Format K1

Maharashtra State Board of Technical Education, Mumbai

TEACHING PLAN (TP)

Academic Year: **2025-26 (EVEN)**

Institute Code and Name: 0078- K. K. Wagh Polytechnic, Nashik **Semester**: Fourth
Programme and Code: Chemical Engineering (CH) **Course Index:** 405
Course and Code: Pollution Control in Chemical Industries (PCCI) and 314311
Name of Faculty: Mrs. J. H. Nihalani **CLASS: SYCH**

INDUSTRY EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences: • Apply pollution control methods to mitigate different types of pollution in the chemical industries.

COURSE LEVEL LEARNING OUTCOMES (COS)

- CO405.1 - Use relevant equipment for the control of air pollution in chemical process industry.
- CO405.2 - Select the appropriate treatment method required for treating chemical industrial wastewater.
- CO405.3 - Select appropriate disposal method for given chemical industrial solid waste.
- CO405.4 - Apply relevant treatment method for managing given hazardous waste.
- CO405.5 - Apply pollution control act to control pollution in chemical industry.

TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme										
				Actual Contact Hrs/Week			SLH	NLH			Theory				Based on LL & TSL Practical				Based on SL		Total Marks
											FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
				CL	TL	LL					Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
314311	Pollution Control in Chemical Industries	PCCI	DSC	4	-	**2**	2	8	4	03	30	70	100	40	25	10	25#	10	25	10	175

Total IKS Hrs for Sem.:0 Hrs

Abbreviations: CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

THEORY LEARNING OUTCOME (TLO)

TLO No.	Title of TLO
TLO 1.1	Identify the chemical industries responsible for air pollution.
TLO 1.2	Explain characteristics of chemical industrial wastewater.
TLO 1.3	Select relevant equipment for air pollution control in industry.
TLO 1.4	Explain air pollution control method with reference to manufacturing industry

TLO 2.1	Identify the sources of wastewater in chemical industry.
TLO 2.2	Explain characteristics of chemical industrial wastewater.
TLO 2.3	Calculate BOD and COD of chemical industrial wastewater.
TLO 2.4	Select the appropriate treatment method for given chemical industrial wastewater.
TLO 3.1	Identify the sources of solid waste.
TLO 3.2	Explain steps of industrial solid waste management.
TLO 3.3	Select disposal method for given solid waste.
TLO 3.4	Explain the health consequences of poor industrial waste disposal.
TLO 4.1	Identify the sources of hazardous waste.
TLO 4.2	Explain collection and storage process of hazardous waste.
TLO 4.3	Select relevant treatment method for given hazardous waste.
TLO 4.4	Explain the factors responsible for hazardous waste prevention and minimization.
TLO 4.5	Explain the health consequences of poor industrial hazardous waste disposal.
TLO 5.1	Explain role of central and state pollution control board.
TLO 5.2	Describe the needs of air pollution control act.
TLO 5.3	Apply water pollution control act in given industry
TLO 5.4	Explain salient features of hazardous waste management rule 2016

SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	**Programme Outcomes (POs)**							**Programme Specific Outcomes (PSOs)**	
	PO-1 Basic and Discipline Specific Knowledge	**PO-2 Problem Analysis**	**PO-3 Design/ Development of Solutions**	**PO-4 Engineering Tools**	**PO-5 Engineering Practices for Society, Sustainability and Environment**	**PO-6 Project Management**	**PO-7 Life Long Learning**	**PSO- 1**	**PSO- 2**
CO1	2	2	1	2	3	1	2	3	3
CO2	2	2	1	2	3	1	2	3	3
CO3	2	2	1	2	3	1	2	3	3
CO4	2	2	1	2	3	1	2	3	3
CO5	1	--	--	--	3	--	2	3	3

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

Maharashtra State Board of Technical Education K-1

Teaching Plan (TP)

