



M.Sc. Wildlife Science

CHOICE BASED CREDIT SYSTEM (CBCS)

2025-26



Course outline & Syllabus

University of Kota, Kota M.B.S. Marg near Kabir circle, 324005



Rajasthan is a land of stupendous dimensions, which are colorful, exotic, traditional and modern. Rajasthan is fortunate to have a richness of natural beauty, flora and fauna accompanied with places of religious, historical and archeological importance. The rich cultural and historical heritage of the state attracts people from other states of India as well as from all over the world. So far tourism in Rajasthan has been attracting domestic and foreign tourists towards its National Parks and Wild Life Sanctuaries in large numbers but looking to the enchanting beauty and splendor of the picturesque forest wealth present in the hills of Aravallis and Vindhya there is still lot of scope of opening avenues of wildlife tourism related to nature and forests. The forests of Rajasthan have tremendous potential in the tourism sector. The development of "Green Tourism or Eco-tourism" will not only enhance the tourist arrivals in the state but also earn sizable foreign exchange together with employment generation largely in and around forest areas benefitting the rural and tribal population of the state.

The state houses tigers, black bucks, chinkara, the sporadic desert fox, the greatly threatened caracal, the Great Indian bustard, gharial, monitor lizard, wild boars, porcupine etc. Exotic traveling birds like the common crane, ducks, coots, pelicans and the rare Siberian cranes, imperial sand grouse, falcons, buzzards herd to this land throughout the bitter chilly winter months. Large characteristic zones strongly demonstrating each of the ecologies have been reserved as vast singular wildlife extents. Rajasthan proudly lays claim to two National Parks, over a dozen Sanctuaries and two Closed Areas.

Kota is very rich in flora and fauna and Mukundara Hills Tiger Reserve is one of the prominent outcomes of the rich biodiversity notified by Govt. of India. The growing need of scientific studies with public awareness in Wildlife Science has triggered University of Kota to initiate the PG degree course as a self-financing scheme at Kota (Rajasthan) in the year 2010.

The Wildlife program is a very rigorous program designed to provide the education and experience for being wildlife professionals. The course is entirely taught by Guest faculty and Extension lectures of specialized experts are conducted to ensure the exposure of the students to the latest research and monitoring skills, techniques and software in their respective fields. Students from all over India are undergoing the course. The students from all the states of India and one NRI student from California US have pursued the course.

Objectives

The objectives of a Wildlife Science course typically aim to provide students with a comprehensive understanding of the biology, ecology, conservation, and management of wildlife species and their habitats. Specific objectives may include:

1. ***Understanding Wildlife Biology:*** - Comprehend the biological and ecological principles governing wildlife species and their interactions within ecosystems.
2. ***Biodiversity Awareness:*** - Recognize the importance of biodiversity and the role of wildlife in maintaining ecological balance.
3. ***Habitat Ecology and Management:*** - Study different habitats and environmental factors affecting wildlife distribution and abundance.
4. ***Conservation Principles:*** - Learn about threats to wildlife (e.g., habitat destruction, poaching, invasive species) and strategies for conservation and sustainable management.
5. ***Wildlife Research and Monitoring:*** - Develop skills for field research, population assessment, and monitoring techniques.
6. ***Legal and Ethical Aspects:*** - Understand wildlife laws, policies, and ethical considerations related to wildlife conservation.
7. ***Application of Wildlife Management Techniques:*** - Gain practical knowledge of management practices, habitat restoration, and species recovery programs.
8. ***Promoting Sustainable Use:*** - Emphasize sustainable utilization of wildlife resources for economic and ecological benefits.
9. ***Interdisciplinary Approach:*** - Integrate knowledge from ecology, genetics, physiology, and social sciences for holistic wildlife management.
10. ***Fostering Conservation Attitudes:*** - Cultivate awareness and responsibility towards wildlife conservation among students.

These objectives aim to prepare students to contribute effectively to wildlife conservation efforts and informed decision-making related to biodiversity and ecosystem health.

Course Structure

The course M.Sc. in wildlife science is a two year full time curriculum offered in the form of Choice-based Credit System organized in four semesters of 24 credits each. Each semester is structured into theory papers with lab & field practical's, which will be evaluated during the semester. The first three semesters have four theory papers with four credit each and field and laboratory practical of 08 credits. Each theory paper is sub-divided into 5 units. The assignment and practical exercises will also be administered separately by coordinators. (The third semester will also have one specialized paper on research design and for developing a pre proposal for dissertation). The fourth semester is a dissertation program (field lab work and data analysis and writing). There is an equal emphasis on providing theoretical understanding and developing practical skills. Classroom lectures, assignments, group discussions and extended field visits are therefore given equal importance. Each month will have about 20 working days, and each day will have three lecture hours and two practical hours. An important activity during the course is critical review of published research in the assignments and presentations the student is expected to provide an overview, synthesis of work done in the pet and critical evaluation based on the information that has been gathered. Sixty percent of the credit will be taught as regular classroom teaching and 40% will be interactive learning, which will include seminars, group discussions, assignments, power-point and poster presentations etc.

Field Study

In all there will be field tours for Orientations, Techniques, National Park, Wetland field Conservation Practices and management. These field studies are compulsory part of the curriculum and will be conducted during the first three semesters. The students will be required to prepare reports and these will be evaluated during the respective semester.

Assignments and Seminars

Substantial time is made available for assignments and seminars, besides additional time during a particular semester. These assignments and seminars will be based on the theory papers in the respective semesters.

Dissertation

Wildlife Science is essentially a field – based subject, and therefore due emphasis is given to this. The entire duration of the fourth semester is allotted for an independent field and or lab based dissertation project. As part of the preparation for the dissertation project students are required to submit a pre proposal of 1000 words by the end of the third semester (format of pre proposal will be circulated at the start of the semester). Upon acceptance of their pre – proposal, a detailed proposal needs to be submitted in the first week of the beginning of IV semester. The dissertation will be submitted in the prescribed format within the 16-18 week.

