



**DEPARTMENT OF CIVIL ENGINEERING**  
**NATIONAL INSTITUTE OF TECHNOLOGY**  
**TIRUCHIRAPPALLI - 620 015, TAMIL NADU, INDIA**

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COURSE PLAN (PART I)												
Name of the programme and specialization	M.Tech. / Environmental Engineering											
Course Title	Environmental Engineering Processes Laboratory											
Course Code	CE710	No. of Credits	2									
Course Code of Pre-requisites	-											
Session	January 2021	Section (if, applicable)	NA									
Name of the Faculty	Dr. R. Gandhimathi	Department	Civil Engineering									
E-mail	rgmathii@nitt.edu	Telephone No.	0431 – 250 3171									
Course Coordinator(s)(if, applicable)	Dr. S. T. Ramesh											
E-mail	stramesh@nitt.edu	Telephone No.	-									
Course Type		Core										
		Elective										
		Open Elective										
	√	Laboratory										
COURSE CONTENT (Approved in BoS)												
Water Softening - Lime and Caustic Soda Process - Coagulation and Flocculation of Water - Optimization of Dose, pH and Time of Flocculation - Sedimentation - Settling Column Analysis of Flocculating Particles - Filtration - Chlorination - Adsorption- Colour Removal by Adsorption - Heavy Metal Precipitation - Kinetics of Activated Sludge Process - anaerobic digestion - biogas potential- Specific methanogenic activity												
COURSE LEARNING OBJECTIVES												
1. To brief the application of various physico-chemical processes in water and wastewater treatment 2. To quantify the requirement of chemicals for treatment of water 3. To familiarise the kinetics and isotherm models of various processes. 4. To measure the performance of various processes in water and wastewater treatment.												
COURSE OUTCOMES (CO)												
Course Outcomes	Aligned Programme Outcomes(PO)											
After successful completion of the course, the students will be able to:												
CO1	Perform common environmental experiments relating to water and wastewater quality, and know which tests are appropriate for given environmental problems.	1	2	3	4	5	6	7	8	9	10	11
		L	L	M	H	M				L		L
		L	M		H	M						M
		L		M	M	L		L		L		M
		M		M	M	L					L	M
CO2	Demonstrate and analyse basic reactor types and kinetics.	1. Scholarship of Knowledge						2. Critical Thinking				
		3. Problem Solving						4. Research Skill				
		5. Usage of modern tools						6. Collaborative and Multidisciplinary work				
CO3	Demonstrate and analyse basic environmental engineering processes (physical/chemical) for treatment of contaminants, including gas transfer, adsorption and advanced oxidation processes.	7. Project Management and Finance						8. Communication				
		9. Life-long Learning						10. Ethical Practices and Social Responsibility				
		11. Independent and Reflective Learning										
CO4	Relate the theoretical understanding with hands on experience of basic methods of environmental analysis.											

## COURSE PLAN (PART II)

### COURSE OVERVIEW

The course provides methods to assess the required quantity of chemicals for water treatment, understand the kinetics of activated sludge process, detailed application of various physico-chemical and biological processes for water and wastewater treatment.

### COURSE TEACHING AND LEARNING ACTIVITIES

Sl. No.	Week	Topic	Mode of Delivery (online through MS teams: One Note for Windows 10)
1.	3 <sup>rd</sup> week of January 2021 (3 Contact Hours)	Introduction to Environmental Engineering processes laboratory	Lecture
2.	1 <sup>st</sup> week of February 2021 (3 Contact Hours)	Determination of Reaeration rate constant Determination of Ultimate BOD and BOD rate constant	Lecture / Writing with Digital Board / Model calculations
3.	2 <sup>nd</sup> week of February 2021 (3 Contact Hours)	Determination of Coagulant Dosage	Lecture / Writing with Digital Board / Model calculations
4.	3 <sup>rd</sup> week of February 2021 (3 Contact Hours)	Water softening (Lime soda process, caustic soda process Split Treatment	Lecture / Writing with Digital Board / Model calculations
5.	4 <sup>th</sup> week of February 2021	<b>ASSESSMENT 1</b>	
6.	1 <sup>st</sup> week of March 2021 (3 Contact Hours)	Color removal by adsorption	Lecture / Writing with Digital Board / Model calculations
7.	2 <sup>nd</sup> week of March 2021 (3 Contact Hours)	Determination of mixed liquor suspended solids (MLSS), Determination of mixed liquor volatile suspended solids	Lecture / Writing with Digital Board / Model calculations
8.	3 <sup>rd</sup> week of March 2021 (3 Contact Hours)	Estimation of settling characteristics of wastewater and activated sludge	Lecture / Writing with Digital Board / Model calculations
9.	4 <sup>th</sup> week of March 2021	<b>ASSESSMENT 2</b>	
10.	5 <sup>th</sup> week of March & 1 <sup>st</sup> week of April 2021 (3 Contact Hours)	Kinetics of activated sludge process	Lecture / Writing with Digital Board / Model calculations
11.	2 <sup>nd</sup> week of April 2021 (3 Contact Hours)	Settling Column Analysis of Flocculating Particles	Lecture / Writing with Digital Board / Model calculations
12.	3 <sup>rd</sup> week of April 2021 (3 Contact Hours)	Estimation of filter head loss and clogging front for sand filter	Lecture / Writing with Digital Board / Model calculations
13.	4 <sup>th</sup> week of April 2021 (3 Contact Hours)	Determination of breakpoint chlorination for disinfection	Lecture / Writing with Digital Board / Model calculations
14.	5 <sup>th</sup> week of April 2021 (3 Contact Hours)	Removal of Heavy metals from wastewater by precipitation	Lecture / Writing with Digital Board / Model calculations
15.	1 <sup>st</sup> week of May 2021 (3 Contact Hours)	Anaerobic digestion, biogas potential, Specific methanogenic activity	Lecture / Writing with Digital Board / Model calculations

