

# M.Sc. Wild Life Biology

## Syllabus

### AFFILIATED COLLEGES

Program Code: \*\*\*

2023 – 2024 onwards

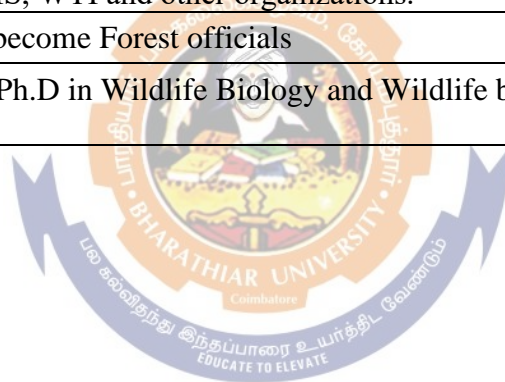


## BHARATHIAR UNIVERSITY

(A State University, Accredited with “A++” Grade by NAAC,  
Ranked 21<sup>st</sup> among Indian Universities by MHRD-NIRF)

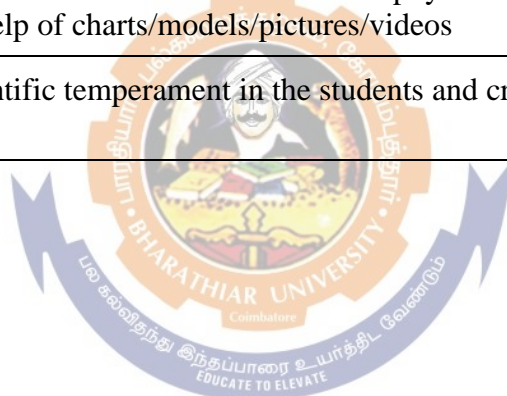
Coimbatore - 641 046, Tamil Nadu, India

<b>Program Educational Objectives(PEOs)</b>	
The <b>M.Sc. Wildlife Biology</b> program describe accomplishments that graduates are expected to attain with in five to seven years after graduation	
PEO1	M.Sc., graduates can work as teaching faculty in Environmental Science, Wildlife Sciences & Wildlife Biology, Researchers, Scientists, Forest service and Biologists. They can also become teachers in Environmental sciences and animal trainers in all fields of biology.
PEO2	They can find jobs in any field of biological science including Forest Ecologist ZSI, BSI, WII and field works in conservation.
PEO3	They can enter into environment, forest ecosystems and pollution control sectors.
PEO4	They can find employment in Zoos, Museums, Zoological Parks, Tiger Reserves, Sanctuaries and National Parks.
PEO5	They can fit into Wildlife Forensic labs
PEO6	They can earn and shine in Forest department & Research institutions
PEO7	They can work in Veterinary sector
PEO8	They are eligible to serve as Biologist & Scientist in wildlife institutions and NGO'S like BNHS, WTI and other organizations.
PEO9	Appear exams to become Forest officials
PEO10	Higher studies as Ph.D in Wildlife Biology and Wildlife biology – Zoology Interdisciplinary



<b>Program Specific Outcomes (PSOs)</b>	
After the successful completion of <b>Wildlife Biology</b> program, the students are expected to	
PSO1	Elucidate animal-animal, animal-plant, animal-microbe interactions and their consequences to animals, humans and the environment.
PSO2	Develop deeper understanding of key concepts of biology at molecular and cellular level, physiology and reproduction at organism level, and ecological impact on animal behavior.
PSO3	Strengthen knowledge of genetics in light of advancements in understanding animal genome and other model organisms.
PSO4	Describe the expression of genome revealing multiple levels of regulation and strategies to manipulate the same in the benefit of animal life.
PSO5	Learn handling forensic analysis of wild animals and identifying dead animals organs. Cause of death of wild animals, Human animal conflicts etc.,
PSO6	Understand relationships of variations in phenotypic expression.
PSO7	Develop an understanding of Zoological Science for its application in animal classification Wild Fauna, Forest Entomology and Wildlife Science.
PSO8	Develop theoretical and practical knowledge in handling the animals and using them as model organism.
PSO9	Maintain high standards of learning in animal sciences especially in wildlife.
PSO10	Focus to prepare them with research-oriented approach in frontier Area so research in Wildlife Biology and preparing them for carrying out advance research.

<b>Program Outcomes (POs)</b>	
On successful completion of the M.Sc. Wildlife Biology program	
PO1	Expected to attain writing skills via assignment, reports, seminar & projects
PO2	To develop presentation & communication skills through research
PO3	To attain analytical skills like understanding & interpreting the results
PO4	To know the basics of instrumentation
PO5	To develop taxonomical skills in identifying the animal species
PO6	To learn about animal biodiversity and forest ecosystems
PO7	To understand animal by studying the biology, anatomy, physiology etc.,
PO8	To create an awareness of the impact of Wildlife and the environment, forestry and development outside the scientific community.
PO9	To study and understand the classification of whole phyla includes in Chordates with the help of charts/models/pictures/videos
PO10	To inculcate the scientific temperament in the students and creating interest in research.



**BHARATHIARUNIVERSITY :COIMBATORE641 046**  
**M.Sc., WILDLIFE BIOLOGY DEGREE COURSE (COLLEGES - CBCS**  
**PATTERN)REVISEDSCHEME OFEXAMINATION**  
(Forthe students admitted during the academic year 2023 – 24 onwards

Course Code	Paper	TitleoftheCourse	Credits	Hours		MaximumMarks		
				Theory	Practical	CIA	ESE	Total
<b>FIRSTSEMESTER</b>								
13A	Core I	Ichthyology and Herpetology	4	6	-	25	75	100
13B	Core II	Ornithology	4	6	-	25	75	100
13C	Core III	Mammalogy	4	6	-	25	75	100
13D	Core IV	Forestry and Silviculture	4	6	-	25	75	100
13E	Core XI	Conservation of Biodiversity of Wildlife	4	6	-	25	75	100
23P	Practical I	(Comprises of Papers I,II&III)	-	-	2	-	-	-
23Q	Practical II	(Comprises of Papers V,VI& VII)	-	-	2	-	-	-
23R	Practical III	(Comprises of Papers IV & EI)	-	-	2	-	-	-
23R	Practical V	( Comprises of paper XI )	-	-	2	-	-	-
<b>Total</b>			<b>20</b>					<b>500</b>
<b>SECONDSEMESTER</b>								
23A	Core V	Ecology and Evolution	4	6	-	25	75	100
23B	Core VI	Ethology of Wildlife	4	6	-	25	75	100
23C	Core VII	Biotechnology and Genetic Engineering	4	6	-	25	75	100
23D	Elective I	Forest Entomology	4	6	-	25	75	100
23P	Practical I	(Comprises of Papers I, II & III)	4	-	2	25	75	100
23Q	Practical II	(Comprises of Papers V, VI & VII)	4	-	2	25	75	100
23R	Practical III	(Comprises of Papers IV & EI)	4	-	2	25	75	100
<b>Total</b>			<b>28</b>					<b>700</b>
<b>THIRDSEMESTER</b>								
33A	Core VIII	Physiology and Health care of Wildlife	4	6	-	25	75	100
33B	Core IX	Management of Zoo, Sanctuaries and National Parks	4	6	-	25	75	100
33C	Core X	Wildlife Management Techniques	4	5	-	25	75	100
3EA	Elective II	Biostatistics, Application of Computing and Artificial Intelligence 4.0	4	5	-	25	75	100
3EB	Elective III	Research Methodology	4	6	-	25	75	100
43P	Practical IV	(Comprises of Papers VIII & IX)	-	-	2	-	-	-
43Q	Practical V	(Comprises of Papers X)	-	-	2	-	-	-
43R	Practical VI	( Comprises of paper XI )	-	-	2	-	-	-
4ES	PracticalVII	Elective Practical (Comprises of Elective Papers II and III)	-	-	2	-	-	-
<b>Total</b>			<b>20</b>					<b>500</b>

FOURTH SEMESTER								
4EC	Paper XV	Project & viva- voce	6	-		100	50*	150
43P	Practical IV	(Comprises of Papers VIII & IX)	4	-	2	25	75	100
43Q	Practical V	(Comprises of Papers X)	4	-	2	25	75	100
43R	Practical VI	( Comprises of paper XI )	4	-	2	25	75	100
43S	Practical VII	Elective Practical (Comprises of Elective Papers II and III)	4	-	2	25	75	100
		<b>Total</b>	<b>36</b>					<b>550</b>
		<b>GrandTotal</b>	<b>90</b>					<b>2250</b>

\*For Project 150 marks (Project work=100 marks and Viva-voce=50 marks).

**Project Guidelines:**

1. Internal and external examiners will evaluate the project work and award marks out of 100.
2. Internal and external examiners will conduct viva-voce examination and award marks out of 50.



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		2023 – 2024	
<b>Course Objectives:</b>						
The main objectives of this course are:						
<ol style="list-style-type: none"> <li>To understand about the procedures and trends in taxonomy.</li> <li>To understand important physiological functions in various vertebrate forms.</li> <li>To know about the breeding behaviour of Fishes, Amphibians and Reptiles.</li> <li>To know about the organization of Phylum Pisces, Amphibians and Reptiles and its characters.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	To understand concept soft 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
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6–Create</b>						
<b>Unit:1</b>	<b>PRINCIPLES &amp; TAXONOMY OF PISCES</b>					<b>15hours</b>
Characteristics and Classification of Pisces upto Order with suitable examples – Economically important Marine, Esturine, Lentic, Game and Aquarium fishes in South India						
<b>Unit:2</b>	<b>PRINCIPLES &amp; TAXONOMY OF AMPHIBIANS</b>					<b>15hours</b>
Characteristics and Classification of Amphibia upto order with suitable examples – Salient features and distribution of South Indian Amphibians – Economic importance of Amphibians						
<b>Unit:3</b>	<b>PRINCIPLES &amp; TAXONOMY OF REPTILES</b>					<b>15hours</b>
Classification and Characteristics features of Reptilia upto Order with suitable examples – Economic importance of Reptiles – Common South Indian Poisonous and Non- poisonous snakes distinctive features and distribution. Distinctive features and distribution of Indian Crocodiles – Breeding Biology of Indian Crocodiles.						
<b>Unit:4</b>	<b>LOCOMOTION AND DIGESTION</b>					<b>15hours</b>
Distinctive features and locomotory organelles of Amphibians and Reptiles. Digestive system and feeding behaviour of Fishes and Amphibians						

<b>Unit:5</b>	<b>IMPORTANCE OF INDIAN TURTLES, TERRAPINS, TORTOISES AND CROCODILES</b>	<b>15hours</b>
Distinctive features and distribution of Indian Turtles, Indian Tortoise and Indian terrapins – various aspects of migration in sea turtles – Breeding biology of Marine Turtles. Types of crocodiles, status, distribution and conservation threats.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2hours</b>
Expert lectures, online seminars –webinars ,Conferences and Workshops		
<b>Total Lecture hours</b>		<b>77hours</b>
<b>TextBook(s)</b>		
1	Moyle & Cechi, Fishes An Introduction to Ichthyology	
2	John Richardson, Ichthyology	
3	Kothpal, A Text book of Modern Chordata	
4	Laurie J. Vitt, Janalee P. Caldwell, Herpetology: An Introductory Biology of Amphibians and Reptiles	
<b>ReferenceBooks</b>		
1	Gupta, General & Applied Ichthyology: Fish and Fisheries June 2006	
2	SS Khanna, Textbook of Fish Biology and Fisheries 3 <sup>rd</sup> Edition	
3	Laurie J. Vitt, Janalee P. Caldwell, Herpetology: An Introductory Biology of Amphibians and Reptiles	
4	Kerridge, Cold Blood: Adventures a with Reptiles and Amphibians	
5	McCarthy, Reptile	
6	Pough, Herpetology	
7	Mark O'Shea, Venomous Snakes of the World	
<b>RelatedOnlineContents[MOOC,SWAYAM, NPTEL, Websitesetc.]</b>		
1	SystemsBiology(NPTEL)webhttps://nptel.ac.in/courses/102/106/102106035/	
Course Designed By: Dr. P. Kannan, Assistant Professor, T.V.K College, Thiruvaur and Dr. H. Mohanakrishnan, Head of the Department, Department of Wildlife Biology, GAC, Ooty.		



