Models: Morphometric, Physiological, and Ecological Correlations.
5. Ordinary Least Squares (OLS) Regression and Predictive Allometric Modeling.
6. Multivariate Regression, Generalized Linear Models (GLMs), and Biological Workflows.

Unit:2	Applied Biostatistical Inference, Experimental Design, and Probability Theory	18 hours

1. Foundational Probability Theory, Combinatorial Axioms, and Event Algebra in Biology.
2. Conditional Probability, Independent Events, and Bayes' Theorem in Biological Diagnostics.
3. Hypothesis Testing Architecture and Non-Parametric Chi-Square (χ^2) Analysis.
4. Continuous Data Diagnostics: Student's t-Test Variants and Experimental Comparisons.
5. One-Way ANOVA Frameworks, Partitioning Variance, and Post-Hoc Analysis.
6. Two-Way Factorial ANOVA: Main Effects, Interaction Dynamics, and Experimental Block Designs

Unit:3	Experimental Design, Sampling Methodology, and Data Organization in Biological Analytics	18 hours

1. Sampling Theory, Randomization Strategies, and Survey Methodologies.
2. Data Acquisition Protocols: Fieldwork, Laboratory Experimentation, and Metadata Curation.
3. Data Cleaning, Categorization, and Structured Tabulation Frameworks.

4. Statistical Series Architecture: Frequency Distributions and Class Aggregations.
5. Diagrammatic Analytics: Line, Bar, and Comparative Pie Charts.
6. Graphical Analytics: Histograms, Frequency Polygons, and Smoothing Curves.

Unit:4	**Experimental Design, Sampling Methodology, and Data Organization in Biological Analytics**	**16 hours**

1. Sampling Theory, Randomization Strategies, and Survey Methodologies.
2. Data Acquisition Protocols: Fieldwork, Laboratory Experimentation, and Metadata Curation.
3. Data Cleaning, Categorization, and Structured Tabulation Frameworks.
4. Statistical Series Architecture: Frequency Distributions and Class Aggregations.
5. Diagrammatic Analytics: Line, Bar, and Comparative Pie Charts.
6. Graphical Analytics: Histograms, Frequency Polygons, and Smoothing Curves.

Unit:5	**Experimental Design, Sampling Methodology, and Data Organization in Biological Analytics**	**18 hours**

1. Sampling Theory, Randomization Strategies, and Survey Methodologies.
2. Data Acquisition Protocols: Fieldwork, Laboratory Experimentation, and Metadata Curation.
3. Data Cleaning, Categorization, and Structured Tabulation Frameworks.
4. Statistical Series Architecture: Frequency Distributions and Class Aggregations.
5. Diagrammatic Analytics: Line, Bar, and Comparative Pie Charts.
6. Graphical Analytics: Histograms, Frequency Polygons, and Smoothing Curves

Unit:6	**Contemporary Issues**	**2 hours**

Expert lectures, online seminars, webinars, workshops and conferences

	Total Lecture hours	**90 hours**

Text Book(s)

1	Biostatistics: Foundation for analysis in the Health sciences, Wayne W. LaMorte
2	Biostatistics, Arumugam
3	Python Data Science Handnook, Jake Vanderplas.
4	Pattern Recognition and Machine Learning Tools and Techniques, Ian H. Witten and EibkeFrak

Reference Books

1	Biostatistics for Biological and Health Sciences, Marc M., Triola and Mario F. Triola
2	Biostatistics: The Bare Essentials by Geoffrey, R. Norman and David L. Streiner.
3	Big Data, The Missing Manual , Tim O'Reilly
4	R for Datta Science Handbook, Fueld Cady

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

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

Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. J. Pandiyan, Associate Professor, A.V.C. College (Autonomous), Mayiladuthurai

Mapping with Programme Outcomes

Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	L	S	S	M	S	S	S
CO2	S	S	S	L	S	S	M	S	S	S
CO3	S	S	S	L	S	S	M	S	S	S

CO4	S	S	S	L	S	S	M	S	S	S
CO5	S	S	S	L	S	S	M	S	S	S

*S-Strong;M-Medium;L-Low

Course code	3EB	RESEARCH METHODOLOGY, APPLICATION OF COMPUTING AND ARTIFICIAL INTELLIGENCE 4.0	L	T	P	C
Core/Elective/Supportive		ELECTIVE VI	6	0	0	4
Pre-requisite		Basic knowledge about behavior of animals	Syllabus Version		2025-2026	

