



हिमाचल प्रदेश केंद्रीय विश्वविद्यालय

CENTRAL UNIVERSITY OF HIMACHAL PRADSEH

(Established under Central Universities Act 2009)

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DETAILED COURSE CONTENTS OF THE COURSES

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.

Unit II: Biogeographic Regions of India

Major biogeographic 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 III: Vegetation of India

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

Unit IV: 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 V: 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 411 - Waste Management

[2 Credits]

Unit I: Classification of waste

Solid waste, liquid waste, Biodegradable and non biodegradable solid waste, Hospital and Pharmaceutical Waste, E-waste: Sources, generation, chemical composition, classification, Health hazards, Environmental impacts

Unit II: Waste minimization technologies

Framework for Solid Waste Management; Reuse/ recycling of Reuse and Recycling of different types of waste: Recycling of waste paper, plastics, landfill, other management techniques

Unit III: Waste Water Management

Technological Options at Household Level Management, Kitchen Garden with Piped and without Piped Root Zone System, Leach Pit.

Unit IV: Technological Options at Community Level Management

Sustainable technologies of waste management at Panchayat Level and local level; Case studies, opportunities in waste management.

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

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 501- Environmental Pollution and Human Health

[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, organophosphorus pesticides, 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

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 III

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 IV

Heavy metal contamination: sources, uses, health effect with detail biological mechanism. Noise pollution: sources, uses, health effect with detail biological mechanism.

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 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

FOUNDATION COURSES

1. Human Making Course

ENV 508 Environmental Ethics

[2 Credits]

Unit I

Environmental Ethics: Definition. Principles. Need of the subject at present time. Moral standing. Human responsibilities towards nature, environment and other species. Anthropocentric ethics, intrinsic and instrumental values. Our relationship with nature/environment. The view from a human-made wilderness. Vital questions to be asked. Thinking with Ethics.

Unit II

Improving nature- from Biblical Tradition to John Locke. Aldo Leopold and "The land ethic". Liberation for animals. Holism, Scientism, and other pitfalls. Social construction of nature. Human impact on the environment. Population, development and environmental impact. Earth overshoot day. Social issues and Environment. Relevance of Environmental ethics to environmental protection.

Unit III

Environments as hazard. Beyond risk-The political economy of Hazards. The state of the World Environment: Significant global environmental issues. Examining both the nature of the issues and their causes. Climate change and air quality. Recent incidents due to climate change and their effect. Eco-biological effects of Climate change. Effect and consequences of climate change on Ecosystem and on Biodiversity. Climate migration and Socio-economic effect.

Unit IV

Ethics, Justice and Equity. Overcome the Anthropocentrism and Responsibility. Political economy- Killing of atmosphere, deforestation, E-waste. International and National efforts for Environmental Protection. Public environmental awareness. Sustainable living.

2. Skill Development Course

ENV 553 Environmental Thermodynamics

[2 Credits]

Unit I: Introduction to Thermodynamics

Fundamental Concept: Thermodynamic terms, Thermodynamic variables, Thermodynamic Process, Laws of Thermodynamics, State of equilibrium, Thermodynamic functions, state functions (with differential equations).

Unit II: The First Law of Thermodynamics

The energy concept, Physical significance of internal energy, work done in a system, path function, Heat capacities, Enthalpy, Important thermodynamic relations based on first law of Thermodynamics, calculations of Thermodynamic quantities.

Unit III: The second Law of Thermodynamics

Relevance of the Second Law, Carnot's cycle, Concept of Entropy, Combined form of First and Second Laws of Thermodynamics, Thermodynamic relations based on Second Law, Calculation of entropy changes, Entropy changes for isolated system.

Unit IV: Third Law of Thermodynamics

Third law of Thermodynamics and evaluation of absolute energy, Concept of residual entropy, entropy at equilibrium.

Unit V: Application of Thermodynamics

Problem solving