Mapping with Programme Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
C01	M	S	S	L	S	M	S	S	M	L
C02	S	M	M	L	S	S	S	M	S	M
C03	S	M	M	L	S	S	S	M	S	M
C04	L	L	L	L	S	M	S	M	S	S
C05	M	M	S	L	S	S	S	S	S	S

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



Coursecode	13B	ORNITHOLOGY	L	T	P	C
<b>Core/Elective/Supportive</b>		<b>Core Paper II</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite</b>		Basic knowledge about Birds, anatomy and physiology	<b>Syllabus Version</b>		<b>2023 – 2024</b>	
<b>CourseObjectives:</b>						
Themain objectives ofthis courseare						
<ol style="list-style-type: none"> <li>1. To understand about Aves and its origin.</li> <li>2. To study about structure and function of Aves.</li> <li>3. To study about Avian classification, development, structure and function of integument types.</li> <li>4. To understand the evolution of circulatory organs and process of respiration.</li> <li>5. To know about the various aspects of skeletal system and evolution of urinogenital system.</li> <li>6. To understand the working of nervous system and sense organs.</li> </ol>						
<b>ExpectedCourseOutcomes:</b>						
On the successful completion of the course, student will be able to:						
1	To understand the origin of Avian, concept of Avian diversity and importance of Avian morphology.					K2
2	To gain knowledge about Avian classification, as well as structure and function of integument and its derivatives.					K2
3	To analyze the evolution of Avian Physiology, blood components as well as respiratory mechanisms and organs in various Birds.					K4
4	To understand the skeletal system and its parts and analyze the evolution of urino-genital system in different Vertebrates.					K2&K5
5	To gain knowledge about Avian diversity, receptors of olfaction, taste and hearing and other organs.					K4
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6–Create</b>						
<b>Unit:1</b>	<b>TAXONOMY OF BIRDS</b>					<b>15 hours</b>
Taxonomy and Anatomy Birds: Classification upto order with examples. Structure and external Morphology of Birds. Modification in birds: Beak, Wing and feet. Evolutionary adaptations in aves– archaeopteryx - Economic Values of birds. Birds of agricultural importance – Bird hazards in airports – recreation – aesthetics – hunting - bird watching.						
<b>Unit:2</b>	<b>FORAGING BEHAVIOUR IN BIRDS</b>					<b>15 hours</b>
Physiology of digestive system in birds. Adaptation of birds based on Feeding habits: Insectivores – Fugivores, Nectarivores, Graminivores, Carnivores, Omnivores and scavengers. Habitat ecology of Indian birds: Coastal birds, Inland water birds, Birds of high altitude and deserts birds.						
<b>Unit:3</b>	<b>SKELETAL SYSTEM AND MIGRATION</b>					<b>15 hours</b>
Physiology of skeletal and respiratory system in birds. Bird Migration: mechanics of migration – timing of migration – physiology of migration – orientation and navigation. Nests: Choice of Roost site, Choice of nesting sites, Selection of Nesting Materials, Colonial nesting, Types of nests and Multiple Nests structures.						
<b>Unit:4</b>	<b>BREEDING BEHAVIOUR IN BIRDS</b>					<b>15 hours</b>

Physiology of Urinogenital system in birds. Reproduction: Breeding seasons, factors influencing breeding seasons – courtship display – sexual selection – pair bond – sexual dimorphism – polymorphism – polyandry – polygamy – promiscuity – co-operative breeding – brood parasites.		
<b>Unit:5</b>	<b>PARENTAL CARE IN BIRDS</b>	<b>15hours</b>
Physiology of Nervous system and Sense organs in Birds. Egg laying, clutch size, incubation patterns in different species, hatching and parental care - Nest sanitation – brooding and defence of young ones.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>2hours</b>
Expert lectures, online seminars –webinars		
		<b>Total Lecture hours</b>
		<b>77 hours</b>
<b>TextBook(s)</b>		
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	Kotpal, A Textbook of Chordata	
<b>ReferenceBooks</b>		
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.	
<b>Related Online Contents [MOOC,SWAYAM, NPTEL,Websitesetc.]</b>		
1	GeneralHumanAnatomy(WMA): <a href="https://www.mooc-list.com/course/general-human-anatomy-wma">https://www.mooc-list.com/course/general-human-anatomy-wma</a>	
2	EvolutionaryBiology: <a href="https://onlinecourses.swayam2.ac.in/cec20_bt06/preview">https://onlinecourses.swayam2.ac.in/cec20_bt06/preview</a>	
Course Designed By:Dr. A Veeramani, Assistant Professor, and Dr. S Vidya, Guest Faculty,GAC, Ooty.		

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

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

Coursecode	13C	MAMMALOLOGY		L	T	P	C
<b>Core/Elective/Supportive</b>		<b>Core Paper III</b>		<b>6</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite</b>		Basic knowledge about Mammal biodiversity and conservation		<b>Syllabus as on</b>		<b>2023-2024</b>	
<b>CourseObjectives:</b>							
The main objectives of this course are to:							
1. Understand the classification of Mammals.							
2. Acquire the knowledge of mammalian physiology.							
3. Knowledge about different mammalian species.							
4. Levels of organization in Mammals.							
5. Analyze the ecological and evolutionary affinities of mammals.							
<b>ExpectedCourseOutcomes:</b>							
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	
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6–Create</b>							
<b>Unit:1</b>	<b>TAXONOMY AND CLASSIFICATION OF MAMMALS</b>					<b>15hours</b>	
Classification of mammals upto order with suitable examples – economic importance of Mammals – Physiology of mammals; digestion, reproduction, endocrine, excretory and skeletal system – skull and dental formulae. Evolutionary adaptations in mammals							
<b>Unit:2</b>	<b>ORDER CARNIVORA</b>					<b>15hours</b>	
Major Cats – Tiger, Lion, Leopard and Snow Leopard, Lesser Cats – Golden, Leopard, Fishing, Jungle. Civet – Tiger civet, Large Indian Civet, Small Indian Civet, Palm Civet, Binturong or Bear Cat, Hyena-Stripped, Mongoose, Common Mongoose, Small Indian, Stripped necked, Crab-eating. Dogs- Wolf, Jackal, Red Fox, Indian Fox, Dhole, Bears- Sloth Bear, Himalayan Black Bear, Brown Bear, Weasels- Common and Smooth Indian Otter.							
<b>Unit:3</b>	<b>ORDER PERISSODACTYLA</b>					<b>15hours</b>	
Horses- wild Ass, Rhinoceros- one horned Rhinoceros. Order Artiodactyls: Deer- Kashmir stag, brown-antlered deer, swamp deer, hog deer, spotted deer, barking deer, musk deer,mouse deer, sambar deer, antelope –black buck, four horned antelope. Goat- Himalayan Thar, Nilgiri thar, Oxen, Guar, Pig- Wild Boar							
<b>Unit:4</b>	<b>POPULATION DYNAMICS</b>					<b>15hours</b>	
Demographic and life history parameters, evolution of life history parameters: r & K selection, allometry, aging and sexing, life tables, age and stage structures models, methods of estimation of life history parameters, population dynamics: exponential, logistic and other forms of growth of population, density dependent and independent growth, population simulation, predator-prey systems, carrying capacity, Sampling designs for population estimation, population estimation methods: Distance based Sampling Methods, Mark-Recapture for Closed Population, Indices, and Estimation of Demographic parameters.							

<b>Unit:5</b>	<b>MAMMALS: AN OVERVIEW</b>	<b>15hours</b>
History of mammalogy. Adaptations in mammals; hibernation, torpor, aestivation, locomotion and water regulation. Metabolism and thermoregulation; ectothermy, homeothermy and cold stress, body size versus homeothermy. Body size variation in mammals and its influence on life history, metabolic rate, weight constraints, feeding behaviour, niche width and reproduction. Mammalian skin and its derivatives. Behaviour and social organization in mammals; social and mating systems; territories; communication.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2hour</b>
Expert lectures, online seminars–webinars,		
<b>Total Lecture hours</b>		<b>77hours</b>
<b>TextBook(s)</b>		
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.	Manual of Zoology–Egambaranathar Iyyer	
<b>ReferenceBooks</b>		
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, Mayer 1963	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	Ecology and Wildlife Conservation (FutureLearn): <a href="https://www.mooc-list.com/course/ecology-and-wildlife-conservation">https://www.mooc-list.com/course/ecology-and-wildlife-conservation</a>	
2	Wildlife Conservation: <a href="https://nptel.ac.in/courses/102/104/102104068/">https://nptel.ac.in/courses/102/104/102104068/</a>	
3	Wildlife Ecology: <a href="https://swayam.gov.in/nd1_noc20_bt38/preview">https://swayam.gov.in/nd1_noc20_bt38/preview</a>	
Course Designed By: Dr. H. Mohanakrishnan, Assistant Professor and Head, Department of Wildlife Biology, GAC, Ooty and Dr. S. Vidya, Guest Faculty, Department of Wildlife Biology, GAC, Ooty.		