Academic Year: 2024-25 **Institute Code:** 0078
Program: Chemical Engineering **Course Code:** 314311
Course: Pollution Control in Chemical Industries (PCCI) **Semester:** Fourth (CH-4K)
Name of faculty: Mrs. J. H. Nihalani

Chap No. (Alloted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
Unit - I Air Pollution and Control								
1 (12)	**CO-1**	**TLO 1.1**	1.1 Sources and Types of air pollution in chemical industry.	1	15/12/2025		Blackboard, Books, media, PPT	
		TLO 1.2	1.2 Particulate pollutant and control– • Bag filter •Cyclone separator •Electrostatic precipitator •Wet scrubber **MKCL Quiz 1**	3	16/12/2025 to 20/12/2025			
		TLO 1.3	1.3 Gaseous pollutant and control – •Absorber •Catalytic converter •Thermal Incinerator •Stack Analysis	3	22/12/2025 to 26/12/2025			
		TLO 1.4	1.4 Air pollution control in industries- •Sulphuric acid plant •Cement plant •Fertilizer Industry.	4	27/12/2025 to 02/01/2026			
		----	**Practice test 1 and MKCL Quiz 2**	1	03/01/2026			

Chap No. (Alloted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
Unit - II Water Pollution and Control								
2(14)	**CO-2**	**TLO 2.1**	2.1 Sources and characteristics of chemical industrial wastewater-	2	05/01/2026 to 06/01/2026		Blackboard, Books, media, PPT	
		TLO 2.2	2.2 •Turbidity •pH •Total suspended solids •Total solids **MKCL Quiz 3**	2	09/01/2026 to 10/01/2026			
		TLO 2.3	2.3 •BOD and COD (Definition Calculation of BOD and COD)	2	12/01/2026 to 13/01/2026			
		TLO 2.4	2.4 Waste Water Treatment: Primary methods: •Sedimentation •Forth flotation Secondary methods: •Activated sludge treatment •Trickling filter •Bioreactor Tertiary method: •Membrane separation- Microfiltration Ultrafiltration Nano filtration (Only Concept) •Reverse Osmosis- Detail process of RO for wastewater treatment	8	16/01/2026 to 27/01/2026			
		--	**MKCL Quiz 4 and Practice test 2**	1	27/01/2026			**1 extra**

Chap No. (Alloted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
Unit - III Solid Waste Management								
3(10)	**CO-3**	**TLO 3.1**	3.1 Solid waste generation: Sources from industry	1	30/01/2026		Blackboard, Books, media, PPT	
		TLO 3.2	3.2 Steps of Industrial Solid Waste Management: •Collection •Transportation •Storage and disposal	1	31/01/2026			
		TLO 3.3	3.3 Factors considered for the selection of disposal method **MKCL Quiz 5**	2	02/02/2026 to 03/02/2026			
		TLO 3.4	3.4 Disposal Methods- •Open burning •Sea dumping •Sanitary landfill •Composting •Incineration 3.5 Health Consequences of Poor Industrial Waste Disposal: •Carcinogenic and others	5	06/02/2026 to 13/02/2026			
		---	**MKCL Quiz 6 and Practice test 3**	1	14/02/2026			
Unit - IV Hazardous Waste Management								
4(14)	**CO-4**	**TLO 4.1**	4.1 Hazardous Waste-Sources and Types.	1	16/02/2026		Blackboard, Books, media, PPT	
		TLO 4.2	4.2 Steps of Hazardous Waste Management: •Generation •Storage and collection •Transfer and transport •Processing and disposal	2	17/02/2026 to 20/02/2026			