Course Objectives:

The main objectives of this course are to:
To understand about research.
To acquire the knowledge on thesis writing.
To learn the methodology about the research work.
To understand the data interpretation.
To sensitize the students to study about research.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Acquire the knowledge on research	K4
2	Learn significance of writing literature.	K3
3	Understanding the data interpretation.	K2
4	Evaluate the results of interpreted data.	K2
5	Understand the significance of research.	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	BASIC OF RESEARCH AND LITERATURE COLLECTION	18 hours

1) **Research Conceptualization:** Systematic processes for topic selection, defining concise research objectives, formulating testable null and alternative hypotheses, and designing comprehensive structural work plans.
2) **Methodological Identification:** Frameworks for selecting appropriate field and laboratory methodologies, establishing experimental controls, and identifying prospective funding agencies for student-led and institutional research grants.
3) **Literature Sourcing Foundations:** Typology of academic and non-academic literature, contrasting newsletters and mainstream news articles with peer-reviewed, high-impact journal publications.
4) **Digital Search Optimization:** Mechanics of advanced search strategies; deploying Boolean operators, nesting search terms, and using wildcard parameters across global indexing engines.
5) **Bibliographic Databases:** Structural data mining across life science and agricultural repositories including **Google Scholar, PubMed, Medline, Science Direct, and AGRICOLA**.
6) **Academic Networks and Open Access:** Utilizing institutional resource networks like **INFLIBNET** alongside evaluating the quality, licensing frameworks, and predatory risks of open-access virtual source portals.

Unit:2	DATA ANALYSIS	hours

1) **Sampling Fundamentals:** Designing field sampling matrices; establishing sample size thresholds, random versus stratified sampling strategies, and reducing sampling errors during wildlife or biological data collection.
2) **Data Processing and Tabulation:** Systematic methods for cleaning, transforming, and tabulating raw datasets; establishing academic formatting standards for data tables, headers, footers, and continuous data matrices.
3) **Parametric Testing Frameworks:** The theoretical basis for standard parametric tests of significance; executing Student's t-tests (paired and independent), Z-tests, and Analysis of Variance (one-way and two-way ANOVA) under assumptions of normality.
4) **Non-Parametric Testing Frameworks:** Deploying distribution-free non-parametric hypothesis tests when normality assumptions are violated, focusing on Chi-Square (χ^2) tests of independence, Mann-Whitney U, and Kruskal-Wallis tests.
5) **Statistical Reporting Metrics:** Calculating and interpreting statistical significance thresholds, including exact p-values, confidence intervals (CI), degrees of freedom, and standard error boundaries.
6) **Visual Presentation of Results:** Best practices for transforming complex data tables into high-resolution, peer-reviewed graphical illustrations, including frequency histograms, scatter plots, and box plots.

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Unit:3	PROPOSAL WRITING AND THESIS STRUCTURE	18 hours

1) **Proposal Composition Pipelines:** Structural engineering of a research grant proposal; detailing the narrative flow from introduction, literature review, and objectives to methodology, expected outcomes, and risk mitigation.
2) **Project Logistics Planning:** Designing realistic research timelines and project milestones using Gantt charts; compiling balanced budget tables, justification narratives, and resource management protocols.
3) **Thesis Components & Material Methods:** Structuring a standard postgraduate thesis; detailing the spatial attributes of the study area, environmental variables, and the replicability of materials and methods.
4) **Results and Scholarly Discussion:** Synthesizing experimental results without bias; writing a comprehensive discussion that balances observed trends against current peer-reviewed literature.
5) **Reference Engineering and Bibliographies:** Master techniques for in-text citations and bibliographic formatting; standardizing styles (APA, Harvard, or Vancouver) and deploying digital reference managers (e.g., Mendeley, Zotero).
6) **Appendices and Cartographic Indices:** Compilation of supplementary materials, formatting high-resolution photographic plates with scale bars, and constructing accurate geographical indices for thematic maps.

Unit:4	PUBLISHING ARTICLE	18 hours

1) **Mass Media Science Communication:** Techniques for translating complex technical science into public newsletters or newspaper columns to broaden public engagement and scientific literacy.
2) **Journal Selection and Evaluation:** Strategic evaluation of prospective peer-reviewed publications; understanding the role of the International Standard Serial Number (**ISSN**) and journal indexing criteria.