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

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

Coursecode	13D	FORESTRY AND SILVICULTURE	L	T	P	C
Core/Elective/Supportive		Core Paper IV	6	0	0	4
Pre-requisite		Basic understanding about Forest	Syllabus version		2023-2024	
<b>Course Objectives:</b>						
The main objectives of this course are,						
<ol style="list-style-type: none"> <li>1. To explain the core concepts of ecology for a better understanding of the environment.</li> <li>2. To motivate, identify and solve environmental problems.</li> <li>3. To create awareness about the improvement and protection of the environment.</li> <li>4. To make understand the need for conservation of biodiversity and natural resources.</li> <li>5. To help understand the concepts of exobiology.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Understand the ecological dynamics and the significance of environmental integrity					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.					K4
4	Scrutinize specific cases of environmental pollution and challenges, and their impacts on ecology.					K5
5	Apply knowledge of chemistry, biology, molecular biology and micro biology to arrive at Innovative solutions to environment issues and extra-terrestrial habitats					K3
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6-Create</b>						
<b>Unit:1</b>	<b>REGENERATION OF FOREST</b>				<b>15hours</b>	
Natural and artificial regeneration of forests - nursery and planting techniques. Clear felling, Uniform shelter wood selection, coppice and conversion systems. Silviculture management -Mangroves- Cold desert & Plantations . Tree improvement & Seed Technology (collection, storage, pre-treatment and germination, establishment and tendings) – Non timber forest products – Wood seasoning and preservation - Anatomical structure of wood, defects and abnormalities of wood, timber identification.						
<b>Unit:2</b>	<b>FOREST WORKING PLAN</b>				<b>15hours</b>	
Forest working Plan–Planning, evaluation, monitoring and forest industries. Silvicultural systems - Indian forest act 1927); forest conservation act(1980); Biodiversity Act, HACA						
<b>Unit:3</b>	<b>FOREST MENSURATION</b>				<b>15hours</b>	
Forest management techniques - Methods of measuring - diameter, girth, height and volume of trees- form-factor- volume estimation of stand Sampling method sand sample plots. Yield calculation-forest cover monitoring through remote sensing-GIS management and modeling- Forest survey-map reading.						
<b>Unit:4</b>	<b>FOREST MANAGEMENT</b>				<b>15hours</b>	
Forest types in India, identification- dendrology, Establishment of herbaria and arboreta. Agro forestry systems - Social/Urban Forestry – Joint Forest Management. Watershed management – Deforestation & Impacts. Forest Inventory.						

<b>Unit:5</b>	<b>SOIL CONSERVATION</b>	<b>15hours</b>
Role of Forest in soil Conservation: erosion- reclamation – role of microorganisms –Watershed management –forest hydrology–river channel stabilization –avalanche and landslide control–ground water recharge. Check dam – Percolation pond – Impact of invasive alien species in Forest Management.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2hours</b>
Expert lectures, online seminars –webinars, Workshop		
	<b>TotalLecturehours</b>	<b>77hours</b>
<b>TextBook(s)</b>		
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	
<b>ReferenceBooks</b>		
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	Environmental Science:Systems and solutions–MichaelL.McKinney & Robert M.Schoch.	
4	Ecology and Environment–P.D. Sharma	
<b>RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]</b>		
1	Primark:A Primer of Conservation Biology	
2	Calabrese: Pollutants and High-Risk Groups	
3	Controlled Ecological Life Support system –NASA conference publication(2378)(e-content)	
Course Designed By: Dr.B. Ramakrishnan, Assistant Professor in Wildlife Biology, GAC, Ooty and Dr. A.VeeraMani, Assisatnt Professor in Zoology, GAC Kumbakonam.		

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

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

Coursecode	13E	Conservation in Biodiversity of Wildlife	L	T	P	C
Core/Elective/Supportive		Core paper-V	6	0	0	4
Pre-requisite		Basic knowledge about Techniques Conservation of biodiversity in Wildlife	Syllabus		2023-2024	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>To make understand the basic wildlife organizations.</li> <li>To understand the significance of Biodiversity.</li> <li>To gain knowledge about conservation of wildlife.</li> <li>To understand the wildlife laws and legislation.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6–Create</b>						
<b>Unit:1</b>	<b>BIODIVERSITY</b>					<b>18hours</b>
Definition - Types - Genetic, Species and Ecosystem diversity. Values of biodiversity. Biogeographical classification of India. Biodiversity measurements, mega diversity centers. Loss of biodiversity. Hotspots, Biosphere Reserves, Threats, Endangered and Endemic species. Conservation strategies: <i>In-situ</i> - National Parks, Wildlife Sanctuaries, Community Reserve and conservation Reserves. <i>Ex-situ</i> – Cryopreservation, gene banks, sperm banks, DNA banks and tissue culture, Zoo, Zoological Park, Arboretum.						
<b>Unit:2</b>	<b>CONSERVATION OF NATURAL RESOURCES</b>					<b>18hours</b>
Resources types - Food, water, energy and minerals. Human impact on Terrestrial and Aquatic resources – Distribution and conservation of Forest, Grasslands and semi-arid habitats of India. Wetland Habitats of India: Definition and types of wetlands, important wetlands of India and their conservation issues.						
<b>Unit:3</b>	<b>ORGANISATIONS</b>					<b>16hours</b>
Organization at State level- State Biodiversity Board, National level –NBA, ZSI, BSI, FRI, FSI. International level - CITES, IUCN, CBD and WWF. NGOs - BNHS, Zoo outreach organization, WCT and WPSI. International agreements for conserving marine life. Convention on wetlands of International Importance (Ramsar convention).National Forest Policy –1988, Biodiversity Act - 2002						
<b>Unit:4</b>	<b>WILDLIFE IN INDIA</b>					<b>18hours</b>
Protected Area concept: National parks, Wildlife Sanctuaries, Biosphere Reserves – Core, buffer and tourism zones. Exclusive Economic Zone; Wildlife wealth of India and threatened wildlife. Reasons for wildlife depletion in India. Wildlife conservation approaches and limitations - Wildlife Habitat - Characteristic, Fauna and Adaptation with special reference to Tropical						



Unit:5	MANAGEMENT OF WILDLIFE	18hours
Wildlife Trade and legislation - Assessment, documentation, Prevention of trade. Wildlife laws and ethics. Human – wildlife conflict management –Human death, cattle lifting, crop damage – Mitigation measures and corridor. Important projects for the conservation of wildlife – Project Tiger and Project Elephant. Wildlife(Protection) Act, 1972 and its Amendments. Wildlife trade and regulations Biodiversity Act 2000.		
Unit:6	ContemporaryIssues	2hours
Expertlectures,onlineseminars –webinars,workshopsandconferences		
TotalLecturehours		90hours
<b>TextBook(s)</b>		
1	Asthana. D.K. and MeeraAsthana. (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	Manikandank&PrabhuS. (2019). <i>Indian Forestry A Break through Approach to Forest Service</i> .Jain Brother Publishers.	
6	Robinson, Wl. and Eric, G. Bolen, 1984. Wildlife Ecology and Management Mac Millan Publishing Co, New York. Pp 478.	
7	Dasmann R F, 1964. <i>Wildlife Biology</i> , JohnWiley&Sons, New York, p231	
<b>ReferenceBooks</b>		
1	WarningRH andSchlesinger WH, 1985. <i>Forest Ecosystems:Conceptsand Management</i> . AcademicPress,New York.	
2	Robinson, Wl. 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	
<b>RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]</b>		
1	<a href="https://swayam.gov.in/">https://swayam.gov.in/</a>	
2	<a href="https://www.mooc.org/">https://www.mooc.org/</a>	
4	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>	
CourseDesigned By:Dr. A. Veeramani, Assistant Professor in Zoology, GAC, Kumbakonam and Dr. B.Ramakrishnan, Assistant Professor in Wildlife Biology, GAC, Ooty		

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





**Second  
Semester**

Course code	23A	ECOLOGY AND EVOLUTION	L	T	P	C
<b>Core/Elective/Supportive</b>		<b>Core Paper VI</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite</b>		Basic knowledge about Ecology and Evolution	<b>Syllabus</b>		<b>2023-2024</b>	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
1. To understand basics of Ecology.						
2. To elucidate the interaction of animals with ecosystem.						
3. To understand the basic Phylogeny of animals.						
<b>Expected Course Outcomes:</b>						
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 Phylogenetics					K3
4	To understand the various methods in pollution control.					K4
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6–Create</b>						
<b>Unit:1</b>	<b>LIMITING FACTORS IN ECOLOGY</b>					<b>15hours</b>
Light, Temperature, Soil, Law of minimum, Law of tolerance. <b>Population ecology</b> - Density, Natality, Mortality, Growth curves, Equilibrium fluctuation, Biotic potential, Regulation. <b>Community ecology</b> - Structure, Stratification, Ecotone and Edge effect, Ecological niche, Ecological succession.						
<b>Unit:2</b>	<b>ECOLOGICAL FACTORS</b>					<b>15hours</b>
Structure, dynamics, energy flow, Primary production and decomposition. Structure and function of ecosystems-terrestrial (forest, grassland) and aquatic (freshwater, estuarine, marine), <b>Biogeochemical cycles</b> -gaseous (Carbon, Nitrogen, Oxygen), Sedimentary (Sulphur, Phosphorus).						
<b>Unit:3</b>	<b>POLLUTION IN THE ECO-SYSTEM</b>					<b>15hours</b>
Air, Water, Land, Noise, Thermal, Radioactive - Conservation of Natural Resources. Environmental Impact Assessment (EIA). <b>Remote Sensing</b> -Aerial Photography, Satellite images, Thermal, Infra Red, Radar Images. Geographical Information System (GIS) and its application; Space Ecology.						
<b>Unit:4</b>	<b>NATURAL SELECTION AND ADAPTATION IN EVOLUTION</b>					<b>15hours</b>
Origin of life on earth, Abiotic synthesis of organic monomers and polymers, concept of Oparin and Haldane; Evolution of prokaryotes and eukaryotes; Evolutionary time scale – Eras, Periods and Epoch, Variations and its concept; Hardy Weinberg Law-Genetic drift, Speciation- Evolution of man-Fossil records of man, Cultural evolution of man, Future evolution of man. Geological Time Scale, Fossils and Fossilization.						
<b>Unit:5</b>	<b>PHYLOGENETICS</b>					<b>15hours</b>
Role of gene in evolution - Evolution of gene families Construction of phylogenetic trees-Phylogenetic inference –Distance methods, parsimony methods, maximum likelihood method-Immunological techniques – DNA – DNA hybridization and molecular clocks. Impact of DNA barcoding in modern evolutionary studies.						

<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2hours</b>
Expertlectures,onlineseminars –webinars		
<b>Total Lecturehours</b>		<b>77hours</b>
<b>TextBook(s)</b>		
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.	
<b>ReferenceBooks</b>		
1	Yadav, P. R. 2003. Fossils. Discovery Publishers	
2	Arora, M. P. (1992). An Introduction to palaeontology. Himalaya Publishers.	
<b>RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]</b>		
1		
2		
CourseDesigned By:Dr.Senthil Kumar,Assistant Professor of Zoology, SVC, Erode and Dr. A. Jeyashankar, Assistant Professor in Zoology, GAC,Coimbatore.		

