Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2019-2020

Course Handout Part II

01-08-2019

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.	Learning objective	Topics to be covered	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 and Hazardous wastes.	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 waste	Ch. 9 of T1; Ch. 11 of R1	a,c,e, j, k

		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 inoor 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
34-37	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. 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
38-42	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

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid Semester Test	90 min	30	4/10 3.30 - 5.00 PM	Closed Book
Surprise Quiz	TBA	10	To be announced in class.	Open book
Assignment	TBA	10	To be announced in class.	Open Book
Mini Project	TBA	10	To be announced in class.	Open Book
Comprehensive Exam.	3 hrs.	40	12/12 AN	Closed

*** 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 Consultation Hour: With prior appointment on Tuesdays and Thursdays.

Notices: Notices concerning the course will be displayed on Google Class room.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Make-up Policy: Frivolous make- ups are not entertained. Prior permission is mandatory in genuine cases. Medical emergencies have to be supported by valid certificates

INSTRUCTOR-IN-CHARGE