Attendance

Admitted students have to attend all the lectures, practical and field tour. A minimum of 75 % attendance in each semester is required in order to be allowed to appear in the University examination.

Semester Wise Distribution of Marks

Semester	Details	Marks
1	4 Papers (100 marks each*)	400
	Lab and Field Practical	200
	Total Marks	600
2	4 Papers (100 marks each*)	400
	Lab and Field Practical	200
	Total Marks	600
3	4 Papers (100 marks each*)	400
	Lab and Field Practical	200
	Total Marks	600
4	Dissertation internal	200
	Dissertation external	200
	Project reports and Viva-Voce	200
	Total Marks	600
	GRAND TOTAL	New Scheme 2400

Examinations

Evaluation of the theory papers will be both external and internal in the ratio of 70:30 respectively. The theory papers will be both external examinations for 70 marks will be conducted by University of Kota at the end of each semester. The internal examination for 30 marks will be conducted by the respective paper coordinator. There will be two internal assessment tests each of 15% weightage, for theory papers in each semester. Each internal assessment test shall be of one hour duration for each paper and shall be taken according to the academic calendar notified by the University. The fourth semester examination (dissertation) will be evaluated by external and internal examiners including dissertation presentation and Viva-Voce (weightage 24 Credits). Students are required to apply in the prescribed application form for appearing in the theory examination and need to pay the necessary examination fees on the date to be notified by the University. The candidate shall be declared as pass in a semester examination, if he/she secures at least 40 % marks in each theory paper separately in external and Internal examination and

50% marks in each practical paper at least 50% marks in project / dissertation with 50% aggregate marks in that semester. The semester wise distribution of the course and papers are given below:

In order to qualify for the M.Sc. degree, a student should:

- (a) Secure minimum 40% in each theory paper separately in external and internal examination and 50% in practical examinations, with 50% aggregate marks.
- (b) Secure minimum 50% in his / her dissertation and Viva- Voce examinations.

Classification of successful candidates after last semester examination

Description of marks obtained

- 80% and above marks in a paper
- A candidate who has secured aggregate 60% and above but less than 80% marks
- A candidate who has secured aggregate 50% and above but less than 60% marks

If a candidate clears any paper(s) prescribed at the Semester Examination after a continuous period of two years, then for the purpose of working out his division the minimum pass marks only viz. 40% (50% in the case of practical) shall be taken into account in respect of such papers(s)/Practical(s) are cleared after the expiry of the aforesaid period of three years, provided that in case to reach the minimum aggregate as many marks out of those actually secured by him will be taken into account as would enable him/her to make up the deficiency in the requisite minimum aggregate

A total of twelve theory papers (3 hours duration each) are prescribed in (4 in each semester). Field and Lab/Computer practical Examination (5 hrs. duration each) shall be conducted in each semester. The pattern of examination will be similar as adopted in other P.G. exams of

University of Kota along with by means of dissertations/Project Report/Seminar as prescribed in the syllabus.

Pattern of Q. Paper will follow the adopted scheme i.e. the Q.P. will be divided in three sections A,B, & C. Section "A" will contain 10 short answer type questions and all will be compulsory. Section 'B' will contain 10 questions, 2 from each unit. Candidates will be required to attempt 5 questions selecting 1 from each unit. Section 'C' will contain 4 questions set from different units. Candidates will be required to attempt any 2 questions. **(Old Scheme)**

Pattern of Q. Paper will follow the adopted scheme i.e. the Q.P. will be divided into 2 sections A & B Section. 'A' will contain 10 short answer type questions (20 marks) and all will be compulsory. Section 'B' will contain 10 questions, 2 from each unit. Candidates will be required to attempt 5 questions selecting 1 from each unit (50 marks). Minimum passing marks 28/70. **(New Scheme)**

A candidate may be promoted to III semester if he / she secure at least 40 % marks in at least seven out of ten papers (8 theory papers + 2 practical's) prescribed at the I and II semester taken together provided that aggregate marks in all theory papers of I and II semester taken together is at least 50 % such candidate shall be required to appear in theory papers in which he / she has secured less than 40 % of I & II semester along with the theory papers of III and IV (Project) semester respectively, as and when such examination are held.

A candidate may be promoted to second year if he/she has secured at least 40% marks in each theory paper but has failed to secure 50% marks in aggregate (theory and practical separately). He shall be required to appear in some theory papers of I and II semester so as to make his aggregate at least 50% along with III and IV (Project) semester, whenever examinations of these courses are held.

A candidate may be allowed grace marks at maximum two places up to the extent of 1% of the total marks prescribed for that examination.

Eligibility

B.Sc. in Forestry Science OR B.Sc. with Chemistry and any one of the following subjects: Anthropology/Bio-Chemistry/Bio-Physics/Bio-Technology /Botany / Chemistry/Computer Science/Nursing/ Veterinary science /Genetics /Mathematics /Micro-Biology/Pharmacy/ Physics/ Statistics/Zoology or equivalents. OR MBBS/BDS/B. Tech or equivalents, from any University recognized by UGC with 50% marks.

(For SC/ST/OBC/SOBC is 40%) pose of working out his division the minimum pass marks.