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

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

Coursecode	23B	ETHOLOGY OF WILDLIFE	L	T	P	C
Core/Elective/Supportive	CorePaperVII		6	0	0	4
Pre-requisite	Basic knowledge about Animal Behaviour		Syllabus rsion		2023- 2024	
<b>CourseObjectives:</b> 1. To provide overview of introduction to behaviour in Wild Animals. 2. To learn the fundamental concepts of Animal Behaviour. 3. To make aware of hormonal actions in Animal Behaviour. 4. To understand the social behaviour of Mammals.						
<b>Expected Course Outcomes:</b> On the successful completion of the course, student will be able to:						
1	To understand and apply the principles of Animal Behaviour.					K3
2	To gain knowledge about Hormonal Regulation in Animal Behaviour.					K2
3	To analyze the Biological rhythms in Animals.					K4
4	Students will learn about the mechanisms and regulation of social communication in Animals.					K4
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6–Create</b>						
<b>Unit:1</b>	<b>CONCEPT AND CLASSIFICATION</b>				<b>15hours</b>	
Behaviours in Animals: Types of Behaviours - classical and modern concepts-fixed action pattern and ritualization. Learning-Imprinting-habituation. Analysis of behaviour pattern: taxis, kinesis and reflexes. Analysis of behaviour – Ethogram						
<b>Unit:2</b>	<b>HORMONES AND PHEROMONES</b>				<b>15hours</b>	
Physiological mechanism of behaviour–Neural behaviour - Perceptual mechanism, Role of hormones and Pheromones in behaviour of Animals, predator detection, predator tactics. Altruism and evolution - Methods of studying behavior.						
<b>Unit:3</b>	<b>BEHAVIOURAL PATTERN</b>				<b>15hours</b>	
Biological rhythms: Circadian, Lunar,Tidal and animal rhythms. Animal communication: Visual, Auditory, Chemical and Vocalisation in Mammals, Birds and Insects. Foraging Behaviour in Mammals and Birds, Origin and significance of play.						
<b>Unit:4</b>	<b>BREEDING BEHAVIOUR OF ANIMALS</b>				<b>15hours</b>	
Courtship, display-sexual selection – pair bond – sexual dimorphism - polymorphism-polyandry, polygamy- promiscuity – cooperative breeding –brood parasites –parental care in Amphibians, Reptiles and Mammals.						

<b>Unit:5</b>	<b>SOCIAL BEHAVIOURS IN ANIMALS</b>	<b>15hours</b>
Aggression – Competition – Social spacing – Territory – Dominance. Social commensalism – mutualism – Parasitism. Social behaviour of Elephants, Lion and Primates.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2hours</b>
Expert lectures, online seminars –webinars		
<b>Total Lecture hours</b>		<b>77hours</b>
<b>TextBook(s)</b>		
1	AgarwalV.K.(2009). <i>Animal Behaviour (ETHOLOGY)</i> .S.Chand Publishing.	
2	LeshnerAI,1978.An Introduction to Behavioural Endocrinology, Oxford University Press, NewYork.	
3	McFarlandD (ed.),1981. <i>The Oxford Companion to Animal Behaviour</i> , Oxford University Press,Oxford.	
4	RidleyM,1968. <i>Animal Behaviour –A concise Introduction</i> , Blackwell Scientific Publications, Oxford.	
<b>ReferenceBooks</b>		
1	SlaterPJB,1985. <i>An Introduction to Ethology</i> , Cambridge University Press, Cambridge.	
2	Natarajan P and Arumugam N. <i>Animal Behaviour–Ethology</i> . SarasPublication	
3	WallaceRA,1979. <i>TheEcologyandEvolution of Animal Behaviour</i> , Good year Publishing Company Inc.,Santa Monica, California.	
4	WilsonE O,1978. <i>Sociobiology</i> , TheBelknap Press, Harvard University Press, Cambridge, MA.	
5	TristramD.Wyatt. <i>Pheromones and Animal Behaviour</i> . Cambridge University Press	
<b>RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]</b>		
1		
2		
3		
Course Designed By:Dr.S.Vidya, Guest Faculty in Wildlife Biology, GAC, Ooty and Dr. H. Mohanakrishnan, Assisatnt Professor of Wildlife Biology, GAC, Ooty		

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

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

Coursecode	23C	BIOTECHNOLOGY AND GENETIC ENGINEERING	L	T	P	C
Core/Elective/Supportive		Core Paper VIII	6	0	0	4
Pre-requisite		Basic information on Biotechnology and GE	Syllabus Version	2023- 2024		
<b>CourseObjectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. To make aware of the students about the theories, concepts and basics of Biotechnology.</li> <li>2. To provide knowledge about tissue culture.</li> <li>3. To acquire knowledge about molecular methods involved in genetic engineering.</li> </ol>						
<b>ExpectedCourseOutcomes:</b>						
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 Biotechnology.					K2
2	The students will be able to identify and understand the sex of the animals.					K5
3	The students will be 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
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6–Create</b>						
<b>Unit:1</b>	<b>TISSUE CULTURE AND MEDIA PREPARATION</b>					<b>15hours</b>
Introduction to Animal Tissue Culture: Background, Advantages, Limitations and applications. Culture Environment, Essential Equipment's required for animal tissue culture, Aseptic Technique and general safety. Media: Physicochemical properties, Balanced Salt Solutions, Complete media, serum - Advantage and Disadvantages of serum, free media.						
<b>Unit:2</b>	<b>PRESERVATION OF CULTURE</b>					<b>15hours</b>
Contamination: Source of contamination, Types of Microbial contamination, Monitoring, Eradication of contamination, Cross-contamination. Cryopreservation; Need of cryopreservation, Apoptosis and its determination: cytotoxicity assays. Application of animal cell culture; Vaccine production; Tissue engineering;						
<b>Unit:3</b>	<b>RECOMBINANT TECHNIQUES</b>					<b>15hours</b>
In vitro Fertilization and Embryo Transfer: Composition of IVF media, steps involved in IVF, Fertilization by means of micro insemination, PZD, ICSI, SUZI, MESA, stem cell culture, embryonic stem cell and their applications. Ethical issues in animal biotechnology.						



<b>Unit:4</b>	<b>GENE MANIPULATION</b>	<b>15hours</b>
Genomic and cDNA libraries; PCR; Principle and types; Site directed mutagenesis; DNA sequencing, Micro arrays – cDNA and protein chips. DNA finger printing; SNPs, VNTRs and microsatellites, Molecular Marker techniques; RFLP, RAPD, STS, SSR, ISSR, SCAR, SSCP AND AFLP. Importance of molecular markers assisted selection.		
<b>Unit:5</b>	<b>ENZYMES INVOLVED IN GENETICAL ENGINEERING</b>	<b>15hours</b>
Definition of enzyme, enzymology and enzyme technology, nature of the enzymes. Enzymes used in manipulation; Polymerases and types; nucleases: endonucleases, exonucleases and restriction enzymes; ligases; topoisomerases, methylases. Applications of enzymes. Electrophoresis.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>2hours</b>
Expert lectures, online seminars –webinars		
<b>Total Lecturehours</b>		<b>77hours</b>
<b>TextBook(s)</b>		
1	Animal Biotechnology by N. Arumugam, V. Kumaresan . Saras Publication, 2019	
2	Texbook of Animal Biotechnology by B. Sing, S.K.Goutham. The Energy and Resources Institute, TERI, 2013	
3	Genetic Engineering A Primer. Yamagami T. Auris Publishing 2017	
4	Molecular Biology and Genetic Engineering, N. Arumugam, AThangamani, L M. Narayanan, Padmalatha Singh. Saras Publication. 2012	
<b>ReferenceBooks</b>		
1	Animal Biotechnology. AshisVerma, Anchal Singh, 2 <sup>nd</sup> Edition, Academic 2020	
2	Animal Biotechnology. P. K. Gupta. Rastogi Publications, 2020	
3	Principle of Genetics. Gardner, Wiley India, 2006	
4	Genetic Engineering, Smita Rastogi, Oxford Univerisy Press, 2009	
<b>RelatedOnlineContents[MOOC,SWAYAM, NPTEL, Websitesetc.]</b>		
1	NOC:IntroductiontoDevelopmentalBiology,Prof.SubramaniamK,IITMadras, <a href="https://nptel.ac.in/courses/102/106/102106084/">https://nptel.ac.in/courses/102/106/102106084/</a>	
Course Designed By: Dr. A.Jeyashankar, GAC Coimbatore. and Dr. Senthil Kumar, GAC, Erode		

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

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

Coursecode	23D	FOREST ENTOMOLOGY	L	T	P	C
Core/Elective/Supportive		Elective I	6	0	0	4
Pre-requisite		Basic information about Forest Insects	Syllabus Version		2023-2024	
<b>CourseObjectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>To develop awareness about the Forest Insects</li> <li>To learn the taxonomy and classification of Insects.</li> <li>To study about economic importance of Insects and health care of wild animals.</li> </ol>						
<b>ExpectedCourseOutcomes:</b>						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	Understanding the beneficial role of Insects.					K2
2	To elucidate various insects affect Wild Fauna.					K5
3	The course will give an idea about management of forest insects.					K4
4	The students will be capable of interpreting and understanding about insects of forest.					K2
5	The learners will be trained in handling and preservation of insect specimen.					K4
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6-Create</b>						
<b>Unit:1</b>	<b>TAXONOMY AND ANATOMY</b>					<b>18hours</b>
Classification and taxonomy- Classification of insects up to order with examples. Morphology and anatomy of insects-segmentation and divisions of the body. Head-Mouth parts and its types. Thorax-legs-Modifications of the basic leg structure. Exoskeleton-integument-Basic structure of cuticle-wings and flight. Life cycle of Insects – Silk worm.						
<b>Unit:2</b>	<b>PHYSIOLOGY OF INSECTS</b>					<b>18hours</b>
Physiology of Insects: Digestion- transport and regulation; respiratory – physiology of gas exchange; excretory system – osmoregulation; muscular system – types; integument system – structure, function and formation, growth and moulting; reproductive system.						
<b>Unit:3</b>	<b>ECOLOGIC AND ECONOMIC IMPORTANCE</b>					<b>16hours</b>
Biology of Honey bee, silk moth and Lac insect –Culture methods for honey bee and silk worm – Appliances used and problems related to these cultures. Beneficial insects – Pollinators, predators, parasitoids – scavengers – weed killers.						
<b>Unit:4</b>	<b>DESTRUCTIVE INSECTS</b>					<b>18hours</b>
Biology – control measures – damages caused – Insect Pest of a) Teak, b) Sandalwood, c) Bamboo. Mode of Insect attack on trees: Leaf eaters, sapsuckers – Meristematic Tissue feeders Wood destroyers, Insect collection, preservation.						

