

Department of Civil Engineering
Major Courses for Environmental Engineering
Content
List of Major Courses for Environmental Engineering

Sr. No.	Semester	Name of Course	Teaching Scheme	Duration	Instructor	Organizing Institute	Credits
01	V	Planning for Sustainable Development	4hrs/week	12 Weeks	Prof. Bhanu Prakash Vellanki	IIT Roorkee	04
02		Municipal Solid Waste Management	4hrs/week	12 Weeks	Prof. Ajay Kalamdhad	IIT Guwahati	04
03	VI	Air Pollution Control	4hrs/week	12 Weeks	Prof. Brajesh Kumar Dubey	IIT Kharagpur	04
04		Environmental Impact Assessment and Life Cycle Analyses	4hrs/week	12 Weeks	Prof. Brajesh Kumar Dubey	IIT Kharagpur	04
05	VII	Disaster Preparedness & Planning Management	4hrs/week	12 Weeks	Prof. B Bhattacharjee	IIT Delhi	04

I) Course : Planning for Sustainable Development

Semester : V

Instructor: Prof. Bhanu Prakash Vellanki

Content :

- Place-making and design
- Community engagement
- Spatial planning at various different scales
- Environmental awareness
- Development and growth in rural and urban areas
- Legal and political know-how
- Technical competence and a deep understanding of the realities of sustainable development.

II) Course : Municipal Solid Waste Management

Semester : V

Instructor: Prof. Ajay Kalamdhad

Content :

- Evolution of Solid Waste Management
- Sources/Types and Characteristics of Solid Waste
- Generation of Solid Waste
- Waste Handling, Separation, storage, and Processing
- Collection of Solid Waste
- Transfer and Transport
- Separation and processing of Solid Waste
- Chemical Transformation (combustion/incineration)
- Biological Treatment (Composting)
- Biological Treatment (Anaerobic Digestion)

- Disposal of Solid Waste
- ISWM and legislation

- **III) Course : Air Pollution Control**

Semester : VI

Instructor: Prof. Mukesh Sharma

Content :

- Introduction to Atmosphere, Air Pollution Systems, Air Quality Standards, Types and Forms of Air Pollutants, Measurement Units and Particulate classification, Interpretation and Particle size Distribution, Atmospheric formation of Air Pollutants, Kinetics of Air pollution and combustion processes, Internal Combustion Engine and Air Pollution
- Air Pollution and Health, Emission Inventory, Sources of Air Pollution, Emission from Fugitive Sources and Sulfuric Acid Production, Aluminium Production and Air, Coke Production and Air Pollution
- Meteorological Measurements and their interpretation, Dispersion Modeling, Vertical Temperature Profile of Atmosphere, Stability, Mixing Height and Plume Behavior, Solar Radiation Based Stability Calculation
- Air Quality Modeling, Derivation of Gaussian Model, Gaussian Model - Useful Formulation, Plume rise, Area and Line Source Model, Air Quality Modeling - Maximum Ground Level concentration, Examples of Air Quality Modeling, Air Pollution Control Devices, Source Emission Monitoring, Receptor Source Modeling, Environmental laws

IV) Course : Environmental Impact Assessment and Life Cycle Analyses

Semester : VI

Instructor: Prof. Brajesh Kumar Dubey

Content

- Life Cycle Assessment – Introduction, LCA and Sustainability, LCA and Environmental Systems, LCA and Water, Food and Energy
- RISK Assessment and LCA Frameworks, RISK Assessment - Toxicology RISK Assessment Methods, RISK Assessment Methods, Environmental Risk Assessment
- Environmental Data Collection and LCA Methodology, LCA - A Detailed Methodology, LCA Benefits and Drawbacks, History of LCA, The ISO Framework
- Unit Process, Data and LCI Databases, Unit Process and System Boundary, Inventory Data and LCIA, LCIA, LCA Interpretation
- ISO 14040, Key Points of a Good LCA and Example LCA, Chemical Release in Environment, Green Sustainable Materials, Green Sustainable Materials,
- Design for Sustainability, Sustainable Engineering Design Principles

V) Course : Disaster Preparedness & Planning Management

Semester : VII

Instructor: Prof. Brajesh Kumar Dubey

Content

- Hazard, Risk, Vulnerability, Disaster Meaning, Nature, Importance,, Dimensions & Scope of Disaster Management, Disaster Management Cycle
- Natural Disasters- Meaning and nature of natural disasters, their types and effects, Hydrological Disasters - Flood, Flash flood, Drought, cloud burst, Geological Disasters- Earthquakes, Tsunamis, Landslides, Avalanches, Volcanic eruptions, Mudflow
- Disaster Preparedness: concept and significance , Disaster Preparedness Measures, Institutional Mechanism for Disaster Preparedness, Disaster preparedness with special needs/ vulnerable groups, Disaster Preparedness: Policy and Programmes
- Concept and Significance of Disaster Preparedness Plan, Disaster Preparedness Plan essentials, Community Based Disaster Preparedness plan, Prediction, Early Warnings and Safety Measures of Disaster
- Role of Information, Education, Communication, and Training, Role of Government, International and NGO Bodies, Role of Information Technology (IT) in Disaster Preparedness, Role of Geographers on Disaster Management
- Essential Components of Disaster Response, Disaster Response Plan, Resource, Management- Financial, Medical, equipment, communication, Human, transportation, Food and essential commodity (Identification, Procuring, Propositioning and deployment), Directing and controlling functions, Communication, Participation & activation of Emergency Preparedness Plan, Logistics, Management, Emergency support functions, Need and damage assessment
- Disaster Response Plan - Communication, Participation, and Activation of Emergency, Preparedness Plan, Search, Rescue, Evacuation and Logistic Management