

Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Civil Engineering

BCE055 Industrial Waste Treatment and Disposal
Fifth Semester, 2017-18 (odd Semester)

Course (catalog) description

The purpose of this course is to provide knowledge on sources and characteristics of industrial waste water, techniques and approaches for minimizing the generation and application of physio-chemical and biological treatment methods for recovery, reuse and disposal.

Compulsory/Elective course : Elective course for Civil students

Credit / Contact hours : 3 credits / 45 hours

Course Coordinator : Dr.M.P.Chockalingam, Professor

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Dr.M.P.Chockalingam	Fourth year Civil	Civil Block			9.00 - 9.50 AM
Ms.B.Saritha	Fourth year Civil	Civil Block		saritha.civil@bharathuniv.ac.in	12.45 - 1.15 PM

Relationship to other courses:

Pre –requisites : BCE505 Environmental Engineering

Assumed knowledge : Basic knowledge in Water and Wastewater Treatment

Following courses : BCE074 Physical and Chemical Treatment of Water and Wastewater

Syllabus Contents

UNIT I EFFECTS AND CONTROL OF INDUSTRIAL POLLUTION 9

Effects of industrial wastes on streams, land and air, wastewater treatment plants, water quality criteria – effluent standards : Process modification, method and material changes, housekeeping etc., to reduce water discharges and strength of the waste and established recovery methods for bye products within the plant operations.

UNIT II CHARACTERISTICS AND TREATMENT OF INDUSTRIALWASTEWATER 9

Characteristics of major industrial waste water (liquid wastes) Chemical Industries: Petrochemicals & refineries, pharmaceuticals. Apparel Industries: Textile, synthetic fibres, leather, paper. Agro Industries: Fertilizer Food Industries: Heat – packing pickles, canning poultry and eggs, distillers, sugar. Metallurgical Industries: Thermal power station, nuclear power plants.

UNIT III PHYSICAL TREATMENT METHODS**9**

Conventional methods of treatment and disposal of industrial wastes. Equalisation and neutralization, separation of solids – sedimentation and filtrations.

UNIT IV BIOLOGICAL TREATMENT METHODS**9**

Removal of organic contents: Biological treatment methods, aerobic and anaerobic, digestion, trickling filters, stabilization ponds, activated sludge process – oxidation ditch.

UNIT V PHYSICO – CHEMICAL TREATMENT METHODS**9**

Physico - Chemical Treatment Method – Neutralization, coagulation, flocculation, adsorption and precipitation. Combined treatment of industrial and municipal wastes.

TEXT BOOKS:

1. Eckenfalder W.W, "Industrial Water Pollution Control", McGraw Hill, New York, 1989

REFERENCES:

1. Arceivala S.J & Shyam Asolekar R, "Waste Water Treatment and Pollution Control Tata McGraw Hill, 1998.
2. Nelson Leonard Nemerow, "Theories and practice of industrial waste treatment", Addison Wesley Pub. Co., 1963
3. World Bank Group "Pollution prevention and Treatment Hand Book" World Bank and UNEP Washington DC, 1998.

Computer usage: NIL

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area: Conventional Treatment Methods of Industrial Effluent

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	August 1 st week	Session 1 to 14	2 Periods
2	Cycle Test-2	September 2 nd week	Session 15 to 28	2 Periods
3	Model Test	October 1 st week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

This Course is to introduce the principles of various surveying methods and applications to Civil Engineering projects.	Correlates to program outcome		
	H	M	L
1. Know the elements of construction planning and estimating activity durations and resource requirements.	g,k	h	
2. Know the elements of scheduling and to apply appropriate tools and techniques like networks and coding systems		g	c
3. Understand the monitoring and accounting of projects through cost control.	a,e	b,c,g	a
4. Know the elements of quality control and safety of construction projects.	a	b,c,g	a
5. Know the concept of gathering and using project information	g,i	b,c	a