<b>Unit:5</b>	<b>DETECTION AND EVALUATION OF INSECTS</b>	<b>18hours</b>
Detection and evaluation methods of insect infestation: Survey – estimation of insect abundance – devices for evaluation method for determining degree of hazards – Biological evaluation – control of forest insects, direct and indirect methods.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2hours</b>
Expert lectures, online seminars –webinars, Conferences and Workshop and internship Programmes		
<b>Total Lecture hours</b>		<b>90hours</b>
<b>TextBook(s)</b>		
1	R.L.Kotpal.(2007). <i>Modern Text Book of Zoology –Invertebrates</i>	
2	M.S. Nalinasundari and R. Santhi. 2008. Entomology, MJP Publishers, Chennai	
3	Ambrose, Dunston P. 2004. The Insects; Structure, function and Biodiversity. Kalyani publishers, Ludhiana, New Delhi, Chennai.	
4	Nayar, K.K., Ananthakrishnan, T.N. and David, B.V. 1986. General and applied entomology, Tata McGraw Hill Publications, New Delhi.	
5	Vasantharaj David, B. 2001. Elements of Economic Entomology, Popular Book Depot. Chennai – 15.	
6	Chapman.R.F.1998.The insects .structure and function .4 <sup>th</sup> edition, Cambridge University Press, UK.	
<b>ReferenceBooks</b>		
1	ImmsAD,1965. <i>A GeneralTextbookofEntomology</i> ,ELBS,London.	
2	MetcalfC LandFlintW P,1973. <i>DestructiveandUsefulInsects</i> ,McGraw-Hill,NewYork.	
3	Snodgrass, R.E. 1985. Principles of Insect Morphology, McGraw Hill and Co., New York.	
<b>RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]</b>		
1	<a href="https://canterbury.libguides.com/biol">https://canterbury.libguides.com/biol</a>	
CourseDesigned By:Dr. A. Jeyashankar, Assistant Professor of Zoology, GAC, Coimbatore and Dr. D.Jeyabalan, Assistant Professor in Zoology, GAC, Ooty		

<b>MappingwithProgrammeOutcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	S	M	L	M	M	L	S
<b>CO2</b>	S	S	S	S	M	L	M	M	L	S
<b>CO3</b>	S	S	S	S	M	L	M	M	L	S
<b>CO4</b>	S	S	S	S	M	L	M	M	L	S
<b>CO5</b>	S	S	S	S	M	L	M	M	L	S

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

Coursecode	23P	ICTHYOLOGY & HERPETOLOGY, ORNITHOLOGY AND MAMMALOLOGY	L	T	P	C
<b>Core/Elective/Supportive</b>		<b>PRACTICAL-I</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>Pre-requisite</b>		Fundamental knowledge on animal anatomy And biodiversity	<b>Syllabus Version</b>		<b>2022- 2023</b>	
<b>CourseObjectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>To understand important physiological functions in various vertebrate forms.</li> <li>To understand the working of nervous system and sense organs.</li> <li>Acquire the knowledge of biodiversity in different geographical areas.</li> </ol>						
<b>ExpectedCourseOutcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Attain knowledge about locomotory organs, locomotion, feeding and digestion in Various Invertebrates.					K2
2	Understand the origin of Chordata, concept of Protochordata, importance of 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	Appreciate the various conservation strategies to protect biodiversity.					K4
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6-Create</b>						
<b>STRUCTURE AND FUNCTIONS OF VERTEBRATA</b>						<b>12hours</b>
<ol style="list-style-type: none"> <li>Comparative study of system: vertebrata (any two animals) Appendages, external morphology, digestive system, nervous system and reproductive system.</li> <li>Culture of fishes in laboratory to identify the stages.</li> <li>Culture and identification of morphology of Egg.</li> </ol>						
<b>ANATOMY OF CHORDATES</b>						<b>12hours</b>
<ol style="list-style-type: none"> <li>Morphometric study of fishes and reptiles in laboratory.</li> <li>Examination and drawing of museum materials: skins, skulls, feet, eggs and nests of characteristic species.</li> <li>Mist-net techniques and methods of ringing in birds.</li> <li>Study of epidermal derivatives; comparative morphology of dentition and skull; mapping distribution of primates, carnivores and ungulates.</li> <li>Study of system: chordate physiology; digestive and reproductive system.</li> <li>Scat analysis.</li> <li>Taxidermy.</li> <li>Identification of Beak and feet in different birds.</li> <li>Study of scales in fishes; cycloid, ctenoid, placoid and ganoid scales.</li> <li>Modification of bones in vertebrates; forelimb, hind limb.</li> <li>Communal ecology in mammals.</li> </ol>						
						<b>12hours</b>

<b>SPOTTERS(Non-chordateandchordate)(eachanyfivespecimens)</b>		<b>12hours</b>
1. Biological importance 2. Medical importance 3. Beneficial pests 4. Evolutionary significance 5. Economic importance		
<b>SUBMISSIONS</b>		
<b>Submission at the time of Practical Examination</b>		
1. Submit an album of amphibians (minimum 10) with classification and ecological importance. 2. Submit an album of reptiles (minimum 10) with classification and habitat adaptation. 3. Submit an album of birds (minimum 10) with classification and foraging behaviour. 4. Submit an album of mammals endemic to Nilgiris (minimum 10) with classification and habitat adaptation. 5. Bonafide Record		
		<b>88hours</b>
		<b>Total Lecture hours</b>
<b>TextBook(s)</b>		
1	Advanced Practical Zoology by Sinha, J., Chatterjee A.K., Chattopadhyay P. 2011. Arunabha SenPublishers.	
2	Practical Zoology Invertebrate by H.S. Bhamrah.2003.Dominant Publishers.	
3	KV.Krishnamurthy. <i>An Advanced Textbook on Biodiversity Principles and Practice</i> . Oxford & IBH Publishing CoPvt. Ltd.	
<b>ReferenceBooks</b>		
1	Preeti Gupta and Mridula Chaturvedi.(2000). <i>Modern Experimental Zoology</i>	
2	Verma.(2000). <i>Manual of Practical Zoology: Chordates</i> S.ChandPublishing	
Course Designed By:Dr. A. Veeramani, Assistant Professor, Government Arts College, Kumbakonam. And Dr. H. Mohanakrishnan, Assistant Professor in Wildlife Biology, GAC, Ooty.		

<b>MappingwithProgrammeOutcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	M	S	S	L	S	M	S	S	M	L
<b>CO2</b>	S	M	M	L	S	S	S	M	S	M
<b>CO3</b>	S	M	M	L	S	S	S	M	S	M
<b>CO4</b>	L	L	L	L	S	M	S	M	S	S
<b>CO5</b>	M	M	S	L	S	S	S	S	S	S

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

Coursecode	23Q	<b>ECOLOGY &amp; EVOLUTION, ETHOLOGY OF WILDLIFE AND BIOTECHNOLOGY &amp; GENETIC ENGINEERING</b>	L	T	P	C
Core/Elective/Supportive	<b>PRACTICAL-II</b>		0	0	2	4
Pre-requisite	Basic information on ecology, <b>Ecology &amp; Evolution, Ethology Of Wildlife And Biotechnology &amp; Genetic Engineering</b>		Syllabus Version		2023-2024	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. Explain core concepts in ecology, and summarize our ecological understanding of environmental problems.</li> <li>2. To train how the biological data are processed and interpretations are made.</li> <li>3. To develop skill in understanding &amp; handling molecular science &amp; instrumentation.</li> <li>4. To elucidate its interaction of molecules.</li> <li>5. To provide an overview of mapping techniques.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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 basic level.					K2 & K4
3	Understand the physical and chemical concepts in biology.					K2
4	Understand mapping techniques.					K2
5	Understand and apply the principles and techniques of molecular biology in basic research and ensuring accurate unity and diversity at the molecular and cellular levels					K3
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b>						
<b>I</b>						<b>12 hours</b>
<ol style="list-style-type: none"> <li>1. Determination of: pH, CO<sub>2</sub> and O<sub>2</sub>.</li> <li>2. Focal animal sampling and preparation of ethogram.</li> <li>3. Evolutionary modifications – fore limb from fishes to mammals</li> <li>4. Isolation of DNA from animal tissue (demonstration only)</li> <li>5. DNA finger printing.</li> <li>6. Analysis of Abundance Data Using Distance, Mark, Density and R software.</li> <li>7. Comparison of several techniques for quantitative habitat survey and mapping using GIS.</li> <li>8. Digitization of Maps and Projection</li> <li>9. Analysis of species diversity.</li> <li>10. Types of Ecosystems</li> <li>11. Estimation of Canopy volume</li> <li>12. Preparation of Quadats and Transects to estimate vegetative analysis in an area</li> <li>13. Prey-predator relationship</li> <li>14. Paleo-evolution of mammoths</li> <li>15. Parental care</li> </ol>						

16. Communication	
17. Paper chromatography	
18. Instruments used in Biotechnology laboratory	
<b>FIELDTRIPS</b> 1. Visit to–Drinking water treatment plant; Industrial effluent treatment plant; Pollution control lab.	
<b>Submission at the time of Practical Examination</b>	
1. Report on the Field study and Field trips of different ecosystems.	
2. Report on any Molecular laboratory.	
3. Bonafide Record	
	<b>Total Lecture hours</b>
	<b>88hours</b>
<b>TextBook(s)</b>	
1	Advanced Practical Zoology by Sinha, J., Chatterjee A.K., Chattopadhyay P. 2011. Arunabha Sen Publishers.
2	Environmental biology and ecology laboratory manual by Lynn. (2003). Kendall Hunt Publishing
<b>Reference Books</b>	
1	Modern Experimental Zoology by Preeti Gupta and Mridula Chaturvedi. 2000
2	Fundamentals of Biochemistry by Jain J.L, Sunjay Jain, Nitin Jain. 2007.
3	Toxicology Laboratory Lab Manual by 5. Oberdorster Eva. 2009. Kendall Hunt Publishing
Course Designed By: Dr. Dr. Senthil Kumar, Assistant Professor in Zoology, GAC, Erode and Dr. A. Jeyashankar, Assistant Professor in Zoology, GAC, Coimbatore.	