Chap No. (Alloted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
		TLO 4.3	4.3 Treatment Methods for disposal: Physical and Chemical Treatment- •Filtration and separation •Chemical precipitation •Chemical oxidation and reduction(redox) •Solidification and stabilization •Evaporation •Ozonation Thermal Treatment-Pyrolysis Biological Treatment- •Enzymatic systems •Aerobic and anaerobic treatment **MKCL Quiz 7**	5	21/02/2026 to 28/02/2026			
		TLO 4.4	4.4 Pollution prevention and waste minimization- •Management support and employee participation •Training, Waste audits •Good operating practices •Material substitution practices •Technological modification practices •Recycling options •Surplus chemical waste exchange options	4	02/03/2026 to 07/03/2026			
		TLO 4.5	4.5 Health Consequences of Poor Industrial hazardous Waste Disposal: •Carcinogenic and others	1	09/03/2026			
		---	**Practice test 4 and MKCL Quiz 8**	1	10/03/2026			
Unit - V Industrial Pollution Control Act								
5(10)	**CO-5**	**TLO5.1**	5.1 Central and State pollution control board: •Structure and role 5.2 Air pollution control act 1981:	2	13/03/2026 to 14/03/2026		Blackboard, Books, media, PPT	

Chap No. (Alloted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
			•Need and objective					
		TLO 5.2	5.3 Air quality act 2004 (Act No. 39 of2004): •Need and objective	2	16/03/2026 to 17/03/2026			
		TLO 5.3	5.4 Water pollution control act 1974(Act No. 6 of 1974): •Need and objective 5.5 The Water (Prevention and Control of Pollution) Amendment Bill, 2024: •Need and objective **MCKL Quiz 9**	2	20/03/2026 to 21/03/2026			
		TLO 5.4	5.6 Salient features of Hazardous waste management rule 2016 **Beyond Syllabus Membrane Technology**	2	23/03/2026 to 24/03/2026			
			Practice test 5 and MKCL Quiz 10	2	27/03/2026 to 28/03/2026			

ASSESSMENT METHODOLOGIES/TOOLS

A. Formative assessment (Assessment for Learning) (FA-TH)

- Continuous assessment based on process and product related performance indicators. Each practical will be assessed considering
  - 60% weightage is to process
  - 40% weightage to product

B. Summative Assessment (Assessment of Learning) (SA-TH)

- Continuous Assessment based on Process and Product related performance indicators. Each practical will be assessed considering
  - 60% weightage to Process
  - 40% weightage to Product

SUGGESTED LEARNING MATERIALS / BOOKS

Sr. No.	Author	Title of Book	Publication
1	Rao, C. S.	Environmental Pollution Control and Engineering	New Age International Publication, New Delhi, 2015. ISBN: 81-224-1835
2	S.P. Mahajan	Pollution Control in Process Industries	Tata McGraw Hill Publishing Company,1985, ISBN: 0074517724, 9780074517727.
3	Soli J Arceivala, Dr.Shyam R. Asolekar	Waste water treatment for pollution control and reuse.	McGraw Hill Education (India) Private Limited, ISBN: 9780070620995
4	A D Patwardhan	Industrial Solid Waste	Teri Press, New Delhi, 2013,ISBN:9788179935026
5	Michael D. Lagrega, Phillip L. Buckingham	Hazardous Waste Management.	McGraw Hill Education (India) Private Limited, ISBN: 978-0070195523
6	Central Pollution Control Board.	Pollution Control Acts, Rules &Notifications Issued There under	Central Pollution Control Board, ISBN: 978-2021152036.

LEARNING WEBSITES & PORTALS

Sr. No	Link / Portal	Description
1	**https://ceerapub.nls.ac.in/wp-content/plugins/pdfjs-viewer-shortcode/pdfjs/web/viewer.php?file=/wp-content/uploads/2020/01/Handbook-on-Waste-Managementbook.pdf&dButton=false&pButton=false&oButton=false&sButton=true**	E-Book-Handbook on Chemicals and Hazardous Waste Management and Handling in India
2	**https://www.nptelvideos.com/video.php?id=1936&c=11**	Sources of air pollution
3	**https://archive.nptel.ac.in/courses/123/105/123105001/**	Fundamentals of Environmental pollution and control
4	**https://archive.nptel.ac.in/courses/105/106/105106056/**	Physiochemical Treatment of solid and hazardous waste
5	**https://cpcb.gov.in**	Analysis of air quality index.

Note : Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

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