Teachers Mannual

ENVIRONMENTAL SCIENCES

For

Diploma Level Courses

For Department of Technical Education
Govt. of Uttarakhand

ALTERNATE HYDRO ENERGY CENTRE
INDIAN INSTITUTE OF TECHNOLOGY, ROORKEE

September 2007

About The Course

At the workshop held in October 2006 Under "Leveraging Rick Potential of Water an Hydro Resources in Uttarakhand", at Indian Institute of Technology, Roorkee recommendation to introduce an Awareness Course in Environmental Science within ongoing Education Programmes, was made.

Subsequently it was felt that course material for the Teachers involved in teaching of the course is required. A Short Term Course was also held at Roorkee in May 2007 for Teachers of Polytechnics in Uttarakhand.

An effort was therefore made to prepare the course material as per defined syllabus and the same is presented here. The course material has been described in seven chapters as below:

Chapter 1: Introduction to Environment
Chapter 2: Introduction to Biological Systems
Chapter 3: Fundamental of Ecology
Chapter 4: Environmental Pollution
Chapter 5: Natural Resources and Concept of Sustainability
Chapter 6: Environmental Issues of Global Concern
Chapter 7: Existing Policies and Regulations

Each chapter has been covered as per the requirement and the portion to be covered in every lecture has been indicated. The first page of every chapter defines the lecture details.

It is left to the teachers whether they teach in the conventional manner in the class or takes help of over head projection facilities or uses computer aided power presentation. The material for over head projection slides also have been indicated for one lecture in each chapter.

As the course is interdisciplinary, sustained effort is necessary to update the course.

The case histories required under the chapter eight has been left for the teachers to pick up from the vicinity. They may take students alongwith them to the sites to appraise them with the existing State of Environment. These projects could be of:

- Management of Lakes
- Management of Rivers
- Management of Slopes, Soil erosion and catchment basins
- Environment Impact Assessment of Industries, commercial/residential complexes/ Roads
- Water Pollution Studies
- Air Pollution Studies
- Warmi Composting
- Management of biomedical wastes
- Low cost sanitation programmes
- Disposal of solid and liquid wastes

FOR ENGINEERING DIPLOMA LEVEL COURSE

1. Course Title: Environmental Science

2.* **Contact Hours:** **L:** 48 **T:** 0
P: 0

3.* **Examination Duration (Hrs.): Theory:**
Practical:

4.* **Relative Weightage :** **CWS**
PRS **MTE**
ETE
PRE

5.* **Credit:**
Semester:

Autumn **Spring** **Both**

7.* **Pre-requisite:** NIL

8. Details of Course:

Sl. No.	Particulars	Contact Hours
1.	Introduction To Environment: Definition and scope, components of environment, atmosphere, hydrosphere, lithosphere and biosphere, structure and composition	5
2.	Introduction To Biological Systems: Life systems, pro and eukaryotic organizations, Metabolic principles; types of plants and animals. Producers, consumers and decomposers.	6
3.	Concept of Ecology: Terminology and approach, ecosystem, types of ecosystems; structure and function, mineral cycling, energy flow and trophic chains. Development and evolution.	8
4.	Environmental Pollution: Sources, causes, assessment, effect, prevention and control of water pollution, air pollution noise and land pollution.	7
5.	Natural Resources: Strategies of management, concept of sustainability. Energy and environment and their relationship with human activities. Water Resources and utilisation, forest resources.	6
6.	Global Environmental Problems: Human health, settlements, management of rivers, lakes, forests, wild life and catchments. Role of society, NGO and Govt. agencies. Concept of urbanization and green cities Global Warming, green house causes and effects, carbon sequestration.	3
7.	International agreements and protocols, National forest policy and Environmental laws and acts. EIA	4

8.	Some important case histories of environmental degradation.	3
9.	Suggested Field Work – Visit to local area to document to document environmental assets – river/grassland/hill/mountain. Visit to local polluted area (Industrial/agriculture/urban/rural).	

CONTENT

LIST OF FIGURES

LIST OF TABLES

CHAPTER – 1.0

INTRODUCTION TO ENVIRONMENT

(Total Lectures Five)

Lecture No. 1 :	Concept and components of environment, atmosphere, hydrosphere and lithosphere. Pyramid of life (Fig. 1.1), major environmental problems (P^3 Syndrome) (Fig. 1.2) Composition of atmosphere, homosphere and heterosphere.
Lecture No. 2 :	Thermal structure of atmosphere (Fig. 1.3), Flow of energy through atmosphere (Table 1.1 and Fig. 1.4), Green house effect, Earths albedo, Wind rose.
Lecture No. 3 :	Hydrosphere, Global Water Resources (Table 1.2), Hydrologic Cycle (Fig. 1.6) and Annual Water Resources of India (Fig. 1.7).
Lecture No. 4 :	Water Quality, Important water quality parameters, National water quality criteria.
Lecture No. 5 :	Lithosphere, minerals, rocks (Rock Cycle Fig. 1.8), Soils, Soil profile (Fig. 1.9), Soil map of India (Fig. 1.10).