Category-A

Course Structure with Distribution of Marks and Credits for PG subject with

Practical component

Year / Semester	Serial Number, Code & Nomenclature of Paper			Duration of Exam	Teaching Hrs/Week & Credit			Distribution of Marks			Min. Pass Marks	
	Number	Code	Nomenclature		L	P	C	Internal Assess.	Sem. Assess.	Total Marks	Internal Assess.	Sem. Assess.
I Year I Semester	1.1	Paper-I	Theory	3 Hrs	4	--	4	30	70	100	12	28
	1.2	Paper-II	Theory	3 Hrs	4	--	4	30	70	100	12	28
	1.3	Paper-III	Theory	3 Hrs	4	--	4	30	70	100	12	28
	1.4	Paper-IV	Theory	3 Hrs	4	--	4	30	70	100	12	28
	1.5	Paper-V	Practical –I (Day 1 = Lab Prac. + Day 2 = Field Prac.)	5 Hrs per day	--	16	8	--	100 + 100	200	--	100
	Total				16	16	24	120	480	600	--	
I Year II Semester	2.1	Paper-VI	Theory	3 Hrs	4	--	4	30	70	100	12	28
	2.2	Paper-VII	Theory	3 Hrs	4	--	4	30	70	100	12	28
	2.3	Paper-VIII	Theory	3 Hrs	4	--	4	30	70	100	12	28
	2.4	Paper-IX	Theory	3 Hrs	4	--	4	30	70	100	12	28
	2.5	Paper-X	Practical –I (Day 1 = Lab Prac. + Day 2 = Field Prac.)	5 Hrs per day	--	16	8	--	100 + 100	200	--	100
				16	16	24	120	480	600	--		
II Year III Semester	3.1	Paper-XI	Theory	3 Hrs	4	--	4	30	70	100	12	28
	3.2	Paper-XII	Theory	3 Hrs	4	--	4	30	70	100	12	28
	3.3	Paper-XIII	Theory	3 Hrs	4	--	4	30	70	100	12	28
	3.4	Paper-XIV	Theory	3 Hrs	4	--	4	30	70	100	12	28
	3.5	Paper-XV	Practical –I (Day 1 = Lab Prac. + Day 2 = Field Prac.)	5 Hrs per day	--	16	8	--	100 + 100	200	--	100
	Total				16	16	24	120	480	600	--	
II Year IV Semester	4.1	Paper-XVI	Dissertation Internal	5 Hrs		--	8			200		100
	4.2	Paper-XVII	Dissertation External	-		--	8			200		100
	4.3	Paper-XVIII	Project Report and Viva	5 Hrs per day		--	8			200		100
									600	--		
G. Total									2400	--		

Note: In full or partial mode, the second/last year may be devoted to Dissertation with Presentation and Viva-Voce/Research

Project with Presentation and Viva-Voce/ Comprehensive viva-voce or Internship etc. Each theory paper will be allocated a workload of 4 Hrs. / week and practical component will be allocated a workload of 16 Hrs/week i.e. 1 Hrs/week/credit for theory and 2 Hrs/week/credit for practical.

Semester –I
(Syllabus 2025-26)
WLS-101: Biogeography, Ecology and Vegetation Science (04 Credits)

Unit –I

Biogeography (0.8 Credit)

Biogeography: Continental drift, Bio-geographical realms (8-Afrotropical, Antarctic, Australian, Indomalayan, Nearctic, Neotropical, Oceanian and Palearctic) and 14 Biomes. Applied biogeography, Endemism, Refugia. Biogeographical classification of India. Dispersal : Ecology of dispersal, Barriers, Corridors and their importance, threats and solution.

Unit – II

Introduction to Biological Diversity and Evolution (0.8 Credit)

Types of Biodiversity, Levels of biodiversity: alpha, beta, gamma diversity, keystone species, umbrella species, flagship species, indicator species, indigenous and introduced / exotic species. Natural Selection, Species concept and Speciation; Phylogenetic, Evolutionary and Ecological Species concepts. Macroevolution and Co-evolution.

Unit – III

Fundamentals of Ecology (0.8 Credit)

Basic concepts and structure of Ecosystems: Abiotic and Biotic components (Inter-specific and Intra-specific interaction), Energy flow. Trophic equilibrium: food chains, Ecological pyramids, Food webs, Biogeochemical cycles (C, N, O, S, and P cycle): Nutrients and Minerals. Concept of productivity: Types of productivity, GPP, NPP, Secondary productivity.

Unit-IV

Environmental Pollution (0.8 Credit)

Pollution: Definition, Types, Sources of global warming and Climate change, Green house effect, Ozone layer depletion, Acid rain, impact and control measures, Environmental monitoring; Concept of sustainable development , Eutrophication and biomagnification.

Unit- V

Succession and Forest soil (0.8 Credit)

Succession: Primary and Secondary succession. Plant succession: Hydrosere, Lithosere, Xerosere; concepts and processes. Forest soils: Classification, Process of soil formation. Factors affecting soil formation (Physical, Chemical and Biological Properties). Soil erosion: types, Conservation, and management of eroded soil/areas. Wind break/shelter belt, sand dunes, reclamation of saline, alkaline soil and water logged soils.

WLS –102: Biology of Indian Wildlife (04 Credits)

Unit – I

Non-Chordates (0.8 Credit)

Major phyla of Non Chordates – Protozoa to Echinodermata, distinguishing characters. Social organization and economic importance of – Honey bee, Termites, Ants and Silkworm. Preliminary knowledge about Butterflies, Moths, Dragonflies, Scorpions, Spiders.

Unit – II

Ichthyology (0.8 Credit)

Classification (up to order) of fishes in India. Ecology and adaptations of fishes in different ecosystems. Economic importance. Introduction to biology of sport fishes (Mahseer, Trout and common carp). Difference between chondrichthyes and osteichthyes, Skates and Rays; Threats and conservation perspectives of fish biodiversity of India. Threatened fishes of India. Methods to study ecology of fish habitat diversity, abundance and growth.

Unit – III

Batrachology & Herpetology (0.8 Credit) **Batrachology:** Taxonomy of Amphibians (up to order); characteristics, examples, their role in nature, threats to their existence and conservation measures. Difference between- Frog and Toad, Newt and Salamander, Siren and Spoda.