3) **Scientometric Matrix Analysis:** Understanding academic impact metrics; calculating the Clarivate **Science Citation Index (SCI)**, journal Impact Factors (IF), h-index, i10-index, and their role in academic ranking.
4) **Manuscript Packaging Foundations:** Structural drafting of a journal submission package, organizing text into standard **IMRAD** format (Introduction, Methods, Results, and Discussion) alongside generating punchy abstracts and keywords.
5) **The Peer Review Editorial Pipeline:** Navigating the step-by-step submission lifecycle; reviewing the duties of handling editors, corresponding authors, blind peer review models, and addressing revision requests.
6) **Publication Ethics and Compliance:** Ethical constraints in scholarly publishing; avoiding plagiarism, self-plagiarism, duplicate submissions, data fabrication, and understanding author-contribution credits.

Unit:5	**ARTIFICIAL INTELLEGENCE 4.0**	**18 hours**

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) Hardware, Software and Firmware, ROM, RAM, CD-ROM, DVD, Pen drive, Hard disc, LCD projector.
4) MS Word processor, MS Excel for Charts, MS PowerPoint and Multimedia. Viruses and Worms, Software packages in Biostatistics:
5) Applications of MINITAB and SPSS. Communication networking and Computer networking. Machine learning,
6) Natural language processing, computer vision, Ronotics, ethics and safety.

Unit:6	**Contemporary Issues**	**2 hours**

Expert lectures, online seminars, webinars, workshops and conferences

	Total Lecture hours	**90 hours**

Text Book(s)

1	Anderson,Durston&Polle1,1970:Thesisandassignment,writingWileyEasternLimited
2	Fisher,R.A,1950:Statisticalmethodsofresearchworkers
3	Freumd,J.E.1967:Modernelementarystatistics,PrenticeHall,Inc.Englewoodcliffs,NJ
4	Paneerselvam, R. Research Methodology., Kindle Edition, 2013
5	Sansanwal D N, Research Methodology and Applied Statistics, Shipra Publications, 2020

Reference Books

1	Malter, K.1972:StatisticalanalysisinBiology,ChapmenHall,London.
2	Rajendrakumar, C.2008ResearchMethodologySBNanjaforAPHA Publishing Corporation New Delhi
3	Kothari S R, Research Methodology Methods and Techniques, Pragun Publication, 2012

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

Course Designed By: Dr. B. Ramakrishnan, Associate Professor, Government Arts College, Udhagamandalam and Dr. J. Pandiyan, Associate Professor, A.V.C. College (Autonomous), Mayiladuthurai

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	L	S	S	M	S	S	S
CO2	S	S	S	L	S	S	M	S	S	S
CO3	S	S	S	L	S	S	M	S	S	S
CO4	S	S	S	L	S	S	M	S	S	S
CO5	S	S	S	L	S	S	M	S	S	S

*S-Strong;M-Medium;L-Low

Course code	**25WB133**	**Health and Wellness**	**L**	**T**	**P**	**C**
Core/Elective/Supportive			**1**	**0**	**0**	**1**
Pre-requisite		Basic knowledge about Health and Wellness	**Syllabus Version**		**2025-2026**	

Course Outcomes (COs)

CO1: Explain the concept and dimensions of holistic well-being
CO2: Apply principles of physical health, hygiene, and healthy lifestyle practices
CO3: Demonstrate emotional regulation, resilience, and positive coping strategies
CO4: Develop social skills, ethical values, and critical thinking abilities
CO5: Practice environmental responsibility and tech-smart sustainable living

Programme Outcomes (POs)

PO1	Knowledge and understanding
PO2	Critical thinking and problem solving
PO3	Effective communication
PO4	Digital and information literacy
PO5	Self-directed learning
PO6	Ethical and moral reasoning
PO7	Environmental sustainability awareness
PO8	Social responsibility and teamwork

CO–PO Mapping Matrix

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	1	1	2	1	1	1
CO2	3	2	1	1	3	2	2	1
CO3	2	3	2	1	2	3	1	2

CO4	2	3	3	1	2	2	1	3
CO5	2	2	1	3	2	2	3	3

Key to Mapping

- **3 – High correlation**
- **2 – Moderate correlation**
- **1 – Low correlation**