<b>Mapping with Programme Outcomes</b>										
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	23R	FORESTRY & SILVICULTURE AND FOREST ENTOMOLOGY	L	T	P	C
<b>Core/Elective/Supportive</b>		<b>PRACTICAL-III</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>Pre-requisite</b>	Basic understanding on and Forestry and Entomology		<b>Syllabus Version</b>		<b>2023-2024</b>	
<b>CourseObjectives:</b>						
The main objectives of this course are to: <ol style="list-style-type: none"> <li>To provide students the idea of Forest Silviculture and Forest Insects</li> <li>To understand the taxonomy, healthcare, administration, legislation and Insect Damages</li> </ol>						
<b>ExpectedCourseOutcomes:</b>						
On the successful completion of the course, student will be able to:						
1	The learner will able to understand methodological approaches to the study of Conserving Forest.					K2
2	Understand Damages caused by the destricitive insects.					K2
3	To make understand the students about beneficial forest insect.					K3
4	The learner will be able to gain knowledge on ex-situ conservation and captive Breeding of wildanimals.					K5
5	Mapping of Zoosacross thecountry.					K4
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6-Create</b>						
						<b>12hours</b>
1.Regeneration study in Forest 2. Study the life cycle of Bee/Lac/silk worm. 3. Effect of Deforestation 4.						
						<b>12hours</b>
<b>SUBMISSIONATTHETIMEPRACTICAL EXAMINATION</b>						<b>12hours</b>
<b>(Shouldnotexceed20% of totalmarks)</b>						
<ol style="list-style-type: none"> <li>Report of visit to a Nursery</li> <li>Report of visit to a Timber depot</li> <li>Report of visit to different Forest types</li> </ol>						
<b>TotalLecturehours</b>						<b>88hours</b>



TextBook(s)	
1	Wildlifemanagement techniquesbyRejesh Gopal.
2	AManual of PracticalZoologybyVermaP. S.,2000. S. Chand Publication.
ReferenceBooks	
1	ClinicalEmbryology:APracticalGuideby1. ZsoltPeterNagy,AlexC.Varghese, AshokAgarwal.2013.Springer-VerlagNewYork Inc
2	ModernTextBookofZoology:Vertebrates,2007.R.L.Kotpal.
3	
CourseDesignedBy:Dr. B.Ramakrishnan, Assistant Professor in Wildlife Biology, GAC, Ooty	

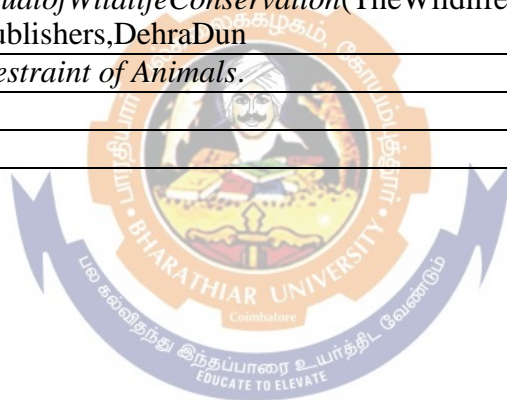
MappingwithProgrammeOutcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
C01	S	S	S	M	L	L	M	M	L	S
C02	S	S	S	M	L	L	M	M	L	S
C03	S	S	S	M	L	L	M	M	L	S
C04	S	S	S	M	L	L	M	M	L	S
C05	S	S	S	M	L	L	M	M	L	S

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



Coursecode	43R	Conservation in Biodiveristy of Wildlife	L	T	P	C
Core/Elective/Supportive		PRACTICAL VI	0	0	2	4
Pre-requisite		Understanding recent developments in Conservation of Biodiversity	Syllabus Version		2023-2024	
<b>CourseObjectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>To make the students understand planning and usage of various field equipments including GPS,GIS and Remote Sensing</li> <li>To know the principle of wild animal population estimation techniques and methods applied in animal capturing</li> <li>To know the principles of survey and mapping techniques</li> <li>To make the students to understand Conservation management</li> <li>To learn about sampling techniques involved investigation analysis</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student willbe able to:						
1	To obtain knowledge on field equipment used in wildlife management.					K1
2	Integrate the strategies involved in various population estimation techniques Including molecular methods					K4
3	To gain knowledge on survey and mapping techniques					K3
4	To learn about current forest management practices					K4
5	To understand about Forest and its management					K5
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6–Create</b>						
						<b>12hours</b>
<ol style="list-style-type: none"> <li>Plotting of important Biosphere reserves in India using QGIS.</li> <li>Conservation of wetlands in India; collection and mounting of zoo planktons.</li> <li>Conservation of terrestrial ecosystems in India; identification of animals in the ecosystem.</li> <li>Types of conservation areas of wildlife; National parks, wildlife sanctuaries, zoological gardens, biosphere reserves and reserves.</li> <li>Estimation of species evenness, diversity and richness of an area.</li> <li>Estimation of carrying capacity of an area.</li> <li>Population Viability Analysis (PVA) and Population Habitat Viability Analysis (PHVA).</li> <li>GIS softwares; Q-GIS/Map-Info/ARC-GIS.</li> <li>Estimating herbivore population using Distance Software.</li> <li>Estimating Tiger population using M-STRIPE software.</li> <li>Identification of an Elephant Corridor.</li> <li>Preparation of EIA of an area</li> <li>Usage of drone Cameras in conservation of endangered animals.</li> <li>Threatens to wildlife; poaching, encroachment, proliferation of invasive alien species and forest fire.</li> <li>Wildlife crimes – trading; tusk, skin, nail, hair, meat, beak and feather.</li> <li>Human-wildlife conflict; elephant, leopard, tiger, primates, birds and wild boar.</li> </ol>						
<b>SUBMISSIONS AT THE TIME OF PRACTICAL EXAMINATIONS</b>						

<ol style="list-style-type: none"> <li>1. A report on GIS training</li> <li>2. Report on the field study and field trips</li> <li>3. Report on the participation of Tiger / Wildlife census.</li> <li>4. Bonafied record</li> </ol>	
<b>TotalLecturehours</b>	
<b>86hours</b>	
<b>TEXTBOOK</b>	
1	DasmannR F, 1964. <i>Wildlife Biology</i> , JohnWiley&Sons,New York,
2	GilasRHJr.(ed.),1984. <i>WildlifeManagementTechniques</i> ,3rded.TheWildlifeSociety, WashingtonD.C.,NatarajPublishers,DehraDun.
3	RobinsonW LandEricGBolen, 1984. <i>Wildlife Ecology andManagement</i> ,Maxmillan PublishingCompany,NewYork
4	RodgersWA,1991. <i>Techniquesfor WildlifeCensusinIndia- AFieldManual:TechnicalManual-T M -2</i> . WII.
5	<i>Silviculture</i> bySS Negi
<b>ReferenceBooks</b>	
1	SahariaV B,1982. <i>WildlifeofIndia</i> ,NatrajPublishers,DehraDun
2	TeagueRD(ed.),1987. <i>AManualofWildlifeConservation</i> (TheWildlifeSociety, WashingtonD.C.).NatarajPublishers,DehraDun
3	WII. <i>A Guide toChemical Restraint of Animals</i> .





**Third  
Semester**

<b>Coursecode</b>	<b>33A</b>	<b>PHYSIOLOGY AND HEALTHCARE OF WILDLIFE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>CorePaperIX</b>		<b>6</b>	<b>0</b>	<b>0</b>	<b>5</b>
<b>Pre-requisite</b>	Basic knowledge about the physiological activities of all the systems in both non-chordates and chordates		<b>Syllabus revision</b>		<b>2023-2024</b>	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
1. To study about the adaptive characters in animals						
2. To acquire knowledge on the physiological aspects about all organ systems.						
3. To acquire knowledge on the osmo and thermo regulatory mechanisms.						
4. Understand the concepts of hormonal activities						
5. To understand the role of hormones in the biological activities such as pregnancy and lactation						
<b>Expected Course Outcomes:</b>						
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 thermo regulations to cope well with the Ecological stress					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
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6-Create</b>						
<b>Unit:I</b>	<b>ADAPTATION AND HOMEOSTASIS</b>				<b>18hours</b>	
Adaptation - Levels and Mechanism of adaptation - Significance of body size – Adaptation, acclimation and acclimatization - Concepts of homeostasis. Physiological adaptations of different environments: Marine - Shores and Estuaries – Freshwater - Extreme aquatic environments - Terrestrial life. Extreme terrestrial environments - Parasitic habitats. Stress Physiology - Basic concept of environmental stress and strain; concept of elastic and plastic strain; stress resistance, stress avoidance and stress tolerance.						
<b>Unit:II</b>	<b>MECHANISM OF THERMO AND OSMOREGULATIONS</b>				<b>18hours</b>	
Physiological mechanism of thermo regulation. Physiological adaptation to osmotic and ionic stress; mechanism of cell volume regulation. Osmo regulation in aquatic and terrestrial environments. Physiological response to oxygen deficient stress. Physiological effects of physical exercises and yoga practices – Meditation & Yoga						
<b>Unit:III</b>	<b>RESPIRATORY PHYSIOLOGY</b>				<b>16hours</b>	
Respiratory physiology – Respiratory organs – Structure and function. Respiratory gases – uptake – respiratory pigments – O <sub>2</sub> & CO <sub>2</sub> dissociation curves – transport of respiratory gases.						

<b>Unit:IV</b>	<b>EXCRETORYPHYSIOLOGYANDENDOCRINOLOGY</b>	<b>18hours</b>
Excretory physiology –Excretory organs– mechanism of excretion– physiology – adaptations of excretion to environment – Excretory products: synthesis and elimination. Endocrine glands – Feedback regulation –Pituitary– gonadal axis. Role of reproductive hormones –gamete formation–fertilization-embryonic development–parturition–lactation-neuro endocrine Regulation		
<b>Unit:V</b>	<b>NEURALANDMUSCULARPHYSIOLOGY</b>	<b>18hours</b>
Neuralphysiology –Neuron sstructure and types. Nerve impulse transmission-resting and action potential — neurotransmitters – mechanism of neural transmission. Neuro- degenerative diseases.Muscular physiology-Muscle contraction–theories–molecular mechanism of muscle contraction.		
<b>Unit:VI</b>	<b>ContemporaryIssues</b>	<b>2hours</b>
Expertlectures,onlineseminars –webinars,workshopsandconferences.		
	<b>TotalLecturehours</b>	<b>90hours</b>
<b>TextBook(s)</b>		
1	AnimalPhysiologyVolI &IIbyChatterjee	
2	AnimalPhysiologybyVerma &Agarwal	
3	Essentialof ANIMALPhysiologybyRastogi	
4	PrinciplesofAnimal PhysiologybyChristopherMoyesand PatriciaSchulte	
<b>ReferenceBooks</b>		
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 JABoulantandRJBrooks	
4	“Advances in Comparative and Environmental Physiology ”by J Machinand S H Wright	
<b>RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]</b>		
1	<a href="https://swayam.gov.in/">https://swayam.gov.in/</a>	
2	<a href="https://www.mooc.org/">https://www.mooc.org/</a>	
3	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>	
Course Designed By: Dr. H. Mohanakrishnan, Assistant Professor in Wildlife Biology, GAC, Ootyand Dr. A. Veeramani, Assistant Professor in Zoology, GAC, Kumbakonam.		

<b>MappingwithProgrammeOutcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	S	M	M	S	S	L	S
<b>CO2</b>	S	S	S	S	M	M	S	S	L	S
<b>CO3</b>	S	S	S	S	M	M	S	S	L	S
<b>CO4</b>	S	S	S	S	M	M	S	S	L	S
<b>CO5</b>	S	S	S	S	M	M	S	S	L	S

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

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	2023-2024		
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. To introduce the evolutionary concepts among various animal groups.</li> <li>2. To make them understand how life originated.</li> <li>3. To realize the current working of evolution.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6- Create</b>						
<b>Unit:1</b>	<b>WILDLIFE SANTUARIES</b>				<b>18 hours</b>	
Wildlife Sanctuaries: Definition, formation, management and administration. Periyar, Chinnar, Nagharhole, Indira Gandhi, Kalakad, Vedanthangal and Parambikkulam.						
<b>Unit:2</b>	<b>NATIONAL PARKS</b>				<b>16 hours</b>	
National parks: Definition, formation, management and administration - Eravikulam, Gir, Bandipur, Kahna, Guindy, Corbett, Silent Valley, and Mukkuruthi, Kaziranga. Marine National Park: Rann of Kutch, Biosphere Reserves. Wildlife Projects: Tiger – Lion- Elephant. Tiger Reserves - Definition, formation, management and administration – Mudumalai Tiger Reserve, Badra Tiger Reserve and Manas Tiger Reserve.						
<b>Unit:3</b>	<b>ZOOLOGICAL PARKS</b>				<b>18 hours</b>	
Zoos and Zoological Parks: Definition- Aims of Zoos- Formation and Management of Zoos and Zoological Parks - Central Zoo Authority of India. Enclosures- Designing, Engineering and Enrichment. Zoo animal nutrition : Food and feeding management. Zoo sanitation: Principles and management of zoo. Zoo veterinary services. Animal restraint: principles and methods, release of restrained animals. Transport of animals. Pests and parasites – nutritional disorders Zoo education: Internship techniques and Zoo research. Captive breeding: Aims, Principles, methods and case studies.						
<b>Unit:4</b>					<b>18 hours</b>	
Habitat Restoration and Animal Conservation: Identifying the key species, Assessment of Carrying capacity, Corridor management – Case studies. Exotic and Invasive Species: Principles and Problems- Case Studies. Introduction and re-introduction of a species- Case Studies- Lion, Tiger, Rhinoceros. Role of Government, NGO's and Educational Institutes involved in Wildlife Conservation.						

<b>Unit:5</b>		<b>18 hours</b>								
Diseases of Wild animals – viral, bacterial and fungal diseases; Techniques of tranquilization and translocation of problematic animals; Wildlife administration and legislation: Administrative set up - Advisory bodies- National Board for Wildlife –Eco-Development, Eco- Restoration and Ecotourism programmes.										
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>								
Expert lectures, online seminars – webinars, workshops and conferences.										
	<b>Total Lecture hours</b>	<b>90 hours</b>								
<b>Text Book(s)</b>										
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									
<b>Reference Books</b>										
1	Devra G. , Katerina V & Charlotte., Wild Mammals in Captivity; 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									
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>										
1										
2										
Course Designed By:Dr.A. Veeramani, Assistant Professor in Zoology, GAC, Kumbakonam, Dr. H. Mohanakrishnan, Assistant Professor and Head, Department of Wildlife Biology, GAC, Ooty.										
<b>Mapping with Programme Outcomes</b>										
<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	L	L	L	M	M	M	S
<b>CO2</b>	S	S	S	L	L	L	M	M	M	S
<b>CO3</b>	S	S	S	L	L	L	M	M	M	S
<b>CO4</b>	S	S	S	L	L	L	M	M	M	S
<b>CO5</b>	S	S	S	L	L	L	M	M	M	S

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



<b>Course code</b>	<b>33C</b>	<b>WILDLIFE MANAGEMENT TECHNIQUES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>Core Paper XI</b>		<b>6</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite</b>	Basic knowledge about Genes and Chromosomes which have learned in undergraduate course		<b>Syllabus Version</b>	<b>2023-2024</b>		
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. To make understand the applications and basic wildlife equipments.</li> <li>2. To acquire the knowledge on handling the equipment related to wildlife.</li> <li>3. To learn GIS and Remote sensing uses and its applications on wildlife management.</li> <li>4. To sensitize the students on wildlife population estimation techniques.</li> <li>5. To understand drugs related to chemical restraints the animals.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create</b>						
<b>Unit:1</b>	<b>EQUIPMENT IN WILDLIFE</b>				<b>18 hours</b>	
Making observations and records – field notes & datasheets - Planning wildlife management Investigations and projects – funding agencies. Wildlife Photography - types of cameras & binoculars - camera traps – altimeter – pedometer - field compass. Sound recording & Media players - activity recording - weight measurement.						
<b>Unit:2</b>	<b>TRACKING OF ANIMALS</b>				<b>18 hours</b>	
Radio isotopes - radio collaring – GPS – GIS & Remote sensing. Q GIS – Map Info –Arch view (outlines only). Molecular methods in Wildlife; Impact and removal of invasive alien species; Habitat manipulation: food, water and shade improvement. Use of GIS and Remote sensing in Wildlife.						
<b>Unit:3</b>	<b>ESTIMATION OF POPULATION</b>				<b>16 hours</b>	
Planning census – sample counts – Block counts – Roadside counts – Dung count – Pugmark & waterhole census – Identifying animals based on indirect signs – Capture recapture techniques – tiger, co-predator monitoring census methods. – Distance software – Creation of capture matrix and softwares used in wildlife sciences.						
<b>Unit:4</b>	<b>CONSERVATION OF FOREST</b>				<b>18 hours</b>	
Survey & mapping water sources – rain gauge setting – supplementary water source – providing access to natural & artificial water sources –Fire as a tool. Wildlife damage control – assessment						

methods – reasons for conflicts – Fences – trenches & other methods – Human pressure classification – Trail survey in boundary – Forest product collection – Village survey – Anti poaching operations –VFC.										
<b>Unit:5</b>	<b>INSECTS AND THEIR ECONOMIC IMPORTANCE</b>								<b>18 hours</b>	
Classification of insects up to order with example. Feeding and reproductive behaviour of insects, Forecasting, assesses risk of insect outbreaks. Insect Management- Insect Plant interaction.										
<b>Unit:6</b>	<b>Contemporary Issues</b>								<b>2 hours</b>	
Expert lectures, online seminars – webinars, workshops and conferences										
								<b>Total Lecture hours</b>	<b>90 hours</b>	
<b>Text Book(s)</b>										
1	Agarwala V P, 1980. <i>Forests in India</i> . Oxford and IBH Publishing Co., New Delhi.									
2	Puri G S, Meher V M, Gupta R K and Puri S, 1981. <i>Forest Ecology</i> . Oxford and IBH Publishing Co., New York.									
3	Stebbin E P, 1977. <i>A Manual of Elementary Forest Zoology For India</i> . International Book Distributors, Dehra Dun.									
4	Tiwari K M and Singh R V, 1980. <i>Social Forestry Plantations</i> . Oxford and IBH Publishing Co., New Delhi.									
5	Manikandan k & Prabhu S. (2019). <i>Indian Forestry A Breakthrough Approach to Forest Service</i> . Jain Brother Publishers.									
6	Vasanthraj David. B & Ramamurthy V V. (2016). <i>Elements of Economic Entomology</i> . Brillion Publishing									
<b>Reference Books</b>										
1	Warning R H and Schlesinger W H, 1985. <i>Forest Ecosystems: Concepts and Management</i> . Academic Press, New York.									
2	Imms A D, 1965. <i>A General Textbook of Entomology</i> , ELBS, London.									
3	Metcalf C L and Flint W P, 1973. <i>Destructive and Useful Insects</i> , McGraw-Hill, NewYork.									
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>										
1	<a href="https://swayam.gov.in/">https://swayam.gov.in/</a>									
2	<a href="https://www.mooc.org/">https://www.mooc.org/</a>									
4	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>									
Course Designed By: Dr. B. Ramakrishnan, Assistant Professor in Wildlife Biology, GAC, Ooty, and Dr. H.Mohanakrishnan, Assistant Professor in Wildlife biology, GAC, Ooty										
<b>MappingwithProgrammeOutcomes</b>										
<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	S	M	L	L	M	S	S
<b>CO2</b>	S	S	S	S	M	L	L	M	S	S
<b>CO3</b>	S	S	S	S	M	L	L	M	S	S
<b>CO4</b>	S	S	S	S	M	L	L	M	S	S
<b>CO5</b>	S	S	S	S	M	L	L	M	S	S

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

Course code	3EA	BIOSTATISTICS, APPLICATION OF COMPUTING & ARTIFICIAL INTELLIGENCE 4.0	L	T	P	C
Core/Elective/Supportive		Core Paper XI	6	0	0	4
Pre-requisite			Syllabus Version		2023-2024	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>To make the students to understand Forestry, Silviculture practice and insect pest.</li> <li>To study forest working plan, forest management techniques.</li> <li>To identify various forest types in India.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	To learn about natural and artificial regeneration of forest.					K4
2	To understand various working plans of forest					K3
3	To learn about forest management techniques					K2
4	To know basic classification of insects					K2
5	To learn the feeding behavior of various forest insects.					K6
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create</b>						
<b>Unit:1</b>	<b>Data collection and Tabulation:</b>					<b>18 hours</b>
Primary data collection and secondary data collection. Processing data: classification and tabulation. Organising of data: individual, discrete and continuous series. Diagrammatic representation of data: line diagram, bar diagram and pie diagram. Graphic representation of data: histogram, frequency polygon, frequency curve and ogive.						
<b>Unit:2</b>	<b>Measures of central tendencies and Deviations:</b>					<b>18 hours</b>
Mean, Median, Mode. Measures of dispersion: range, standard deviation, variance, standard error, Skewness and kurtosis. Correlation: Types and methods of correlation, correlation coefficient. Regression analysis: Regression lines and equations.						
<b>Unit:3</b>	<b>Testing of Hypothesis</b>					<b>18 hours</b>
Null and alternative hypothesis – chi square test , student ‘t’ test, F test (ANOVA) with experimental samples (one way & two way). Probability; Basic Principles - apriori and aposteriori probabilities – addition and multiplication rules of probability - conditional probability.						
<b>Unit:4</b>	<b>Introduction to Computer</b>					<b>16 hours</b>
Introduction, Advantages of using computer, Generation of computers, Computer codes - BCD code, ASCII code, Functional units of a computer; Types of computers: Desktop, Laptop, palmtop, PDA etc. Definition: Hardware, Software and Firmware, ROM, RAM, CD-ROM, DVD, Pendrive, Hard disc, LCD projector.						
<b>Unit:5</b>	<b>Software programs and Tools</b>					<b>18 hours</b>
MS Word processor, MS Excel for Charts, MS PowerPoint and Multimedia. Viruses and Worms,						

Software packages in Biostatistics: Applications of MINITAB and SPSS. Communication networking and Computer networking.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>
Expert lectures, online seminars – webinars, workshops and conferences		
<b>Total Lecture hours</b>		<b>90 hours</b>
<b>Text Book(s)</b>		
1	Agarwala V P, 1980. Forests in India. Oxford and IBH Publishing Co., New Delhi.	
2	Puri G S, Meher V M, Gupta R K and Puri S, 1981. Forest Ecology. Oxford and IBH Publishing Co., New York.	
3	Stebbin E P, 1977. A Manual of Elementary Forest Zoology For India. International Book Distributors, Dehra Dun.	
4	Tiwari K M and Singh R V, 1980. Social Forestry Plantations. Oxford and IBH Publishing Co., New Delhi.	
<b>Reference Books</b>		
1	Tiwari K M and Singh R V, 1980. Social Forestry Plantations. Oxford and IBH Publishing Co., New Delhi.	
2	Warning R H and Schlesinger W H, 1985. Forest Ecosystems: Concepts and Management. Academic Press, New York.	
3	Imms A D, 1965. A General Textbook of Entomology, ELBS, London.	
4	Metcalf C L and Flint W P, 1973. Destructive and Useful Insects, McGraw-Hill, New York.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://swayam.gov.in/">https://swayam.gov.in/</a>	
2	<a href="https://www.mooc.org/">https://www.mooc.org/</a>	
4	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>	
Course Designed By: Dr. Senthilkumar, Assistant Professor in Zoology, GAC, Erode and Dr. A. Jeyashankar, Assistant Professor in Zoology, GAC, Coimbatore.		