Herpetology: Taxonomy of Reptiles (up to order), characteristics, examples, their role in nature, threats to their existence and conservation measures. Comparative Ecology: Differences among Lizards, Gecko and Agma; Chameleon, Skink and Gila Monster; Turtle, Tortoise and Terrapins; Crocodile, Gharial and Alligator. Behavioral & Physiological Adaptations - Trampling and Thermoregulation, Aestivation and Hibernation. Role of temperature in sex determination. Snake Identification: Venomous and non venomous snakes. Characteristics of Indian Krait, Saw-scaled Viper, Russell's Viper and Indian Cobra. Medical Response to Snake Bites - Types of Venom, Anti-venom Treatments, First Aid and Management of Snake Bite cases.

Unit – IV

Ornithology (0.8 Credit) Avian classification (up to order) and distribution with special reference to Rajasthan birds. Morphological adaptations (bills and claws) Development of feathers, flight adaptations, plumage and moult, diurnal and nocturnal adaptations; Activities of birds: roosting, calls and songs; methods (with names of methods) for analyzing, identification and recording calls and songs. Bird Migration and navigation, Impact of migrants on resident species of birds. Threats faced by the avian community, causes of decline of common birds and their control measures. Concept of IBAs (Important bird areas), EBAs (Endemic bird areas) and bird census techniques.

Unit – V

Mammalogy (0.8 Credit) Characteristics and Classification of mammals (up to order) of Indian sub-continent. Zoogeography of Indian mammals. Morphological adaptations in mammals. Difference between Antelope and deer; cheetah, tiger, leopard and lion; otter, beaver, weasel and mongoose; hedge hog and echidna; rabbit and hare; armadillo and pangolin; primates, New World Monkeys, Old World Monkeys and Greater Apes; Dugong and seals; White footed fox and small Indian fox; African elephant and Asian elephant. Comparative study of digestive system of herbivores and carnivores.

WLS -103: Landscape Ecology, Remote Sensing and Animal Welfare (Credits 04)

Unit – I

Landscape Ecology and Remote Sensing (0.8Credit)

Fundamentals of landscape ecology; Basics of Cartography and Remote Sensing. Principal of active and passive remote sensing. Sensors, Image interpretation and Digital image processing.

Unit –II

GPS and GIS (0.8 Credit)

Global positioning system (GPS): Working principle, advantages, limitations and applications. Geographical Information System: data entry and Preparation, concept of database and meta data, spatial modeling and data visualization. Concept of Electromagnetic spectrum. Types of Platforms and Scanning systems.

Unit- III

Forest Protection (0.8 Credit)

Causes of forest damage: Abiotic and Biotic factors, Insect-pests and diseases, Prevention and protective measures (chemical and biological control methods), Effects of pollution on forests and forest die back. Role of afforestation and forest regeneration in absorption of CO₂, Concept of carbon sequestration and Carbon credits.

Unit-IV

Legislation and animal welfare (0.8 Credit)

Laws and policies of Zoo: Animal Welfare Legislation in India, Prevention of cruelty to Animals Act 1960, National Zoo Policy and rules 1998. Laws of animal experimentation Rule 1998.

Unit- V

Watershed Management (0.8 Credit)

Role of micro-organisms in ameliorating (improving) soils; Function of Vesicular Arbuscular Mycorrhiza fungus (VAM) in absorption of nutrients from soil, Concepts of watershed; role of mini-forests and forest trees in overall resource management, forest hydrology, Watershed development in respect of Torrent control, River channel Stabilization, Avalanche and Landslide control, Rehabilitation of degraded areas.

WLS-104 Plant Systematics and Utilization of plants. (04 credits)

Unit –I

Plant Systematics (0.8 Credit)

Introduction to plant systematics, necessity and importance of classification. Basis of Bentham and Hooker's classification, Engler and Prantl classification. Techniques of vegetation survey and quantifications methods.

Unit-II

Forest Types (0.8 Credit)

Champion and Seth's Classification of Indian Forests. Major forest types of Rajasthan (Tropical thorn forest, Tropical dry deciduous forest, Bamboo forest, Central India Subtropical forest, Mixed miscellaneous forest).

Unit-III

Natural Habitats (0.8 Credit)

Deserts - types of deserts (Arid, semi arid, temperate, cold); Factors affecting desertification. Grasslands – types of grasslands (Savannah, Temperate, Tropical, Sub-tropical and Montane).

Unit-IV

Angiosperm Taxonomy (0.8 Credit)

Brief History, its aims and approaches, fundamental components, Alpha taxonomy, Omega taxonomy, Keys, Botanical Nomenclature, Principles and Rules. Salient features of International nomenclature including the naming of taxa according to their rank.

Unit-V

Phytogeography (0.8 credits)

Brief idea of Phytogeography: Phytogeographical regions of India with special reference to Rajasthan. General account on; sources of firewood, timber and bamboo. Present status of composite wood industry in India and future expansion plans. Pulp-paper and rayon; present position of supply of raw material to industry, Wood substitution, Utilization of plantation wood, problems and possibilities.

PRACTICAL (SEMESTER-I)

WLS-105: Laboratory and Field Practical (08 Credits)

Min Pass Marks-100

Max. Marks – 200 marks

(A) Laboratory Practical (Day-1) 5 hours

MM: 100 marks

1. Data entry, data summarization, data management, Chart and graph making in Excel. (10 Marks)
2. Introduction to GPS, Map making Linking, GPS to map (Topo-sheet) and vice-versa. (10 Marks)
3. Map reading and learning the procedure to procure SI maps. (10 Marks)
4. Data input – Digitization of Maps and Projection, Remote Sensing: Geo- rectification and radiometric correction. Image classification technique For mapping of Earth Resources, Landscape Ecology- Logical and Quantitative Models for Species & Habitat. Map making in QGIS and use of Google earth. (10 Marks)
5. Epidermal derivatives; Comparative studies of dentition and skull of different Species. (10 Marks)
6. Horn / antler identification. (10 Marks)
7. Study of pugmark and other indirect evidences of carnivores and herbivores. (10 Marks)
8. Spotting (10 Marks)
9. Practical Record. (10 Marks)
10. Viva Voce (10 Marks)

