



हिमाचल प्रदेश केंद्रीय विश्वविद्यालय

CENTRAL UNIVERSITY OF HIMACHAL PRADSEH

(Established under Central Universities Act 2009)

PO Box: 21, Dharamshala, District Kangra - 176215 (HP)

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DETAILED COURSE CONTENTS OF THE COURSES

SEMESTER –IV

ENV 575 – M.Sc. Dissertation

[6 Credits]

The work will be based on the specialization of respective supervisor

ENV 537- Environmental Engineering

[2 Credits]

Unit I

Mass and Energy Transfer: Concentrations and other units of measure, Material Balance, Thermodynamics, Chemical Equilibrium

Unit II

Air, Water and Their Impurities: Air and the Atmosphere, Water and the Hydrosphere, Water Pollutants, Air Pollutants

Unit III

Air Quality Engineering: Air Pollutant Emissions and Controls, Pollutant generation by combustion: Motor vehicle emissions, Treatment Technologies: Particle control devices, Absorption for gaseous pollutant

Unit IV

Water Quality Engineering: Water Quality Regulations and Treatment Systems, Physical Treatment Methods, Chemical and Physicochemical Treatment Methods, Biological Waste Water Treatment

Unit V

Global Climate Change and Geo-engineering: Green House Effect, Radiative Forcing, Global warming Potential, Global Energy Balance, Global Warming, Climate Change, Mitigation Strategies, Geo-engineering

ENV 428 – Himalayan Geology

[2 Credits]

Unit I

4 hrs

Introduction, importance and significance of Himalaya, their morphology, What is faults, folds, their definitions and their types and classifications.

Unit II

4 hrs

Internal structure of Earth, Internal structure of Earth, fundamental characteristics of crust, mantle, core; fundamentals on rock-forming minerals; weathering and erosion of rocks and minerals. Concept of plate tectonics, types of plate boundaries, features of convergent and divergent boundaries, causes of plate motion, dynamic evolution of continental and oceanic crust, Sea floor spreading, morphological features of ocean floor.

Unit III

4 hrs

Sedimentary rocks their types and classification, metamorphic rocks their classifications. Geosynclines: Classification and evolution of Geosyncline, causes of subsidence and upliftment.

Unit IV

4 hrs

Origin of Himalayas, different phases in evolution of Himalaya. Study of major groups and formations of Himalaya, lithology and thrust boundaries – HFF (Himalayan frontal fault), MBT (main boundary thrust), MCT (main central thrust), STD (south Tibetan detachment), indo-Tsangpo suture zone.

Unit V

2 hrs

Earth's Earthquake seismology, palaeoseismology, seismites, Seismology: seismic waves, intensity and isoseismic lines, earthquake belts. Earthquake zones of India, Seismograph, causes of earthquake in Himalaya.

Unit I

4 hrs

Introduction to Disaster Management, Farmer curve showing significance and frequency of different natural disaster, Scope and Objectives of Disaster Management, Disaster Managers, Elements of Disaster Management

Assignment-1: To prepare historical archive of Cyclone for last 20 years and their disastrous effects

Assignment-2: To prepare historical archive of Flood disaster in India for the last fifty years and their disastrous effect

Unit II

4 hrs

Concepts and Terms in Disaster Management, Natural Disasters, Man-made Disasters, Disaster Victim, Disaster Relief Systems, Phases of Disaster Response, Phases of Relief Operations, Case study of Kashmir Flood 2014.

Assignment -3: list different earthquake of Himalayan region with their magnitude and explain the disastrous effect of 1905 Kangra earthquake

Unit III

4 hrs

The Hyogo Framework for Action 2005-2015: Building the Resilience of Nations, and Communities to Disasters : Case study of earthquake disaster and landslide disaster

Assignment-4 Write down about Yokohama strategy and plan of action for the safer world

Unit IV

4 hrs

The Tools and Methods of Disaster Management, Prevention and Mitigation Tools, Preparedness Tools, Tools of Post-Disaster Management, Case studies

Assignment -5: write down different methods to be used for mitigation of landslide and earthquake disaster as a preparedness part of disaster management cycle.