Unit I	**Foundations of Health and Well-being**	

Concept of Health and Wellness – Dimensions: Physical, Mental, Emotional, Social, Intellectual, Environmental – Importance of holistic well-being – Lifestyle and well-being – Breaking bad habits: Alcoholism – Drug addiction – Unhealthy practices (poor diet, sedentary lifestyle, substance misuse)

Unit II	**Physical Well-being**

Concept of Health and Wellness – Dimensions: Physical, Mental, Emotional, Social, Intellectual, Environmental – Importance of holistic well-being – Lifestyle and well-being – Breaking bad habits: Alcoholism – Drug addiction – Unhealthy practices (poor diet, sedentary lifestyle, substance misuse)

Unit III	**Emotional Well-being**

Stress management and emotional regulation – Self-awareness and self-compassion – Self-acceptance and body positivity – Decision making and importance of saying "No" – Resilience and coping strategies – Managing negative emotions (anger, anxiety, fear) – Developing positive mindset and emotional balance

Unit IV	**Social & Intellectual Well-being**

Building relationships, empathy, and gratitude – Communication skills (interpersonal and group) – Forgiveness and inclusivity – Social responsibility and civic sense – Conflict resolution and teamwork – Critical thinking and problem solving – Creativity and lifelong learning

Unit V	Environmental & Applied Well-being (Digital & Tech-Smart Living)

Environmental health and sustainability – E-waste management – Responsible consumption and use of technology – Impact of technology on health and lifestyle – Digital literacy: safe, ethical, and responsible use – Cyber safety, privacy, and identifying misinformation – Tech-life balance and digital minimalism – Practical components: Wellness and digital detox plan – Reflection journal – Habit-building exercises.

Textbooks

1. Selvaraj, B. (2026). *Health and wellness.* Selvaraj B.
2. The Textbook of Health Psychology – Hariharan, M. (2024). The Textbook of Health Psychology. Routledge.

3. Health Psychology – Marks, D. F., Murray, M., et al. (2024). Health Psychology: Theory, Research and Practice. Sage.

Reference Books

1. Outlive: The Science and Art of Longevity – Attia, P. (2023).
2. The Anxious Generation – Haidt, J. (2024).
3. Mind the Science – Stea, J. N. (2024).
4. Ultra-Processed People – van Tulleken, C. (2023).
5. You Will Get Through This Night – Howell, D. (2021).

Internet Resources:

- www.who.int
- www.unicef.org
- www.unicef.org/health
- data.unicef.org
- corecommitments.unicef.org

Course code	33R	PHYSIOLOGY AND WILDLIFE HEALTH, MANAGEMENT OF ZOO'S, SANCTUARIES ANDNATIONAL PARKS& WILDLIFE MANAGEMENT TECHNIQUES	L	T	P	C
Core/Elective/Supportive		CORE PRACTICAL- III	0	0	2	4
Pre-requisite		Basic information on physiology and wildlife management techniques of animals	Syllabus Version		2025-2026	

Course Objectives:

The main objectives of this course are to:
To make them understand physiology through practical

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand about the National parks	K1
2	To understand about the feeding of zoo animals	K4
3	Know above physiology and health assessment of wild animals	K3
4	Knowledge about wildlife diseases	K4
5	Know about various technologies in wildlife studies	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

12 hours

Major

1. Effect of Water Temperature on Opercular Movement in Freshwater Ectotherms and Determination of the Thermal Coefficient (Q-10).
2. Determination of Whole Blood Specific Gravity in Vertebrates Using the Copper Sulphate (CuSO_4) Falling Drop Technique.
3. Mechanism and Kinetics of Active Sodium (Na+) and Chloride (Cl-) Uptake in Freshwater Teleosts (Fishes).
4. The Effect of Salinity Gradients on Respiration Rate and Oxygen Consumption in Teleost Fishes
5. Qualitative and Quantitative Profiling of Nitrogenous Excretory Products (Ammonia, Urea, and Uric Acid) Across Diverse Animal Taxa.
6. Demonstration of Osmotic Water Balance: Gravimetric Changes in Earthworms (*Pheretima posthuma*) Subjected to Hypo, Iso, and Hypertonic Media.
7. Determination of Median Lethal Dose (LD_50) and Concentration (LC_50) through Acute Toxicity Testing and Probit Analysis.
8. Quantitative Assessment of Biological Diversity, Species Richness, and Evenness Indices in a Local Ecosystem.
9. Spatial Rectification and Geo-Referencing of Raster Image Files for Spatial Analysis Using QGIS / ArcGIS.
10. Estimating Herbivore Population Density and Spatial Distribution Using Line Transect Distance Sampling Software.
11. Estimation of Asian Elephant (*Elephas maximus*) Population Density Using the Indirect Dung Count and Decay Rate Method.