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

Session	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I EFFECTS AND CONTROL OF INDUSTRIAL POLLUTION			
1.	Effects of industrial wastes on streams, land and air,	No	[T1, R2]
2.	Effects of industrial wastes on land and air	No	
3.	wastewater treatment plants, water quality criteria - effluent standards	No	
4.	Process modification	No	
5.	Change of Methods followed	No	
6.	Material changes	No	
7.	Housekeeping to reduce water discharges and strength of the waste	No	
8.	Established recovery methods for bye products within the plant operations.	No	
9.	Established recovery methods for bye products within the plant operations.	No	
UNIT II CHARACTERISTICS AND TREATMENT OF INDUSTRIALWASTEWATER			
10.	Characteristics of major industrial waste water (liquid wastes) Chemical Industries: Petrochemicals & refineries	No	[T1 & R3]
11.	Pharmaceuticals	No	
12.	Apparel Industries: Textile, synthetic fibres	No	
13.	Leather, paper	No	
14.	Agro Industries: Fertilizer	No	
15.	Food Industries: Heat – packing pickles, canning poultry and eggs	No	
16.	Distillers, sugar	No	
17.	Metallurgical Industries: Thermal power station	No	
18.	Metallurgical Industries: Nuclear power plants.	No	
UNIT III PHYSICAL TREATMENT METHODS			
19.	Conventional methods of treatment and disposal of industrial wastes: Equalisation	No	[T1 & R1,R3]
20.	Equalisation	No	
21.	Neutralization	No	
22.	Neutralization	No	
23.	Separation of solids	No	
24.	Sedimentation	No	
25.	Sedimentation	No	
26.	Filtrations	No	
27.	Filtrations	No	
UNIT IV BIOLOGICAL TREATMENT METHODS			
28.	Removal of organic contents	No	[T1 & R1,R3]
29.	Biological treatment methods	No	
30.	Aerobic Processes	No	
31.	Anaerobic Processes	No	
32.	Digestion	No	

33.	Trickling filters	No	
34.	Stabilization ponds.	No	
35.	Activated sludge process	No	
36.	Oxidation ditch	No	
UNIT V PHYSICO – CHEMICAL TREATMENT METHODS			
37.	Physical Treatment Methods	No	[T1 & R1,R3]
38.	Chemical Treatment Methods	No	
39.	Neutralization	No	
40.	Coagulation	No	
41.	Flocculation	No	
42.	adsorption	No	
43.	Precipitation	No	
44.	Combined treatment of industrial and municipal wastes	No	
45.	Combined treatment of industrial and municipal wastes	No	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	5%
Attendance	-	10%
Assignment	-	5%
Final exam	-	70%

Prepared by: Dr.M.P.Chockalingam ,Professor , Department of Civil

Dated :

Addendum**ABET Outcomes expected of graduates of B.Tech / Civil / program by the time that they graduate:**

- 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 hardware and software 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.

Program Educational Objectives**PEO1: PREPARATION**

Civil Engineering graduates will have knowledge to apply the fundamental principles for a successful profession and/or for higher education in Civil Engineering based on mathematical, scientific and engineering principles, to solve realistic and field problems that arise in engineering and non engineering sectors

PEO2: CORE COMPETENCE

Civil Engineering graduates will adapt to the modern engineering tools and construction methods for planning, design, execution and maintenance of works with sustainable development in their profession.

PEO3: PROFESSIONALISM

Civil Engineering Graduates will exhibit professionalism, ethical attitude, communication and managerial skills, successful team work in various private and government organizations both at the national and international level in their profession and adapt to current trends with lifelong learning.

PEO4: SKILL

Civil Engineering graduates will be trained for developing soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS

Civil Engineering graduates will be installed with ethical feeling, encouraged to make decisions that are safe and environmentally-responsible and also innovative for societal improvement.

Course Teacher	Signature
Dr.M.P.Chockalingam	
Ms.B.Saritha	

Course Coordinator

HOD/CIVIL