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

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

Course code	3EB	RESEARCH METHODOLOGY	L	T	P	C
Core/Elective/Supportive		ELECTIVE III	6	0	0	4
Pre-requisite		Basic knowledge about behavior of animals	Syllabus Version		2023-2024	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>To understand about research.</li> <li>To acquire the knowledge on thesis writing.</li> <li>To learn the methodology about the research work.</li> <li>To understand the data interpretation.</li> <li>To sensitize the students to study about research.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create</b>						
<b>Unit:1</b>	<b>BASIC OF RESEARCH</b>					<b>18 hours</b>
Topic selection-Planning research–defining objectives-Preparation of workplans. Identification of suitable methodology- Preparation of project proposal– Funding agencies –Student project						
<b>Unit:2</b>	<b>COLLECTION OF LITERATURE</b>					<b>16 hours</b>
Collection of literature – News articles – Newsletters – Journals. Digital library and search of articles – Keywords and search – Internet – Google Scholar – Pubmed – Inflibnet – Medline – Agricola –Science direct – Open access Journals – virtual sources – other sources.						
<b>Unit:3</b>	<b>DATA ANALYSIS</b>					<b>18 hours</b>
Collection of samples / data – Data analysis – Microsoft Office – Construction of tables – headings Footer – hypothesis testing – Test of Significance – Tabulation – Presentation of results.						
<b>Unit:4</b>	<b>THESIS STRUCTURE</b>					<b>18 hours</b>
Thesis structure – Components – Writing Introduction – review of literature – Materials & Methods – Presentation of results – Discussion of Results based on literature – Arrangement of Bibliography and how to quote reference in thesis - Appendix.						
<b>Unit:5</b>	<b>PUBLISHING ARTICLES</b>					<b>18 hours</b>
Publishing of Articles in newspapers / newsletters – Selection of journals – ISSN Number – Peer Reviewed Journals – Science citation index – impact factor and importance. Manuscripts preparation for Journals – components – Submission and Publication.						
<b>Unit:6</b>	<b>Contemporary Issues</b>					<b>2 hours</b>
Expert lectures, online seminars – webinars, workshops and conferences						

		Total Lecture hours	90 hours
<b>Text Book(s)</b>			
1	Anderson,Durston&Polle1970:Thesisandassignment,writingWileyEasternLimited		
2	FisherR.A,1950:Statisticalmethodsofresearchworkers		
3	FreumdJE,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		
<b>Reference Books</b>			
1	MalterK,1972:StatisticalanalysisinBiology,ChapmenHall,London.		
2	RajendrakumarC2008ResearchMethodologySBNanjaforAPHApublishingCorporation NewDelhi		
3	Kothari S R, Research Methodology Methods and Techniques, Pragun Publication, 2012		
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>			
1	ResearchMethodology: <a href="https://swayam.gov.in/nd2_ cec20_ hs17/preview">https://swayam.gov.in/nd2_ cec20_ hs17/preview</a>		
2	Understanding Research Methods: <a href="https://www.mooc-list.com/course/understanding-research-methods-coursera">https://www.mooc-list.com/course/understanding-research-methods-coursera</a>		
Course Designed By: Dr. S. Vidya, Guest Faculty in Wildlife, GAC, Ooty and Dr. H. Mohanakrishnan, Assistant Professor in Wildlife biology, GAC, Ooty			

<b>MappingwithProgrammeOutcomes</b>										
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



# **Fourth Semester**

<b>Course code</b>	<b>43P</b>	<b>PHYSIOLOGY AND WILDLIFE HEALTH, MANAGEMENT OF ZOO'S, SANCTUARIES AND NATIONAL PARKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>PRACTICAL-V</b>		<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>Pre-requisite</b>	Basic information on physiology and evolution of animals		<b>Syllabus Version</b>		<b>2023-2024</b>	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
1. To make them understand physiology through practicals						
<b>Expected Course Outcomes:</b>						
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 about the captive breeding					K3
4	Knowledge about wildlife diseases					K4
5	Analyse about the conflict					K5
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6- Create</b>						
						<b>12 hours</b>
<ol style="list-style-type: none"> <li>Effect of temperature on the opercular movement of fish and calculation of Q10.</li> <li>Determination of the specific gravity of the blood in vertebrate animal by copper sulphate method.</li> <li>Active uptake of Na<sup>+</sup> and Cl<sup>-</sup> of a fish from the environmental water.</li> <li>Effects of salinity on oxygen consumption of fishes and plot on graph.</li> <li>Analysis of ammonia, urea and uric acid from excretory product of animals.</li> <li>Change in weight of Earthworm in various osmotic media conditions.</li> <li>Estimation of Haemoglobin content in fish blood.</li> <li>Marking major National Parks and Tiger Reserves of India.</li> <li>Marking major Wildlife Sanctuaries of Tamil Nadu.</li> <li>Marking Biodiversity Hotspots of India.</li> <li>Food preparation of zoo and tamed animals.</li> <li>Designing of animal cages.</li> <li>Restraining of animals using drugs and equipments.</li> <li>Ecto-parasite in wild animals.</li> <li>Endo-parasite in wild animals.</li> </ol>						
<b>SUBMISSION:</b>						<b>12 hours</b>
<ol style="list-style-type: none"> <li>Submit a report on Visit to Zoos and sanctuaries.</li> <li>Submit a report on Captive animal management.</li> <li>Visit to animal breeding centres.</li> </ol>						
<b>Total Lecture hours</b>						<b>86 hours</b>



<b>TEXT BOOK</b>	
1	
2	
<b>Reference Books</b>	
1	
2	
3	



Course code	43Q	Wildlife Management Techniques	L	T	P	C
Core/Elective/Supportive		PRACTICALVI	0	0	2	4
Pre-requisite		Basic knowledge about Genetics in Animals	Syllabus Version		2023-2024	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>6. To make the students understand planning and usage of various field equipments including GPS,GIS and Remote Sensing</li> <li>7. To know the principle of wild animal population estimation techniques and methods applied in animal capturing</li> <li>8. To know the principles of survey and mapping techniques</li> <li>9. To make the students to understand Forest Techniques</li> <li>1. To learn about sampling techniques involved investigation analysis</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	To obtain knowledge on field equipment used in wildlife management.					K1
2	Integrate the strategies involved in various population estimation techniques Including molecular methods					K4
3	To gain knowledge on survey and mapping techniques					K3
4	To learn about current forest management practices					K4
5	To understand about Forest and its management					K5
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create</b>						
<ol style="list-style-type: none"> <li>1. Estimation of diversity and specie srichness of an area</li> <li>2. Estimation of carrying capacity of an area</li> <li>3. Population Viability Analysis(PVA) and Population HabitatViabilityAnalysis(PHVA)</li> <li>4. Geo-referencing of animage file to create better image using Q-GIS/Map-Info/ARC-GIS</li> <li>5. Estimating herbivore population using Distance Software</li> <li>6. Estimating Tiger population using M-STRIFE software</li> <li>7. Identification o fan Elephant Corridor</li> <li>8. Preparation of EIA of an area</li> <li>9. Usage of drone Cameras in Wildlife management.</li> <li>10. Estimation of Canopy volume</li> <li>11. Preparation of Quadarts and Transects to estimate vegetative analysis in an area</li> <li>12. Preparation of Quadarts and Transects to estimate vegetative analysis in an area</li> <li>13. Identification of various forest types</li> <li>14. Estimation of tree height</li> <li>15. Estimation of log volume</li> <li>16. Estimation of Canopy volume</li> <li>17. Forest cover monitoring,map reading and surveying techniques of forest area</li> </ol>						
<b>Total Lecture hours</b>					<b>36 hours</b>	
<b>TEXT BOOK</b>						
1	Arunabha Sen Publishers.					

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

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

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

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



<b>Course code</b>	<b>43S</b>	<b>Biostatistics &amp; Computer Application And Research Methodology</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>PRACTICAL VII</b>		<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>Pre-requisite</b>	Basic information on Biostatistics And Research Methodology		<b>Syllabus Version</b>		<b>2023-2024</b>	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>To make the students understand Collection and interpreting the datas</li> <li>To know the influence of various software to analyse the data</li> <li>To understand the use of computer utilization in research</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course ,student will be able to:						
1	To understand the usage of internets					K1
2	To understand the writing of thesis					K4
3	To analyse the significance of Equipments used in field					K3
<b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6-Create</b>						
						<b>12hours</b>
<ol style="list-style-type: none"> <li>Estimate the correlation between the length and width of different types of leaves.</li> <li>Estimation of Chi square test using Eucalyptus leaves as a model.</li> <li>Analysis of variance ANOVA.</li> <li>Testing of hypothesis</li> <li>Theorms of distribution.</li> <li>Graphical representation of data.</li> <li>Diagrammatic representation of data</li> <li>Statistical software: PAST, SPSS, PRESENCE, GENEPOP, R</li> <li>Computer; hardware, software</li> <li>Hypothesis in research.</li> <li>Proposal writing.</li> <li>Different types of article writing; popular article, review article, short communication, peer reviewed research paper.</li> <li>Analyzing the data</li> <li>Writing the dissertation.</li> </ol>						
<b>Total Lecture hours</b>						<b>90hours</b>
<b>TEXTBOOK</b>						
1	Robinson, Wl. and Eric, G. Bolen, 1984. Wildlife Ecology and Management Mac Millan Publishing Co, New York. Pp 478.					
2	Maiti.P.K and Maiti.P. 2011. Biodiversity – perception, peril and preservation. PHI, Learning Pvt. Ltd., New Delhi.					
3	Giles, R.H. Jr.(Ed) 1984. Wildlife Management Techniques 3rd edition. The wildlife Society, Washington. D.C. Nataraj Publishers, Dehradun. India.					

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
C01	S	S	S	M	S	L	M	S	S	S
C02	S	S	S	M	S	L	M	S	S	S
C03	S	S	S	M	S	L	M	S	S	S
C04	S	S	S	M	S	L	M	S	S	S
C05	S	S	S	M	S	L	M	S	S	S

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

