

GUJARAT UNIVERSITY
POST GRADUATE DIPLOMA IN
WILDLIFE
EFFECTIVE FROM JUNE 2018



**DEPARTMENT OF ZOOLOGY, BIOMEDICAL
TECHNOLOGY AND HUMAN GENETICS**
UNIVERSITY SCHOOL OF SCIENCES
GUJARAT UNIVERSITY
AHMEDABAD – 380 009

Intake : 10 Students

Fees : Rs.15,000/- per Semester

Eligibility : Graduation in Science with any biological sciences including Medical, Dental, Veterinary & Pharmacy.

Admission, Evaluation, Examination , Results & issuing of Certificate will be as per CBCS System, Rules & Regulations of Gujarat University, Ahmedabad.

WILDLIFE SYLLABUS FOR CREDIT BASED SEMESTER SYSTEM (CBCS)

<u>NO.</u>	<u>COURSE CODE</u>	<u>NAME OF COURSE</u>	<u>HOURS</u>	<u>CREDITS</u>
1	WL- 401	PRIMER IN WILDLIFE SCIENCE	3 + 1	4
2	WL- 402	BIOGEOGRAPHY AND ECOLOGY	3 + 1	4
3	WL- 403	WILDLIFE ECOLOGY AND CONSERVATION BIOLOGY	3 + 1	4
4	WL- 404	WILDLIFE HEALTH AND POPULATION MANAGEMENT	3 + 1	4
5	WL- 405PR	PRACTICAL 1 (Based on Paper WL 401 and 402)	6	4
6	WL- 406PR	PRACTICAL 2 (Based on Paper WL 403 and 404)	6	4
		TOTAL	28	24
1	WL- 407PT	DISSERTATION AND VIVA-VOCE	20	16
2	WL- 408S	SEMINARS AND INDUSTRIAL/FIELD VISITS	04	04
3	WL- 409M	ASSIGNMENTS AND GROUP DISCUSSIONS	04	04
		TOTAL	28	24
		GRAND TOTAL	56	48

SYLLABUS

POST GRADUATION DIPLOMA IN

WILDLIFE

WL-401: PRIMER IN WILDLIFE SCIENCE

Unit - 1: Mammalogy

History of mammalogy. Evolution of mammals and morphology. 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. Mammalian diet; digestive systems; anatomy, morphology and function.

Unit 2: Ornithology

Origin and radiation of birds, morphological and physiological adaptations. Avian systematics and classification of Indian birds. Biogeographic patterns in Indian avifauna and their affinities. Emphasis on montane avifauna; Himalayas, Western & Eastern Ghats; Island avifauna, waterfowl, desert avifauna; birds of cultivation and degraded habitats. Economic ornithology. Avian extinctions - past and present, endangered and threatened birds. Avian community ecology and habitat selection. Sexual selection in birds. Bird migration. Bird census techniques.

Unit 3: Herpetology and Ichthyology

Systematics and zoogeography of amphibians and reptiles: Factors affecting distribution and abundance of amphibian and reptilian fauna of the Indian sub-continent. Biology of major Indian amphibians, fresh water and marine turtles, crocodilians, lizards and snakes. Thermoregulation, its role, aestivation, hibernation and other eco-physiological adaptations. Role of temperature in sex determination in reptiles. An overview of conservation problems and issues of herpetofauna of Indian sub-continent. Case studies. Classification and evolution of major groups of fishes in India. Ichthyogeography and diversity of freshwater fishes of India. Ecology and adaptation of fishes in different ecosystems. Economic importance of sport fishes of India. Threats and conservation perspectives of fish biodiversity in India as well as at global level. Threatened fishes of India. Methods to study ecology of fish diversity, abundance, growth and their habitats.

