Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-6 (B.Tech)

Subject: Environmental Pollution Control- BETCH16324

Type of course: Minor Stream

Prerequisite: Basic Concepts of chemistry and environmental science.

Rationale: In addition to recognizing different pollutants and common industrial regulations and acts dealing to safety, health, and the environment in the Indian context, this course aims to acquaint students with the principles of various traditional and modern pollution management approaches. This training would allow Students should be able to recognize, evaluate, quantify, and manage risks at every step of operation.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	150
3	0	2	4	60	30	10	20	30	

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE – End Semester Examination; MSE- Mid Semester Examination; CA - Continuous Assessment; ALA-Active Learning Activities.

Course Content:

Sr. No	Course content	Hrs	% Weightage
1	**Impact of man on the environment;** ecological systems and pollution, hydrologic and nutrient cycles. Various types of environmental pollution in general and in chemical and allied industry in particular, sources and causes of environmental pollution, effect of pollution on environment.	09	20

2	**Air pollution:** Classification and properties of air pollutants, Emission sources, behavior and fate of air pollutants with special reference to chemical reactions in atmosphere, reactions at the earth's surface, photochemical smog etc., air pollution meteorology (generation, transportation and dispersion of air pollutants).	09	20
3	**Outlines of industrial air** pollution control and particulate control equipment: selection, design and performance analysis; cyclone separator, fabric filters, gravity settling chambers, ESPs, wet scrubbers. Control of gaseous emissions Stack sampling and analysis of air pollutants.	09	20
4	**Water pollution:** sources and classification of water pollutants, Physico-chemical characterization of wastewater, water quality standards, **Industrial water pollution management:** Wastewater treatment processes; Pretreatment, primary and secondary treatment processes. Advanced wastewater treatment processes. Design of sedimentation tanks and biological treatment processes.	09	20
5	**Solid waste management:** sources and classification, public health aspects, methods of collection, potential methods of disposal: sanitary landfill, incineration, composting, recovery and recycling.	09	20

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Case Study on Pollution in Chemical Industry:** Students will select one chemical or allied industry and prepare a short case study describing types of pollution it generates, causes, and its effect on the environment. Students will upload the report as a PDF on the GMIU Web Portal.	10
2	**Identification of Air Pollutants:** Students will prepare a table showing classification of air pollutants (primary, secondary, gaseous, particulate) with their sources, effects, and fate in the atmosphere. The completed table will be uploaded as a PDF on the GMIU Web Portal.	10

3	**Sources of Water Pollutants:** Students will identify major sources of water pollutants (municipal, agricultural, industrial) and list examples of typical pollutants from each source. Students will upload the PDF on the GMIU Web Portal.	10
	Total	30

Suggested Specification table with Marks (Theory): 60

Distribution of Theory Marks **(Revised Bloom's Taxonomy)**						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	15%	40%	35%	10%	00%	00%

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

List of Suggested Practical

Sr. No	Suggested Practical	Unit No	Hrs.
1	Characterization of a given sample of wastewater by determining its pH, conductivity, TDS, TSS.	1	2
2	To find out the quantity of Dissolved Oxygen (DO) present in the given water sample by Winkler's Method.	1	2
3	.Determination of acidity, alkalinity & hardness of a given sample of water or wastewater.	2	2
4	To determine Biochemical Oxygen Demand (BOD) exerted by the given wastewater sample.	2	4
5	To find out Chemical Oxygen Demand (COD) of the given wastewater sample.	3	4
6	To determine the ion exchange capacity of a given cation or anion exchanger.	3	4

7	Characterization of municipal solid waste (physical and chemical).	4	4
8	Determination of efficiency of cyclone separator for separation of dust particles from mixtures.	5	4
9	Analysis of SOx and NOx compounds present in gaseous mixture using GC or any other techniques.	5	4

Course Outcome:

After learning the course, the students should be able to:	
CO1	Understand the impact of engineering solutions in a global and societal context
CO2	Identify industrial waste solution with updated technologies.
CO3	Apply appropriate control and preventive measures for different types of pollution
CO4	Compare various technics for preventing pollution and control.
CO5	Basic Knowledge of Solid waste management.

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction. Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses. The internal evaluation will be done on the basis of Active Learning Assignment.

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

[1] Environmental Pollution Control Engineering by C.S. Rao, New Age International Publishers, New Delhi.
[2 Wastewater Engineering: Treatment & Reuse by Metcalf and Eddy, McGraw Hill Publication

[3] Pollution control in process industries, S P Mahajan, Tata McGraw Hill Publishing Company, New Delhi.
[4] Environmental Pollution & Control by Prof. N.H. Gopal Dutt.