Minor

1. Quantitative Estimation of Hemoglobin Content in Fish Blood Using Sahli's Acid Hematin Method.
2. Cartographic Mapping and Spatial Distribution of Major National Parks and Tiger Reserves of India.
3. Spatial Mapping and Biogeographical Analysis of Key Wildlife Sanctuaries in Tamil Nadu.
4. Identification and Geographic Demarcation of Biodiversity Hotspots in India.
5. Formulation and Preparation of Nutritional Dietary Regimens for Captive and Domesticated Animals.
6. Structural Design, Enrichment, and Safety Architecture of Enclosures for Captive Animals.
7. Methods and Safety Protocols for Physical and Chemical Restraint of Wild Animals.
8. Morphological Identification and Parasitological Screening of Ectoparasites in Wildlife.
9. Diagnostic Identification and Quantification of Endoparasites in Wild Animal Hosts.
10. Ecological Identification, Mapping, and Conservation Assessment of Elephant Corridors.
11. Spatial Distribution and Cartographic Plotting of Key Wildlife Sanctuaries on the Map of India.
12. Spatial Distribution and Cartographic Plotting of Major National Parks on the Map of India.
13. Spatial Mapping and Comparative Layout of Recognized Zoological Parks in India

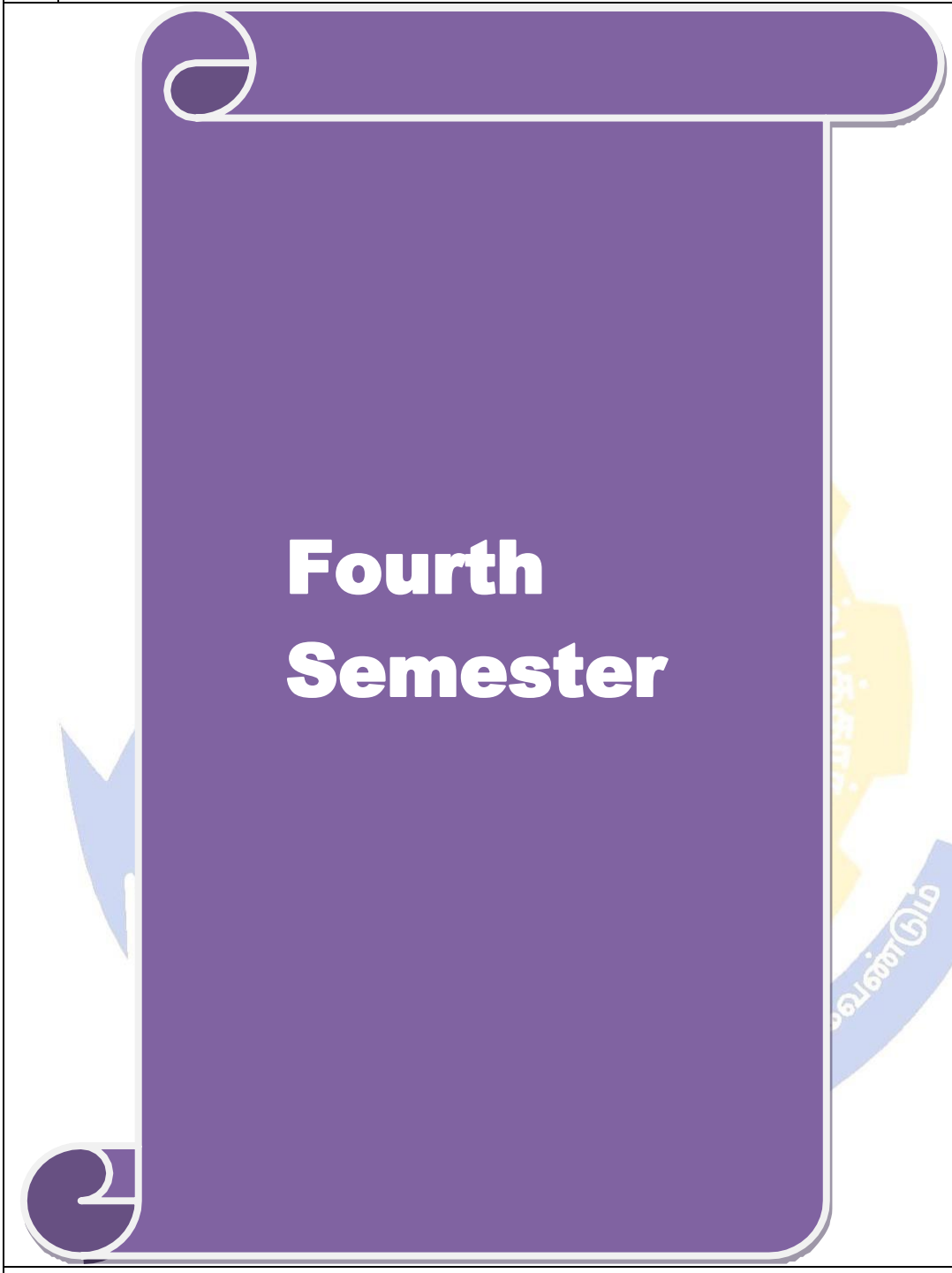
Spotters

1. pH meter
2. Centrifuge
3. Heamoglobino meter
4. Spectrophoto meter
5. Sphygmomano meter
6. ECG Recorded strip
7. GPS
8. Field Campus
9. Altimeter
10. Range Finder
11. Clinometer

SUBMISSION: Submit a report on Visit to Zoos, Sanctuaries National Parks. Submit a report on Captive Animal Management. Visit to animal breeding centers.	**12 hours**
Total Lecture hours	**86 hours**

TEXT BOOK

1	Arunabha Sen Publishers
2	



Reference Books	
1	Wildlife Management Techniques – Rajesh Gopal
2	
3	

Course code	47V	PROJECT & VIVA-VOCE	L	T	P	C
Core/Elective/Supportive		Paper XV	6	0	0	4
Pre-requisite			Syllabus Version		2025-2026	

Course Objectives:

The main objectives of this course are to:
To make the students to understand proposal writing
To make the students to understand statistical methods.
To understand the methods of analyzing the raw datas
To make the students in dissertation writing.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	To learn about basics of statistical methods.	K4