(A) Field Practical (Day- 2) 5 hours

MM: 100 marks

1. Analysis of species diversity in field (Flora & Fauna) (10 marks)
2. Analysis of habitat characteristics in a specific PA (10 marks)
3. Quantification of flora using vegetation sampling methods (Estimation of species dominance, frequency, density using quadrat / plot methods) (10 marks)
4. Identification of venomous and non-venomous snakes (10 marks)
5. Bird watching and identification of resident and migratory birds (minimum 100 species) with their salient characteristics and use of Different Bird census techniques (10 marks)
6. PPT Presentation on assigned topic. (10 marks)
7. Identification of voice/chirping or sounds of birds. (10 marks)
8. Spot (1 to 5). (10 marks)
9. Practical Record. (10 marks)
10. Viva- Voce. (10 marks)

Semester – II
(Syllabus 2025-26)

WLS-206: Habitat Ecology, Population Ecology and Conservation Biology (04 Credits)

Unit – I

Habitat Ecology (0.8 Credit)

Introduction to Habitat Ecology Ecological & evolutionary perspectives Ecology of terrestrial habitats: (Deserts, Grasslands, Forests), Wetlands. Habitat diversity: Ecotones, Interspersion and Juxtaposition. Physical and Anthropogenic factors influencing terrestrial habitats. Habitat degradation.

Unit-II

Applied Habitat Ecology (0.8 credit)

Inventory, Evaluation and Monitoring of habitat (land species, water, estuarine water) Availability, Quality, Palatability of graze and browse. Inventory of unique habitats (name them) and their distribution, Animal sign as indicator of habitat use, use of map overlay approach in habitat evaluation. Monitoring changes in habitat parameters, use and availability of habitat resources.

Unit – III

Population Ecology (0.8 Credit)

Monitoring population and other demographic parameters: r & k selection, Carrying capacity, Allometry, Aging and Sexing, Life tables. Population dynamics: Exponential, Logistic and other forms of growth of population, Density dependent and Independent growth, Population simulation, Predator-Prey Dynamics, Population Genetics.

Unit - IV

Advanced Population Ecology (0.8 Credit)

Sampling designs for population estimation, Population estimation methods: Distance based sampling methods, Mark-recapture for closed population, Indices, Modeling Occupancy. Bayesian models in abundance estimation (Spatial and Non Spatial).

Unit- V

Census (0.8 Credit)

Census, types of census, Methodology of Tiger census, Methodology of Lion census, Bird census and Aquatic animal census. Important conservation projects undertaken in India: Project Tiger, Project Elephant, Project GIB, Rhino - reintroduction and Cheetah - reintroduction Program.

WLS-207: Animal Behavior and Community Ecology (04 Credits)

Unit – I

Introduction to Animal Behavior (0.8Credit)

Definition and importance of studying animal behavior. Concept of behavior: Fixed action pattern (FAP), Sign stimulus (SS), Action specific energy (ASE), Innate releasing mechanism(ARM). Patterns of behavior: aggression territory, communication, feeding, mating, parenting.. Experience and learning behavior, Habituation, conditioned reflex, trial and error learning, latent learning and imprinting, reasoning, intelligence and use of tools.

Unit-II

Social Behavior in Animal Community (0.8 Credit)

Types of social organizations: Solitary, monogamy, harem forming, territorial male, multi-male/multi-female. Benefits and cost of living in social groups, optimal group size. Sociobiology – types of fitness (reproductive success, fitness, Darwinian fitness, inclusive fitness, kin selection, Hamilton rule) Mating strategies, ecological factors, affection bonds, fecundity.

Unit-III

Behavioral Ecology (0.8 Credit)

Understanding proximate and ultimate mechanisms. Selfishness and altruism. Basic idea of physiological, neural and hormonal mechanisms of behavior. Techniques in animal behavior studies: sampling methods; ad-libitum, focal animal, all occurrences, sequence, one zero & scan sampling. Advantages and disadvantages of keeping animals in captivity. Behavioral changes in captivity.

Unit-IV

Community Ecology (0.8 Credit)

Definition and nature of communities; scale and approaches. Community structure, organization and its stability (guilds, resource partitioning, niche, competitive exclusion). Factors governing species diversity. Concept and measurement of niche. Trophic interactions; top-down and bottom-up processes. Null models and their application in ecology. Energy, Productivity and its implication for species diversity.

Unit- V

Animal Physiology and Nutritional Ecology (0.8 Credit)

Feeding ecology of herbivores, carnivores, insectivores and omnivores – food selection, quantity, quality (nutritional value), seasonal variations, relation of food with animal condition. Predator- prey interactions. Importance of minerals for animal health, growth and reproduction. Ecology of seed dispersal and seed predation (depredation). Role of animals in pollination.

WLS-208: Wildlife Health and Wildlife Forensics (04 Credits)

Unit –I

Wildlife Health (0.8 Credit)

Introduction to disease and epizootiology, Determinants of disease and disease transmission, Disease and population dynamics. Importance of wildlife health studies in population management, evaluation of animal health and condition through direct observations of free living animals, physical examination of animals and collection of baseline data on health parameters. Quarantine and Quarantine Act.

Unit –II

Common diseases in Indian Wildlife (0.8 Credit)

Review of major viral, bacterial, protozoan, fungal and parasitic diseases of Indian wild amphibians, reptiles, birds and mammals. Non-infectious diseases- nutritional diseases, poisoning, stress, shock, capture myopathy, physical trauma. Emerging and re-emerging diseases. Zoonotic diseases and health approaches. Assessment of condition, health nutritional status in free-ranging populations. Disease control operations, Investigation of disease outbreaks including biological sampling and laboratory analysis, Planning and management of wildlife health program.

