

DETAILED COURSE CONTENTS (SYLLABI) OF THE COURSES OFFERED (JAN-JUNE, 2019)
FOR M.SC ENVIRONMENTAL SCIENCES

SEMESTER- II

ENV 408 - Biodiversity and Wild Life Management

[2 Credits]

Unit I: Introduction to Biodiversity

Biodiversity- Concept; Levels- Brief account of Genetic, Species and Ecosystem Diversity; Major bio geographic zones of India- Biodiversity of Trans-Himalayan zone, Himalayan zone, Indian desert, Semi Arid, Deccan Peninsula, Gangetic Plain, North –East India, Islands and Coasts.

Unit II: Vegetation of India

Forest vegetation- Tropical, Montane subtropical, temperate and Alpine forests; Grassland vegetation; measuring biodiversity-Alpha, Beta and Gamma diversity.

Unit III: Biodiversity Hot Spots and Threats

Concept of Biodiversity hot spots, brief account of Indian Biodiversity hot spots; threats to Biodiversity-causes of extinction, IUCN Red Data Books.

Unit IV: Biodiversity and Wild Life Conservation

Present scenario of Biodiversity and wildlife conservation in India; National Parks, Biosphere Reserves and sanctuaries; Keystone species in conservation strategy, endangered wildlife special projects-Tiger, Gir-Lion projects, National Biodiversity Authority; International approaches for conservation of Biodiversity- IUCN.

ENV 432 - Introduction to Statistical Techniques

[4 Credits]

Unit I: Variables and Frequency Distributions

Population and Sample; Variables: Discrete and Continuous, Raw Data, Arrays and Frequency Distributions, Histograms and Frequency Polygons, Relative-Frequency Distributions, Cumulative-Frequency Distributions and Ogives.

Unit II: Descriptive Statistics

Mean, Median and Mode; Root Mean Square, Quartiles, Deciles, and Percentiles; Range and IQR, Standard Deviation and Variance, Skewness and Kurtosis

Unit III: Probability and Probability Distribution

Elementary Probability Theory and Probability Distribution, Probability Distributions: Binomial, Normal, and Poisson Distributions

Unit IV: Sampling Theory and Hypothesis Testing

Elementary Sampling Theory, Statistical Estimation Theory, Hypothesis testing, Confidence levels, Type-I and Type-II Errors, Student's t-test, Analysis of Variance, χ^2 test

Unit V: Correlation and Linear Regression

Correlation and Linear regression

ENV 424 – Fundamentals of Remote Sensing

[2 Credits]

Unit I: Introduction to remote sensing

What is Remote Sensing and its different elements, Use of remote sensing in environmental monitoring, Electromagnetic Radiation, Electromagnetic Spectrum, Interactions with the Atmosphere Passive vs. Active Sensing

Unit II: Sensors

Different platforms used in remote sensing: Ground, air and space, Satellite Characteristics, Pixel Size and Scale, Different Resolutions, Cameras and Aerial Photography, Different Satellites, Other Sensors, Characteristics of Images

Unit III: Microwave remote sensing

Introduction to microwave remote sensing, Radar Basic, Viewing Geometry & Spatial Resolution, Airborne vs Spaceborne Radars, Image Analysis: Visual interpretation & Digital analysis, Elements of visual interpretation.

Unit IV: Applications

Applications: Environmental impact assessment, Agriculture, Glaciology, Forestry, Geology, Hydrology, Sea Ice, Land Cover, Oceans & Coastal

ENV 422- Basics of Natural Resource Conservation

[2 Credits]

Unit I

Introduction to Natural Resource Bases, Concept of resource, classification of natural resources, Factors influencing resource availability, distribution and uses, Need for Conservation of Natural Resources, Current status of natural resources.

Unit II

Water Resources, degradation of water, conservation of water, Wildlife, need and methods for the conservation of wildlife, wildlife reserves in India and legislation for wildlife conservation, Ocean, Land Resources, Minerals, Soil Erosion Causes of soil Erosion Conservation of Soil

Unit III

Biological Resources, Biodiversity, importance of biodiversity, threat to biodiversity, conservation of biodiversity, Energy, Types of energy resources, conventional and non conventional source of energy, bio fuel and its advantages, Human Resource.

Unit IV

Conservation of Natural Resources and Traditions of India

Unit V

Management of Common International Resources: Ocean, climate, International fisheries and management commissions; Antarctica: the evolution of an international resource management regime.

ENV 436 - Environmental Sciences Laboratory – II

[2 Credits]

Laboratory Experiments based on the theory courses to be taught in Semester-II

ENV 535 - Natural Hazards

[2 Credits]

Unit I: Introduction to Natural Hazards

The concept of natural processes and hazards, difference between natural hazards and disaster, Definition and classification of natural hazards on the basis of its occurrence and origin. Phases of a Hazard/Disaster. Effects of Hazards. Prevention, Mitigation and Preparedness.

Unit II: Atmospheric Hazards

Tropical Cyclones, Tornadoes, Blizzards, Hail Storms, Severe Thunderstorms, Extreme Temperatures , cloud burst and temperature inversion.

Unit III: Geologic Hazards

Earthquakes, Volcanic Eruptions, Tsunami, Landslides, Land Subsidence, Mass-movement, Mudslides Avalanches

Unit IV: Hydrologic Hazards

Floods: Definition, types of flood; Areal, Riverine (Channel), Estuarine and coastal, Urban flooding and Catastrophic, Causes, Effects and Mitigation measures. Drought: Causes of drought, Types, consequences and mitigations. Hydrological hazards related to Glacial Lake outburst flood and due to Rapid glacier advance & Retreat.

Unit V: Other Hazards

Wild Fire, Biological hazards: Fungal disease, Bacterial, viral and protozoal diseases, Shifting sand/ Sink Holes, Technological hazards, Lightning strike, locust attacks, meteorite fall etc.

ENV 569 - Environmental Pollution and Health issues

[2 Credits]

Unit I

Brief introduction about environmental pollutants and their detrimental effects. Endocrine Disrupting Chemicals [Phthalate, Bisphenol A, lindane , Dioxins & furans, Poly-chlorinated biphenyls (PCBS), Atrazine, Penta chloro phenol(PCP), DDT and metabolites , Nonylphenol (NP), drugs, heavy metals (arsenic, lead, cadmium , mercury)]: sources, uses, health effect with detail biological mechanism [e.g. Hormone Mimicry, Blocking Hormone Receptors, Altering Hormone Metabolism].

Unit II

Water Pollution and Human Health. Pollution by microplastic, microbeads, microfibers: Sources, distribution, environmental impact. Effect of microplastic in ocean health and mechanism of pollution. Deleterious Effect in food chain, on Plankton and on corals health. Ocean pollution- a threat to human health. Way out and Governmental Policies.

Unit III

Radiation and Human Health, different sources of exposure of Radiation to human beings- atomic, ultraviolet, electromagnetic radiation. Impacts of Radiation on Human Health. Basic mechanism of radiation's effect on human health.

Unit IV

Heavy metal contamination [Hg, Cd, As, Pb, Cr]: sources, uses, health effect with detail biological mechanism. Source, distribution and effect of Mono Sodium Glutamate (MSG) in human health.

Unit V

Noise Pollution: Sources and Magnitude, Noise Standards, Biomedical aspects of Noise Pollution.

c solar cell.