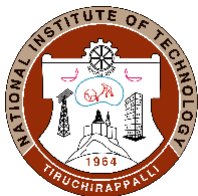




NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF CHEMICAL ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech – Chemical Engineering		
Course Title	WASTEWATER AND SOLID WASTE MANAGEMENT (3-0-0)		
Course Code	CL 621	No. of Credits	3
Course Code of Pre-requisite subject(s)	NIL		
Session	January 2021	Section (if, applicable)	---
Name of Faculty	Dr. N.Anantharaman	Department	Chemical Engg
Official Email	naraman@nitt.edu	Telephone No.	0431-2503103
Name of Course Coordinator(s) (if, applicable)	Dr.P. KALAICHELVI		
Official E-mail	kalai@nitt.edu	Telephone No.	0431-2503110
Course Type (please tick appropriately)	Elective course		
<input checked="" type="checkbox"/>			
Syllabus (approved in 2017)			
<p>Water Pollutants, Effects, Monitoring and Quality standards: Pollution of water and soil, effect of pollutants on environment and health, monitoring water pollution, water pollution laws and minimum national standards, monitoring, compliance with standards, Latest norms for effluent treatment.</p> <p>Water Pollution Sources, Analysis and Methods of control: Water pollution sources and classification of water pollutants - Wastewater sampling and analysis. Treatment of water pollution: BOD, COD of wastewater and its reduction – Fundamentals of Anaerobic digestion and Aerobic digestion.</p> <p>Wastewater Treatment Plant Design: Physical unit operations: Screening, Flow equalization, sedimentation etc., Chemical Unit Processes: chemical precipitation, disinfection, colour removal by adsorption Biological unit processes: Aerobic suspended - growth treatment processes, aerobic attached-growth treatment processes, anaerobic suspended - growth treatment processes, anaerobic attached-growth treatment processes.</p> <p>Advanced Wastewater and Water Treatment: Carbon adsorption - Ion exchange - Membrane processes - Nutrient (nitrogen and phosphorus) removal - Design of plant for treatment and disposal of sludge.</p> <p>Solids Waste and Landfill Management: Sources and classification - methods of solid waste disposal - Composting (natural) - Accelerated composting with industrial sludge - Landfill technology - Methods adopted for municipal solid waste - Toxic-waste management, Incineration of industrial waste, Design aspects, economics.</p> <p>Hazardous Waste Management and Risk Assessment: Types of hazardous Wastes-Health effects - Nuclear fission and radioactive waste treatment and disposal methods. Risk assessment.</p>			



REFERENCE BOOKS:

1. C.S. Rao, Environmental Pollution Control Engineering, Wiley 2 nd Edition, New Age International Publishers, 2006.
2. S.P. Mahajan, Pollution Control in Process Industries, Tata McGraw Hill, New Delhi, 1985
3. Sincero and G.A. Sincero, Environmental Engineering: A Design Approach, PHI, New Delhi,1996.
4. Tchbanoglous and F.L. Burton, Metcalf and Eddy's Wastewater Treatment-Disposal And Reuse (Third Ed.), TMH publishing Co Ltd, N. Delhi.

COURSE OBJECTIVES

To design equipment based on the application of air pollution treatment and various methods of design of air pollution control equipment

MAPPING OF COs with POs

Course Outcomes:

On completion of the course, the students will be able to

1. Understand waste management and its concepts.

2. Get the concepts of recycling of metals and polymeric materials et the concepts of recycling of metals and polymeric materials

3. Identify the treatment of liquid waste streams - mechanical, biological and chemical methods; industrial and municipal cases; anaerobic digestion; production of bio-gas; dewatering and drying

4. Classify solid wastes separation, management by incineration, composting and landfilling

Programme

Outcomes (PO)

(Enter Numbers only)

PO1,PO2,PO3,PO4,
PO9,PO11

PO1,PO2,PO3,PO4,
PO9,PO11

PO1,PO2,PO3,PO4,
PO5,PO9,PO11

PO1,PO2,PO3,PO4,
PO9,PO11

COURSE PLAN – PART II

COURSE OVERVIEW

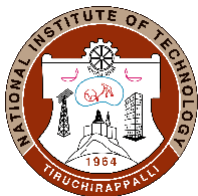
COURSE TEACHING AND LEARNING ACTIVITIES

(Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	1 - 4 hrs	Pollution of water and soil, effect of pollutants on environment and health, monitoring water pollution,	Online mode
2	5-8 hrs	water pollution laws and minimum national standards, monitoring, compliance with standards, Latest norms for effluent treatment.	Online mode



3	9 – 12 hrs	Water pollution sources and classification of water pollutants - Wastewater sampling and analysis.	Online mode
4	13 - 15 hrs	Treatment of waterpollution: BOD, COD of wastewater and its reduction	Online mode
5	16hrs – 19hrs	Fundamentals of Anaerobic digestion and Aerobic digestion.	Online mode
6	20 hrs – 22 hrs	Wastewater Treatment Plant Design: Physical unit operations: Screening, Flow equalization, sedimentation etc.,	Online mode
7	23 hrs- 25 hrs	Chemical Unit Processes: chemical precipitation, disinfection, colour removal by adsorption.	Online mode
8	26 hrs – 29 hrs	Biological unit processes: Aerobic suspended - growth treatment processes, aerobic attached-growth treatment processes, anaerobic suspended - growth treatment processes, anaerobic attached-growth treatment processes.	Online mode
9	30 hrs – 32 hrs	Carbon adsorption - Ion exchange - Membrane processes -	Online mode
10	33hrs – 36 hrs	Nutrient (nitrogen and phosphorus) removal - Design of plant for treatment and disposal of sludge.	Online mode
11	36 hrs- 39 hrs	Solids waste : Sources and classification - methods of solid waste disposal - Composting (natural) - Accelerated composting with industrial sludge - Landfill technology -	Online mode
12	40 hrs- 42 hrs	Methods adopted for municipal solid waste - Toxic-waste management, Incineration of industrial waste, Design aspects, economics	Online mode



13	43hrs -44 hrs	Hazardous waste: Types of hazardous Wastes-Health effects -	Online mode
14	45hrs -48 hrs	Nuclear fission and radioactive waste treatment and disposal methods. Risk assessment	Online mode

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assignment 1	Feb 1st week		10%
2	Test 1	Feb 4 th week	60 min	20%
3	Assignment 2	March 2 nd d week		10%
4	Test 2	March 4 th week	60 min	20%
CPA	Compensation Assessment*	April 4 th week	60 min	20%
5	Assignment 3	May 1 st week		10%
6	Final Assessment *	May 4 th week	120 min	30%

*mandatory; refer to guidelines on page 4

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

- 1) Feed back is planned to be collected twice; once in the mid semester and one at the end of course as soon as classes are over.

COURSE POLICY (including compensation assessment to be specified)

- 1) It is expected that the students will not indulge in any form of malpractice. In the event of any malpractice reported, all those who are involved will forfeit all the marks in that test/examination/assignment. Reappearance /additional assignment will not be given.
- 2) However, if there is a genuine reason for not attending sessions regularly, due credit will be given.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.



ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course 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.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

NIL

FOR APPROVAL

N. Anantharaman
Course Faculty _____
[Dr. N. Anantharaman]

Dr. T. Sivasankar
CC- Chairperson _____
[Dr.T.Sivasankar]

Dr. S. Sivasankar
HOD _____



Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.