### COURSE ASSESSMENT METHODS

Sl. No.	Mode of Assessment	Week / Date	Duration	% Weightage
1.	Assessment 1	4 <sup>th</sup> week of February 2021	60 Minutes	20%
2.	Assessment 2	4 <sup>th</sup> week of March 2021	60 Minutes	20%
3.	Assessment 3 (Record work)	During the Session	-	30%
4.	Final Assessment	2 <sup>nd</sup> week of May 2021	120 Minutes	30%

#### Note:

1. Attending all the assessments (Assessment 1 to 4) is MANDATORY for every student.
2. If any student is not able to attend Assessment-1 / Assessment-2 due to genuine reason, student is permitted to attend the respective assessment as compensation assessment (CPA) with same weightage

3. At any case, CPA will not be considered as an improvement test.
4. A minimum of 30% should be scored in the final assessment (for all courses) for a pass. The passing minimum for all the courses shall be the maximum of 35% or Class Average/2.

**ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc**

1. Benfield, L.D.; Weand, B.L.; Judkins, J.F., *Process chemistry for water and wastewater*. Prentice Hall Inc Englewood Cliffs New Jersey, 1982.
2. Weber Jr., W.J., *Physico-chemical Process for Water Quality Control*. Wiley Inc. Newyork, 1972.
3. Peavy, H.S., Rowe, D.R., Tchobanoglous, G. *Environmental Engineering*, McGraw Hills, New York, 1985
4. Benefield, L.D. and Randall C.W. *Biological Processes Design for wastewaters*, Prentice-Hall, Inc. Eaglewood Cliffs, 1989.

**COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)**

**DISHONEST / PLAGIARISM**

**Dishonest / Plagiarism** means knowingly presenting another person's ideas, findings or work as one's own by copying or reproducing them without due acknowledgement of the source, with intent to deceive the examiner into believing that the content is original to the student.

Plagiarism is a specific form of cheating which consists of the misuse of the published and/or unpublished works of others by misrepresenting the material (i.e., their intellectual property) so used as one's own work.

**Academic Dishonesty**

- a) Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- b) Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- c) The departmental disciplinary committee constituted with the faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

**ATTENDANCE**

The attendance will be taken in all the contact hours. Students are encouraged to attend all the classes without absence. Also, the students are encouraged to participate in various co-curricular and extracurricular activities to enrich the academic / campus life.

- a) At least 75% attendance in each course is mandatory. Students with less than 75% in any course by the end of 9<sup>th</sup> week will be identified and alerted by the respective class committees.
- b) A maximum of 10% shall be allowed under On Duty (OD) category.
- c) Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

**ADDITIONAL COURSE INFORMATION**

1. All the students are advised to check their NIT-T webmail regularly to know the updates. All the correspondence (schedule of classes / schedule of assessment / course material / any other information regarding this course) will be communicated through DROPBOX (envnitt@gmail.com).
2. Queries / Clarifications / Discussions (if required) may be E-mailed to me / contact me with prior intimation.

**FOR APPROVAL**



Dr. R. Gandhimathi  
Course Faculty



Dr. R. Manjula  
Chairperson (Class Committee)



Dr. G. Swaminathan  
HoD / Civil Engineering