2	To understand various aspects in statistics.	K3
3	To learn about interpretation of raw datas in research.	K2
4	To know basic knowledge about datascience.	K2
5	To apply data science in aspects of biology.	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Guidelines for awarding 200 marks of the Project:

*For Project 200 marks (Project work=100 marks and Viva-voce= 100 marks).

Internal and external examiners will evaluate the project work and award marks out of 100.

Internal and external examiners will conduct viva-voce examination and award marks out of 100.

Annexure

General Instructions:

Elective Courses: Minimum Two for Each Semester.
Skill Enhanced Courses: Minimum One for first three Semesters.
Value Added Courses: Minimum 2 and maximum 5 for Each Department for Entire Program
Job Oriented Certificate Courses: Two Courses (Each one on First and Second Year)
All the Board of Studies are requested to follow the same template and use the TIMES NEW ROMAN FONT with the Size of 12.
The Course Designer should be mentioned in each of the courses.

Details for the Certificate Course

1	**Name of the Course**	WILDLIFE BIOLOGY
2	**Name of the Department**	WILDLIFE BIOLOGY
3	**Name of the Faculty Member**	
4	**Inter/Intra Department**	
5	**Objectives of the Course**	
6	**Topics to be Covered**	
7	**Duration of the Course**	
8	**Eligibility**	
9	**Registration**	
10	**Description of the Course**	
11	**Job Opportunities**	
12	**Number of Candidates**	
13	**Course Fee**	

BHARATHIAR UNIVERSITY: COIMBATORE 641046POST GRADUATE PROGRAM IN WILDLIFE BIOLOGY

VISION

To increase the knowledge in the area of Wildlife(Both Fauna and Flora) for understanding the value of wildlifebiology and conservation of ecosystem and societal oriented applied researchusing ecosystemmanagementbystudentsthroughhigh-qualityeducation and research.

MISSION

To create awareness for understanding the importance of animal diversity and conservation of biodiversity.
To mold the students in the field of Wildlife sciences in both theory and practical to equipthemselves in the area of wildlife biology and its related field for their employment
opportunities.Toinvolvethestudentsinactivitiesofconservationofwildlifeanditsrelatedresearchactivities.