Unit 4: Entomology & Invertebrates

Introduction to Entomology: Insect taxonomy and diversity. Their living and non-living environment, economic importance, ecological roles, adaptation, Insects as indicator for biodiversity monitoring. Diversity patterns across biogeographic zones, provinces, regions and neighbouring countries. Insect fauna in prominent Indian PAs. Specific case 16 | Page studies on forest infestation by sal borer and other forest pests and their life cycle and management. Invertebrates: Classification and ecology of marine invertebrates especially corals, sponges, molluscs and echinoderms. Different types of coral reefs and their associated species. Ecological services and management of coral habitats in India.

WL-402: BIOGEOGRAPHY AND ECOLOGY

Unit – 1: Biogeography

History of biogeography, Ecology of dispersal and faunal exchange, barriers, mode of dispersal, origins and radiation, island biogeography theory. Historical biogeography, biogeographical processes, endemism, refugia. Continental drift; dispersal and vicariance biogeography; cladistics; dispersal mechanisms and dispersal barriers; reconciling distribution of fauna and flora. Applied Biogeography; biogeographical realms, provinces and ecoregions. The biogeographic affinities of the fauna and flora of the Indian subcontinent. India's biogeographic classification and Protected Area network.

Unit – 2: Fundamentals in Ecology

Basic concepts and structure of ecosystems: abiotic and biotic components; climatic and edaphic regimes; nutrients and minerals; producers, consumers and decomposers. Communities, populations, groups and individuals. Functioning of ecosystem: energy flow and nutrient cycles, Systems approach to ecological functioning. History of evolutionary thought; natural selection and speciation; evolutionarily significant units. Species concepts; biological, phylogenetic, evolutionary and ecological species concepts. Macroevolution, coevolution and mutualism.

Unit 3 Community Ecology

Definition and nature of communities; scale and approaches. Historical perspective in community ecology studies. Measurement of species richness; diversity; evenness. Community structure, organization and its stability (guilds, resource partitioning, niche, competitive exclusion). Factors governing species diversity. Models of competition; simple community models. Concept and measurement of niche. Trophic interactions; top-down and bottom-up processes. Null models and their application in ecology. Energy and productivity and its implications for species diversity. Functional diversity and food webs. Evolution of communities and neutral theory.

Unit 4: Population Ecology

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 ecology of plants, 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.

WL-403: WILDLIFE ECOLOGY AND CONSERVATION BIOLOGY

Unit 1: Conservation Biology

Introduction to conservation biology, values of biodiversity and conservation ethics, Patterns and process of biodiversity, losses and threats to biodiversity. Biological consequences of habitat fragmentation, covering barriers and isolation, crowding effect, local and regional extinctions, edge effects, changes in species composition and problem of climate change. Population genetics and conservation; community and ecosystem level conservation. Theories, planning and designing conservation reserves; scales of management and cultural context. Conservation outside protected areas. Control of invasive species. Significance of ecological restoration in conservation. Discussions: the role of zoos, aquariums and botanic gardens in conservation. Introduction/reintroduction and translocation.

Unit – 2: Forestry and Natural Resource Conservation

Philosophies of science, conservation and sustainable development. Concept of conservation with special reference to forest and wildlife management, conservation verses preservation. Introduction to forestry, principles of forest management, forest and wildlife as natural resources. Conservation movement in India, socio-economic and political realities, different phases of the conservation and how it has impacted people at large. Concept of stakeholders. International conservation bodies; IUCN UNDP, FAO, WWF. Natural resource economics: Need for integrating environment and economics, the economic reasons for over-exploitation of natural resources, ecosystem functions and services, cost and benefits of biodiversity conservation. Need for ecosystem service valuation. Remote sensing and wildlife photography.

Unit 3: Conservation Genetics and Wildlife Forensics

Introduction to Bio-molecules-DNA, RNA and Proteins; Central Dogma of Molecular Biology- Replication, Transcription and Translation; Mendelian Genetics- Mendal's Laws; Genetic Code- Characteristics and feature of genetic code; Molecular markers; PCR, DNA Sequencing, Genotyping; Allelic variation; Interpretation of genetic data; Application of genetics for wildlife conservation; Loss of genetic diversity, Resolving taxonomic uncertainties; Wildlife

Forensics- Overview, various forensic protocols for species identification, Molecular markers used in wildlife forensics; Wildlife forensics based on DNA analysis and morphometry; Wildlife crime case studies.

