



FIRST SEMESTER 2020-2021

Course Handout Part II

17-08-2020

In addition to part-I (General Handout for all courses appended to the time table) 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 its impact of 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 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 EIA process.



Textbooks:

T 1.

Masters, G. M., & Ela, W. P. (2013). *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.

R 2. Peavy, H. S., Tchobanoglous, G., & Donald, R. R. (2013). *Environmental Engineering*. New Delhi: McGrawhill Education India Pvt. Limited

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

R 4. Reddy M, A. (2013). *Environmental Impact Assessment: Theory and Practice*. BS Publications.

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, Over view of various environmental Systems	Interpret various environmental systems in our physical environment;	Ch. 1 of T1.	a, f, h, i, j
3-4	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
5-14	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 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; Source Reduction, Collection and Transfer Operations, Treatment, Recycling and Recovery and Disposal of Solid waste. Industrial	Identify the various types of solid wastes and their sources; Make use of the characteristics of municipal solid wastes to choose appropriate waste	Ch. 9 of T1; Ch. 11 of R1	a, c, e, j, k



	and Hazardous wastes.	management options; Demonstrate understanding of factors affecting waste generation and storage and collection systems; Outline the working principles of composting, sanitary landfills and energy recovery facilities.		
22-28	Basic definitions, Meteorological aspects, Criteria Pollutants, Gaussian model, Unit operations, Computer applications	Interpret criteria air quality data; Classify sources of pollution and pollutants; Describe 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	Ch. 7 of T1; Ch. 9 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
34-38	Significance of Risk Assessment, Perception of Risk, Methodology and prediction	Explain the concept of risk and stages of Risk assessment; Make use of the concepts of CDI and potency factor to evaluate risk	Ch. 4. of T1,	a, c, h
39-42	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. Define and Illustrate concepts in EIA like Impact, terms of reference, base line data, EMP etc.; Examine simple case examples. Assess and Justify the need for EIA based on existing regulations in India	R 3 and R4.	f, g, h, i, j, k

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Test 1	30 min	15	September 10 – September 20 (During scheduled class hour)	Open Book
Test 2	30 min	15	October 09 – October 20 (During scheduled class hour)	Open book



Test 3	30 min	15	November 10 – November 20 (During scheduled class hour)	Open book
Online/ Pop Quiz	TBA	10	To be announced in class. (Best 5 * 2%)	Open Book
Assignments/ Term paper	TBA	10	To be announced in class. (1 assignment and 1Term paper)	Open Book
Comprehensive Exam.	120 min	35	TBA	Open Book

* 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 appointment through social media. If required to discuss live, it could be done through *Google/ Teams meet* with prior appointment. Students are advised to initiate meetings on *Google/Teams meet* after appointment through *Google Calendar*.

Notices: Notices concerning the course will be displayed on *Google Classroom*.

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. Prior and genuine make up requests will be accommodated on a case to case basis. In case of *pop quiz/quiz*, best of 5 (of about 10) are planned. Students are requested to make an effort to attend at least 5 quizzes to avoid the need of makeup. Only in case of persistent internet connectivity issues, they may be considered to be evaluated as a special case. Such cases are to informed to



the instructor at the earliest. In case of issues of medical emergencies, requests have to be supported by valid certificates.

INSTRUCTOR-IN-CHARGE

