Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2022-2023

Course Handout Part II

29-08-2022

In addition to Part-I (General Handout for all courses appended to the timetable), this portion gives further specific details regarding the course.

Course No.	: **CE F323**
Course Title	: **Introduction to Environmental Engineering**
Instructor-in-Charge	: **Murari R R Varma**

Course Objectives:

- Identify important components of our natural environment and the impact on them due to anthropogenic interventions.
- Recognize how culture, societal factors and economics frame environmental issues.
- Introduce types of problems commonly encountered by environmental engineers and/ recognize the role of environmental engineers in society.
- Use the mass balance equation to estimate pollutant concentrations in simple open and closed environmental systems.
- Apply fundamental principles of chemistry and physics to model the fate of pollutants in the environment (air and water).
- Improve communication and teamwork skills through undertaking individual written assignments, working on a group project, and delivering a group presentation
- Acknowledge the need for life-long learning to keep abreast of emerging environmental issues and policies.

Course Learning Outcomes:

At the end of the course, the student will be able to

1. Explain characteristics of pollutants in air, water and land and interpret the significance in each environmental system.
2. Solve simple problems on water pollution in natural systems.

3. Apply the relationship between meteorology and air quality by using the Gaussian plume model to solve simple problems.
4. Identify elements of municipal solid waste management and evaluate suitable waste management options.
5. Demonstrate the importance of monitoring and auditing anthropogenic activities and demonstrate an understanding project clearance process, the authorities and the EIA process.

Textbooks:

T1. Masters, G. M., & Ela, W. P. (2015). *Introduction to Environmental Engineering and Science; Pearson New International Edition.* Pearson Education Limited.

Reference books:

R 1. Davis, M. L., & Cornwell, A. D. (2014). *Introduction to Environmental Engineering.* New Delhi: McGraw Hill Education. Fifth Edition

R 2. Peavy, H. S., Tchobanoglous, G., & Donald, R. R. (2017). *Environmental Engineering.* New Delhi: McGraw-Hill Education India Pvt. Limited. Indian Edition

R 3. Lecture notes, Relevant legislation, journals, and online materials

Course Plan:

Lecture No.	Topics to be covered	Learning objective	Chapter/s in the Text Book	SLO's*
1-2	Basic units of measurement in environmental Engineering, Overview of various environmental Systems	Interpret various environmental systems in our physical environment;	Ch. 1 of T1.	a, f, h, i, j
3-5	Conservation of mass of and energy, mixing, reaction and decay processes, basic reactors	Apply simple material balances to model environmental systems and relate them to basic reactors; Interpret rates of change in environmental and human systems	Ch. 2 of T1, Ch.2 of R1	a, c, e
6-14	Origin of surface and groundwater resources and their characteristics; Causes of pollution; Water quality management in Lakes, Rivers and Groundwater; Mathematical models to predict water quality of these resources, Computer applications	Illustrate various sources of water and their stressors (pollutants); Identify parameters for describing water quality; Demonstrate different mechanisms controlling the fate of contaminants in groundwater: Make use of simple mathematical models to solve simple problems on water pollution in natural systems	Ch. 5 of T1; Ch. 4,7 of R1.	a, c, e, j, k
15-21	Basic definitions, Meteorological aspects, Criteria Pollutants,	Interpret criteria air quality data; Classify sources of pollution and pollutants; Describe	Ch. 7 of T1; Ch. 9 of R1.	a, c, e, j, k

	Gaussian model, Unit operations, Computer applications	the effect of meteorological parameters air pollution; Apply the Gaussian dispersion model to solve simple indoor and outdoor air pollution scenarios; Demonstrate the choice of various control strategies for stationary and mobile sources of air pollution		
22-28	Basic definitions; Source Reduction, Collection and Transfer Operations, Treatment, Recycling and Recovery and Disposal of Solid waste.	Identify the various types of solid wastes and their sources; Make use of the characteristics of municipal solid wastes to choose appropriate waste management options; Demonstrate understanding of factors affecting the waste generation and storage and collection systems; Outline the working principles of composting, sanitary landfills and energy recovery facilities.	Ch. 9 of T1; Ch. 11 of R1	a,c,e, j, k
29-33	Basic definitions; Sound levels from several sources; Impacts; Control strategies. Basics of ionizing radiation, sources, exposure and protection	Explain concepts of level in noise measurements; Illustrate the relationship between frequency, noise level and Loudness; Outline various methods of Noise Pollution Control, Explain the measurement of Radioactive Pollution; Mention sources and problem in radioactive Pollution	Ch. 10, 14 of R1;	a, j, k
34-37	Basic definitions; Methodologies; Applications using case studies. Industrial site selection criteria, EIA case studies	Define and describe the primary environmental regulations, and discuss how regulations affect engineering practice.	R 3 and R4.	f, g, h, i, j, k
38-42	Significance of Risk Assessment, Perception of Risk, Methodology and prediction	Define and Illustrate concepts in EIA like Impact, terms of reference, baseline data, EMP etc.; Examine simple case examples. Assess and Justify the need for EIA based on existing regulations in India	Ch. 4. of T1,	a,c,h

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid Semester Test	90 min	30	31/10 11.00 - 12.30PM	Open book
Quiz[&]	TBA[#]	15	To be announced	Open Book
Term paper	TBA[#]	10	To be announced.	Open Book

Mini Project	TBA#	10	To be announced	Open Book
Comprehensive Exam.	180 min	35	17/12 AN	Open Book

To be announced.

&. In the case of *quiz*, a minimum of n+1 quizzes are planned. The best marks of n quizzes will be considered.

* Student Learning Outcomes (SLOs):

SLOs are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

(a) an ability to apply knowledge of mathematics, science and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Chamber/Online Consultation Hour:

With prior appointment on through **email only**. Kindly do not message for appointments through social media.

Notices:

Notices concerning the course will be displayed on ***CANVAS*.**

Academic Honesty and Integrity Policy:

Academic honesty and integrity are to be maintained by all the students throughout the semester and any type of academic dishonesty is not acceptable.

Make-up Policy:

Please avoid frivolous make-ups. Makeup for quizzes will not be considered. Only in cases of medical emergency where a candidate is physically debilitated, they may be considered. In such cases of issues of medical emergencies, requests have to be supported by valid certificates.

INSTRUCTOR-IN-CHARGE
CE F323