Unit V

4 hrs

Technologies of Disaster Management, Mapping, Aerial Photography and Remote Sensing Communications, Information Management, Logistics, Epidemiology

ENV 583 – Soil Science

[2 Credits]

Unit I

Inorganic and organic components of soils. Biogeochemical cycles – nitrogen, carbon, phosphorus and sulphur.

Unit II

Weathering including weathering reactions, erosion, transportation and deposition of sediments. Soil forming minerals and process of soil formation, Identification and characterization of clay minerals.

Unit III

Soil physical and chemical properties, soil types and climate control on soil formation, Cation exchange capacity and mineralogical controls.

Unit IV

Geochemical classification of elements, abundance of elements in bulk earth, crust, hydrosphere and biosphere. Partitioning of elements during surficial geologic processes, Geochemical recycling of elements. Paleoclimate

ENV 509 - Glaciology

[04Credits]

Unit I: Glaciology Introduction:

Types of glacier, Transformation of snow to ice, Conditions favourable for glacier formation, Glacier systems, Structure and morphology of glaciers, Glacial erosion, Landscape evolution and different glacial landforms

Unit II: Glacier Mass Balance and Processes

Surface mass balance, Mass balance variations of mountain glaciers, Englacial mass balance, Basal mass balance, Mass loss by calving, Methods of determining glacier mass balance.

Unit III: Glacier Hydrology

Surface hydrology, Englacial hydrology, Subglacial Hydrology, Runoff from glaciers, Methods of determining glacial runoff, Glacier and water resources

Unit IV: Recent Advances in Glaciology

Glacial remote sensing, Reaction of glaciers to environmental changes, Glacier Hazards, Palaeo – climatology, Glacial surges, Different instruments used for studying glacier change

Unit V: Status of Glaciological Research

A global overview, Indian scenario, Polar Research (Arctic and Antarctic scientific expeditions)

ENV 586 Nano-Techniques and Applications in Environment

[04 Credits]

Unit I

Introduction to nanomaterials, properties of materials & nanomaterials, role of size in nanomaterials, 0D, 1D, 2D structures – size effect – fraction of surface atoms – specific surface energy, different classes of nanomaterials quantum dots, wells and wires.

Unit II

Physical method of synthesis of nanoparticles, chemical Routes for Synthesis of Nanomaterials: Chemical precipitation and co-precipitation, chemical vapordeposition (CVD), nucleation and growth of nanoparticles, synthesis of metal and semiconductor nanoparticles by colloidal route, microemulsions

Unit III

Experimental Techniques: Scanning and Transmission electron microscopy, difference between SEM and TEM, X-ray diffraction, Scherrer equation and its limitation and other characterization techniques.

Unit IV

Advanced nanomaterials for drug delivery and cancer therapy, dye sensitized photovoltaic solar cell, catalysis and other applications.

ENV 587* Regional (Indian) Environmental Policies

[04 Credits]

Unit I

Environmental issues related to water resource projects - Narmada dam, Tehri dam, Almatti dam, Cauvery and Mahanadi, Hydro-power projects in Jammu & Kashmir, Himachal and North-Eastern States, National Mission for a 'Green India'.

Unit II

Development of watersheds, Rain water harvesting and ground water recharge. National river conservation plan – Namami Gange and Yamuna Action Plan. Eutrophication and restoration of lakes. Conservation of wetlands, Ramsar sites in India.

Unit III

Chipko movement, Appiko movement, Silent Valley movement and Gandhamardhan movement. People Biodiversity register. Wild life conservation projects: Project tiger, Project Elephant

Unit IV

Crocodile Conservation, GOI-UNDP Sea Turtle project, Indo-Rhino vision. Carbon sequestration and carbon credits. Waste Management – Swachha Bharat Abhiyan.

Unit V

Minnamata Disaster- 1956, Love Canal Disaster, Bhopal Gas Disaster-1984, Chernobyl Disaster-1986, Fukushima Daiichi nuclear disaster-2011, Three miles island tragedy-1979, [Seveso disaster-1976](#).