Unit -III

Capture & Handling of Wild Animals (0.8 Credit)

Capture and handling of animals - purpose, restraint techniques, different capture methods and animal barriers. Drug immobilization - drug delivery equipment and accessories. Immobilization drugs - action, dosage, response and side effects, safety measures, complications. Central Zoo Authority (CZA) protocol of Handling and transport of wild animals, designing sledge, crate and holding enclosures.

Unit-IV

Wildlife Health Management (0.8 Credit)

Wildlife-livestock interface and conservation. Biodiversity loss, climate change and its impact on Wildlife Health. Introduced/Invasive species issues and ecosystem health monitoring. Introduction to the problems of locally over-abundant wild animal populations causing damage, control versus conservation, animal damage control techniques; biological, chemical and mechanical. Management of waterholes in wildlife disease control.

Unit –V

Genetics (0.8 Credit)

Introduction to Bio-molecules-DNA, RNA and Proteins; Central Dogma of Molecular Biology- Replication, Transcription and Translation; Mendelian Genetics- Mendel's Laws; Genetic Code- Characteristics features of genetic code, Genotypic and Allelic variation. Interpretation of genetic data (Bar coding). Application of genetics for wildlife conservation; Loss of genetic diversity, Resolving taxonomic uncertainties.

WLS-209 Conservation Biology (04 Credits)

Unit- I

Conservation Biology (0.8 Credit)

Concept and Introduction to conservation biology with special reference to forest and wildlife management. Values of biodiversity and conservation ethics. Losses and threats to biodiversity. Agenda 21 and Hot Spots.

Unit-II

Habitat fragmentation (0.8 Credit)

Biological consequences of habitat fragmentation; causes, effects and approaches of habitat fragmentation (covering barriers and isolation) .Crowding effect, Local and Regional extinction, Edge effect, Changes in species composition and Community. Control of invasive species.

Unit-III

Restoration Ecological (0.8 Credit)

Types and principles of ecological restoration. Significance/ Rational of ecological restoration. Ecosystem level conservation: plants used as avenue trees for shade, pollution control and aesthetics. Development program at indigenous and local community involvement in conservation. Challenges of restoration.

Unit-IV

In-situ and Ex-situ Conservation (0.8 Credit)

International efforts and Indian initiatives, protected areas in India: sanctuaries, national parks, biosphere reserves, community reserve, conservation reserve, wetlands, mangroves and coral reefs. Principles and practices of Ex- situ conservation Botanical gardens, field gene banks, seed banks, in vitro repositories, cryo banks. General account of the activities of Botanical survey of India (BSI), National Bureau of Plant Genetic Resources (NBPGR), Indian Council of Agricultural Research (ICAR), Council of Scientific and Industrial Research (CSIR), and Department of Biotechnology (DBT) for conservation. Role of NGOs in conservation. Behavioral differences between in-situ and Ex- situ animals.

Unit-V

Conservation policy and Law (0.8 Credit)

National Biodiversity policy 1987 and national Biodiversity action plan, 2002. Convention on biodiversity 1992: Scope and importance, conservation of biological diversity act 2002 and rules. International: CITES, Convention on Migratory Species (CMS), Endangered species act 1973, Critical animals conservation act 2021

PRACTICAL (SEMESTER-II)

WLS-210: Laboratory and Field Practical - II (08 Credits)

Min Pass Marks-100

Duration-6 hrs

MM – 200 marks

(A) Laboratory Practical (Day- 1)

MM: 100 marks

1. Population Estimation data collection and use of software DISTANCE, MARK, PRESENCE and R Program. (10 marks)
2. Demonstration of equipment used in capturing and handling wild animals. (10 marks)
3. Major viral, bacterial, protozoan, fungal and parasitic diseases of Indian Wild amphibians, reptiles. birds and mammals. (10 marks)
4. Use of different techniques in identification of different parts and products of flora and fauna reported in the wild life trade. (10 marks)
5. PPT presentation on assigned topic. (10 marks)
6. Biological Sampling, preservation and transport of samples. (10 marks)
7. Record of treatment of an ill/ injured wild animal (10 marks)
8. Spot (1 to 5) (10 marks)
9. Practical record (10 marks)
10. Viva voce (10 marks)

(B) Field Practical (Day-2) Duration - 5 hours MM: 100 marks

1. Comparison of several techniques for quantitative habitat survey and mapping. Evaluating habitat availability and utilization. Field visits for habitat evaluation, visit to wetland areas and demonstration of habitat quantification techniques. (10 marks)
2. Field data collection for estimating population abundance of mammals using line transect, occupancy survey and point counts. (10 marks)
3. Methods of behavioral observation: Instantaneous scan, focal animal, all-occurrence and one-zero sampling, collection and analysis of behavioral data on few commonly seen species. (10 marks)
4. Social organization of mammals: Observation and submission of reports. (10 marks)
5. Preparation of Ethograms: time-activity budgets and social interaction matrices. (10 marks)
6. Visit to local Biology Park and record disease and health management Practices of various animals. (10 marks)
7. An Approach to rescue of wild animals. (10 marks)
8. Spot (1 to 5) (10 marks)
9. Practical Record (10 marks)
10. Viva- Voce (10 marks)

Semester III
(Syllabus 2025-26)
WLS- 311: Applied Wildlife Science (04 credits)

UNIT- 1

Wildlife Management (0.8 Credit)

Management of special habitats; Riparian zones, Grassland etc. Analysis of wildlife management problems in plantation and exploited forests. Management plan for protected areas: forest working plans and Wildlife Management plans. Need for Wildlife management planning. Principles of planning, Objectives, management zones, Theme plans, Communications, Staff and Visitor amenities,

UNIT –II

Environmental Impact Assessment and Legislation (0.8 Credit)

Introduction to Environmental Impact Assessment (EIA) and other emerging decision support tools; scope and purpose of EIA. Salient features of important environmental legislation: Environmental protection act 1986, Forest conservation 1980, Wildlife Protection act 1972, National Green Tribunal act, 2010; Biological Diversity Act, 2002. National Environmental Clearance Procedures.