Unit 4: Wildlife Management

Interface between forest and wildlife management in India. Legal instruments for managing wildlife in India. Principles and practices of wildlife management. Course and fine filter approaches for wildlife management. Management of special habitats; riparian zones. Grasslands etc. Analysis of wildlife management problems in plantations and exploited forests; Indian and global scenario. Species conservation projects; tiger, lion, rhino, crocodile etc. Role of Biology in management. Management plan for Protected Areas: Forest working plans and wildlife management plans. Need for wildlife management planning. Principles of planning, objectives, resource surveys, analysis of surrounding region, management zones, theme plans, communications, staff and visitor amenities, monitoring. Financing protected areas.

WL-404: WILDLIFE HEALTH AND POPULATION MANAGEMENT

Unit1: Wildlife Health

Introduction to disease and epizootiology, Determinants of disease and disease transmission, Disease and population dynamics. Review of major viral, bacterial, protozoan, fungal and parasitic diseases of Indian wild mammals, birds, amphibians and reptiles. Non-infectious diseases- nutritional diseases, poisoning, stress, shock, capture myopathy, physical trauma. Emerging and re-emerging diseases. Zoonoses. Assessment of condition, health and 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 programmes.

Unit 2: Capture and handling of wild animals

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. Handling and transport of wild animals, designing sledge, crate and holding enclosures. Management and identification of animals in conflict, identification by natural marking, individual damage; behavioural idiosyncrasies etc, managing problem animals using passive marking collars, tags, branding, rings etc. Dynamic marking-beta light, radio-tracking-harnesses, collars; tele-metering of physiological parameters.

Unit 3: Conservation Breeding and Wildlife Utilisation

Captive breeding and Propagation: Founder population, rehabilitation, education, utilization, gene banks, Ex-situ and in-situ linkages, conservation breeding Management Plans, Role of scientific institution and NGOs in Conservation Breeding Programme. Principles: understanding biological requirements of species; design of facilities, food, hygiene, disease control, breeding. Propagation of threatened plants. Case studies on Conservation Breeding Programme of endangered wild animals. Wildlife Utilisation: Non-consumptive and consumptive utilization, their economic benefit. Game ranching and controlled off-take from wild population, rationale, management design, harvesting by management or hunting licences, marketing procedures. Use of wildlife products - skins, meat, musk, etc. Wildlife Tourism - objectives, planning, economics.

Unit4: Environmental Impact Assessment and Human dimensions in wildlife management

Introduction to Environmental Impact Assessment (EIA) and other emerging decision support tools historical perspective, scope and purpose of EIA. Salient features of important environmental legislation, statutory obligations, national environmental clearance procedures and factors affecting the success of EIA as a decision support tool. Procedural steps in generic EIA and adaptations for promoting biodiversity inclusive impact assessment. Mitigation objectives, approaches, hierarchy and feasibility analysis. Introduction to concepts of biodiversity offsets. Introduction to some recent approaches of economic valuation of impacts and monetising values of environmental goods and services. Park-people interface conflict and objectives of human dimensions in management; Ecodevelopment-what, why, where, and whether; Community participation; ConservationDevelopment linkages; Livelihood analysis; Stakeholders in conservation; Conflict management; PA-People Mutual Influence Zone Analysis and village prioritization for pilot ecodevelopment projects; Project planning, monitoring and evaluation.

WL – 405 PR : Practicals based on papers TOX-S 401 and 402

WL – 406 PR : Practicals based on papers TOX-S 403 and 404

WL – 407PT : Dissertation and Viva – voce

WL – 408S : Seminars and Industrial/field visits

WL – 409M : Assignments and Group Discussions