UNIT –III

Wildlife Techniques & Forensics (0.8 Credit)

Introduction to Wildlife telemetry: Transmitters (Antenna, Power source) transmitter attachments (General protocol, collars etc.), Radio tagging, Receivers. Review of Radio-telemetry studies in India. Wildlife forensics; overview, various forensic protocols for species identification Molecular markers used in Wildlife forensic. Wildlife forensics based on DNA analysis and Morphometry. Case studies on Wildlife Crime. Key agencies contributing in Wildlife crime enforcement.

UNIT –IV

Human Dimensions in Wildlife Management (0.8 Credit)

Park – people interface, conflict and objectives of human dimension in management; eco-development – What, why and where; Community participation; Conservation development linkage; livelihood analysis; Stakeholders in conservation ; / PA – people mutual influence zone analysis and village prioritization for pilot eco- development projects; Project planning, Monitoring and Evaluation.

UNIT – V

Relocation and Rescue of Wildlife (0.8 Credit)

Relocating Wildlife; Study designing, consideration and sample consideration. Protocols of tranquilization for Rescue and rehabilitation, Major threats. Study review of habitat utilization by species group; Amphibians, Reptiles, small Mammals and large Carnivores.

WLS-312: Conservation Practices (04 Credits)

Unit I

Natural Resources: Water and Energy (0.8 Credit)

Introduction to natural resources; Types of Clean and renewable energy. Applications, functioning, advantages and disadvantages: Solar energy, Wind energy & Atomic energy, Bio-gas and Hydro-power. Traditional and innovative water harvesting practices. Case studies on successful implementation of renewable energy in rural India.

Unit-II

Forest : Natural Resources and their Utilization (0.8Credit)

Forest as material and service provider: Environmentally sound forest harvesting practices; Logging, Extraction techniques and principles, Transportation systems, storage and sale; Non- Timber Forest Products (NTFPs) - definition and scope; Gums, Resins, oleoresins, fibers, oil seeds nuts, rubber, canes, bamboos, medicinal plants, charcoal, lac and shellac, katha and tendu leaves. Traditional use of plant products by tribes.

Unit- III

Silviculture (0.8 Credit)

Principles of Silviculture : Ecological and physiological factors influencing vegetation, natural and artificial regeneration of forests; methods of propagation, locality factors; nursery techniques (layout, preparation of beds, seed sowing, tending, water budgeting, hardening, grading, etc.), plantation techniques (planting in pits, direct seed sowing, cutting, planting, etc.). Major Silvicultural systems (clear felling, coppice with standard system, selection system, etc). Management of silviculture systems in temperate, subtropical, humid tropical, dry tropical and coastal tropical forests with special reference to plantations, choice of species intensive mechanized methods, aerial seeding, thinning.

Unit –IV

Various Dimensions of Ethnology & Restoration Ecology (0.8 Credit)

Ethno botany: medicinal value of plants, NTFPs and uses of non timber plants in protected areas. Traditional values of tribal and local people of the protected area. Distribution and botanical features of Indian medicinal and aromatic plants. Factors affecting action and toxicity of drug plants and their chemical constituents. Introduction to Restoration Ecology: Setting goals for ecological restorations, analysis of landscapes from degraded to highly valued land. Regulatory requirements in ecological restorations. Monitoring and adaptive management in ecological restoration.

Unit- V

Conservation, Breeding and Wildlife Utilization (0.8 Credit)

Captive breeding and Propagation: Founder population, Rehabilitation, Education, Utilization. Role of scientific institutions and NGOs in Conservation Breeding Programmes. Understanding biological requirements of species; Design of facilities: food, hygiene, disease control, breeding. Case studies on Conservation Breeding Programmes of endangered wild animals in India. Wildlife Utilization: Non-consumptive and consumptive utilization, their economic benefits. Game ranching and controlled off-take from wild population, Rationale, management design, Harvesting by management or hunting license in special cases. Wildlife based Tourism - objectives, planning and economics.

WLS-313 Research Methodology (04 Credits)

Unit – I

Introduction to Research (0.8 Credit)

Research Definition; Importance and Meaning of research, Characteristics of research, types of research, Steps in research; Identification, Selection and formulation of research problem, Research design, Research questions, Formulation of Hypothesis and Review of Literature.

Unit – II

Sampling Designs of Research (0.8 Credit)

Sampling techniques: Sampling theory, types of sampling, Steps in sampling, Sampling and Non-sampling error, Sample size, Advantages and limitations of sampling. Collection of Data: Primary & Secondary Data; Meaning, Data Collection methods, Relevance, limitations and cautions.

Unit – III

Tools of Research (0.8 Credit)

Quantitative and Qualitative Research Techniques; Survey Techniques and its limitations, Operationalization and Questionnaire Construction, Interview Schedule, Reliability and Validity.

Unit–IV

Proposal and Report writing (0.8 Credit)

Styles and formats of writing proposals for ecological / wildlife conservation projects, Research Report: Types of reports, contents, styles of reporting, Steps in drafting reports, Editing the final draft, Evaluating the final draft. Citation, reference and bibliography.

Unit –V

Basic of Journals and IPR (0.8 Credit)

Difference between research journals and science magazines; qualities of good national and International journals of Wildlife Science. Importance of patent in research and process of getting patent right with special reference to Wildlife.

WLS-314: Application of Biostatistics (4.0 Credit)

Unit -I

Descriptive Bio-statistics (0.8Credit)

Introduction to Bio-statistics and its application in wildlife studies. Definition of some statistical terms (Data, variable, sampling universe, sampling unit, sample size, accuracy and precision). Types of variables and scales of measurements (nominal, ordinal, interval / ration scales).

Unit -II

Data Presentation and Central tendency (0.8 Credit)

Data summarization: frequency tables, curves. Data presentation: Histogram, bar diagram, pie charts, line diagram and scatter plot. Central tendency: mean, median, mode, standard deviation, standard error, Skewness and kurtosis

Unit -III

Advanced Bio-statistics (0.8 Credit)

Introduction to statistical distributions. Normal distribution and its salient features. Introduction to hypothesis testing. Null and Alternative hypothesis. Level of significance. Type I and Type II errors. One tailed and two tailed tests. Parametric and non parametric tests of significance. Data transformation(probability transformation).

Unit -IV

Applied Bio-statistics (0.8 Credit)

Student t-test, Z-test, Mann-Whitney U test, Wilcoxon test for matched pairs. Analysis of variance, one way ANOVA, Krushall Wallis one way ANOVA, Friedman two way ANOVA. Correlation and regression. Spearman Rank correlation coefficient. Coefficient of determination. Significance of r, Chi-square test, Goodness of Fit Test.

Unit-V

Vital statistics and Softwares (0.8Credit)

Vital statistics; Introduction, uses, methods (Registration, Census and Analytical). Measurement of fertility, reproductivity and mortality. Life tables. Software's: SPSS, MS-Excel Online platform for biostatistics: Graph Pad Online Tools etc.

PRACTICAL (SEMESTER-III)

WLS-315: Laboratory and Field Practical- (08Credits)

Min Pass Marks-100

MM – 200 marks

Laboratory Practical (Day- 1)

Duration - 5 hours

MM: 100 marks

1. Study of different water harvesting practices in Rajasthan and other parts of India. (10 marks)
2. Presentation of Research Paper on specific topics of population estimation. (10 marks)
3. Understanding of food habits of Ungulates. Carnivores by scat and pellet analysis Hair morphometry (10 marks)
4. Case study on role of NGOs in conservation programs. (10 marks)
5. Forest as material and service provider- utilization. (10 marks)
6. Radio-telemetry; Knowledge of tags collars and radio tracking equipments . (10 marks)
7. Understanding of probability distribution curves. (10 marks)
8. Spot (1 to 5) (10 marks)
9. Practical record (10 marks)
10. Viva voce (10 marks)

Field Practical (Day -2)

Duration - 5 hours

MM – 100 (marks)

1. Study of nearby forest and grassland under various management regimes. (Management practices will also be studied in field courses). (10 marks)
2. Review of forest working plan and maps. (10 marks)
3. Documentation of ethno-botanical flora in any PA in Rajasthan. (10 marks)
4. Study of tiger reintroduction program in any Tiger Reserve (India). (10 marks)
5. Review of ongoing Wildlife projects in India (Any two). (10 marks)
6. Visit and report submission on any eco-development society in Rajasthan. (10 marks)
7. Socio-economic Questionnaire Survey of in minimum five villages around any PA of Rajasthan. (10 marks)
8. Spotting (10 marks)
9. Practical record (10 marks)
10. Viva voce (10 marks)

Field Tours

Conservation Practices Tour

Management Practices Tour

FIELD EXERCISES

The following field courses and tours will be undertaken in association with the course unit programme prescribed above.

Semester-I

1. Orientation Tour

Orientation to field biology and natural history.

Observations and collection of study material, wildlife signs and evidence.

2. Techniques Tour (Ecology, Study Techniques, Wildlife week & Vegetation Studies).

Exercise on wildlife population parameters and census methods for various species.

Vegetation study. Study on animal ecology.

Semester-II

3. National Park Tour

4. Visit a well know National Park

5. Specialized Techniques Tour

Semester-III

Conservation Practice and Management Tour

Field tour designed to examine wildlife conservation issues in a variety of ecological situations in a bio-geographic zone of India and designed to understand Wildlife management practices, eco-development applications and field exercises in Protected Areas.

Note- For the trip/tour/visit, 50% amount will be paid by the students.

Semester IV (2025-26)

WLS-416 A : Presentation of Dissertation and Field Report (24-Credits Day-1)

Dissertation will be based on field work on any topic related to wildlife biology/ ecology/ environment / habitat study etc.

* Performa of Dissertation:-

- Prefatory Material
 - ❖ Title page
 - ❖ Declaration
 - ❖ Certificate
 - ❖ Acknowledgement
 - ❖ Contents
 - ❖ List of tables
 - ❖ List of figures
 - ❖ Body of Dissertation
- Body of Dissertation
 - ❖ Introduction
 - ❖ Review of Literature
 - ❖ Objectives
 - ❖ Materials & Methods
 - ❖ Observations
 - ❖ Results
 - ❖ Discussion
 - ❖ Recommendation
 - ❖ Bibliography
 - ❖ Appendices
 - ❖ Report of Plagiarism

Note: - Research Supervisor will be allotted by the concerned Department of University (UOK, Kota).

Day 1 WLS – 416 (A) Presentation of Dissertation

Dissertation Internal (08-Credits)	200marks
1. Synopsis - within 15 days of Completion of III rd semester	(10 marks)
2. Monthly Reports : 3 reports	(15 marks)
Submit report up to first week of the successive month	
3. Pre submission: (2 copies of dissertation in spiral binding)	(50 marks)
4. a. Final Submission: (6 copies of dissertation in hard binding)	(125 marks)
b. Presentation,	
c. Viva	

Dissertation External (08 Credits)	200 marks
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Day -2 WLS – 416 (B) Field Reports

Submission of a report on collected material/samples/questionnaire- (08-Credits)	200 marks
1. Submit at least 10 photographs of footprints/pugmarks of animals and birds taken during field visits with original details	(25 marks)
2. Case study of at least one village regarding the successful implementation of renewable energy resources.	(25 marks)
3. Prepare a herbarium file (at least 10 specimen of native vegetation) of your study area including the taxonomic classification.	(25 marks)
4. Survey of one village and the challenges faced during relocation.	(25 marks)
5. Submit a report on 'An approach towards rescue of wild animal.	(25 marks)
6. Preparation of Green file (news related to wildlife and environmental issues of current year)	(25 marks)
7. Viva voce	(50 marks)

