Maharashtra State Board of Technical Education, Mumbai

K-2

LABORATORY PLAN (LP)

Academic Year: 2025-26

Date: 15/12/2025

Institute Name & Code: K. K. Wagh Polytechnic, Nashik-3 (0078) Class: SYCH

Program and Code: Chemical Engineering (CH) Course Index: CO406

Course Name: SAFETY IN CHEMICAL INDUSTRIES Course Code &. Abbr.: 314003(SCI)

Total Hrs: 30 Semester: 4th Scheme: K Name of Faculty: Dr. S S Rikame

- **INDUSTRY EXPECTED OUTCOME**

The aim of this course is to help the student to use personal and other safety measures applicable in chemical industries.

- **COURSE LEVEL LEARNING OUTCOMES (COS)**
- **CO401.1:** Select the appropriate personal protective equipment (PPE) in the chemical industry
- **CO406.2:** Use the fire prevention and protection system in the chemical industry.
- **CO406.3:** Control the given identified hazards in the chemical industry.
- **CO406.4:** Apply different guidelines for safe handling of chemicals.
- **CO406.5:** Enumerate major industrial disasters to avoid the repetition of similar accidents in the chemical industry

• Teaching and Examination Scheme:

Course Code	Course Title	Abbr	Course Category/s	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	
314003	**SAFETY IN CHEMICAL INDUSTRIES**	SCI	SEC	**1**	-	**2**	**3**	**6**	4	03	--	--	--	--	25	10	50@	10	25	10	100

Abbreviations: CL- Class Room 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

• Laboratory Learning Outcome (LLO)

LLO No.	Title of LLO
LLO 1.1	Identify the available hazards from the given scenario
LLO 1.2	Select appropriate Non-respiratory PPE accordingly
LLO 1.3	Apply appropriate steps to operate PPE.
LLO 2.1	Identify the available hazards and select appropriate Respiratory PPE accordingly
LLO 2.2	Select appropriate respiratory PPE accordingly
LLO 2.3	Test the PPE and apply appropriate steps to operate it.
LLO 3.1	Identify the type of fire.
LLO 3.2	Select appropriate portable type of Fire extinguishers accordingly.
LLO 3.3	Apply standard operating procedure to operate Fire Extinguishers.
LLO 4.1	Identify the type of fire.
LLO 4.2	Select appropriate fixed fire hydrant systems accordingly.
LLO 4.3	Check the hydrant pressure and then operate it.
LLO 5.1	Identify the type of fire.
LLO 5.2	Select appropriate fixed fire hydrant systems accordingly.
LLO 5.3	Check the hydrant pressure and then operate it.

LLO No.	Title of LLO
LLO 7.1 LLO 7.2	Refer IS 14489 safety audit. Identify hazards and risk level of chemicals available in your chemical laboratory.
LLO 10.1 LLO 10.2	Refer United Nation classification of dangerous goods. Draw the colourful symbols in a chart.
LLO 11.1 LLO 11.2	Refer Central Motor Vehicle Rule, 1989. Draw the Emergency Information Panel with scale of a given chemical.
LLO 13.1 LLO 13.2	Refer IS. 14489. Identify the hazards and risk of petrol pump and prepare a report.
LLO 15.1 LLO 15.2	Collect the detail information related to emergency instruments of education building. Describe the sequence of steps involved in mock drill.

- **COs, Practical Laboratory Learning Outcome (LLOs) and Mapping:**

PR. No	Relevant COs	Practical - Laboratory Learning Outcome (LLO)	Name of Experiments/Assignment/ Sheet/ Job/ Project Activity	Planned Dates		Actual Date of conduction	Remark/ Assess-ment Date with Staff sign
				From	To		
1	CO1	LLO 1.1 LLO 1.2	* Demonstration of the Non-respiratory personal protective equipment for the given industrial hazard protection plan.	A-18/12/25	A-01/01/26		
				B-17/12/25	B-24/12/25		
				C-15/12/25	C-22/12/25		
2	CO1	LLO 2.1 LLO 2.2	* Demonstration of the Respiratory personal protective equipment for the given industrial hazard protection plan.	A-01/01/26	A-08/01/26		
				B-24/12/25	B-07/01/26		
				C-22/12/25	C-05/01/26		
3	CO2	LLO 3.1 LLO 3.2	* Conduction of a mock drill of portable type of Fire extinguishers which are available in your educational building.	A-08/01/26	A-15/01/26		
				B-07/01/26	B-14/01/26		
				C-05/01/26	C-12/01/26		
4	CO2	LLO 4.1 LLO 4.2 .	* Conduction of a mock drill of fixed fire hydrant systems which is available in your educational building.	A-15/01/26	A-22/01/26		
				B-14/01/26	B-21/01/26		
				C-12/01/26	C-19/01/26		
5	CO2	LLO 5.1 LLO 5.2	* Determination of the fire load of chemical engineering laboratory.	A-22/01/26	A-29/01/26		
				B-21/01/26	B-28/01/26		
				C-19/01/26	C-26/01/26		
6	CO3	LLO 7.1 LLO 7.2	* Conduction of an Internal Audit of your chemical laboratory to identify hazards and risk level and make a report.	A-29/01/26	A-02/02/26		
				B-28/01/26	B-04/02/26		
				C-26/01/26	C-05/02/26		
7	CO4	LLO 10.1 LLO 106.2	* Preparation of a chart of United Nation classification of dangerous goods including colourful symbols.	A-02/02/26	A-12/02/26		
				B-04/02/26	B-11/02/26		
				C-05/02/26	C-09/02/26		
8	CO4	LLO 11.1	* Preparation of a (Draw)	A-12/02/26	A-19/02/26		

PR. No	Relevant COs	Practical - Laboratory Learning Outcome (LLO)	Name of Experiments/Assignment/ Sheet/ Job/ Project Activity	Planned Dates		Actual Date of conduction	Remark/ Assess-ment Date with Staff sign
		LLO 11.2	Emergency Information Panel (with scale) of Chlorine / Sulfuric acid /Hydrogen with reference Central Motor Vehicle Rule, 1989.	B-11/02/26	B-18/02/26		
				C-09/02/26	C-16/02/26		
9	**CO5**	**LLO 13.1 LLO 13.2**	* Conduction of a Safety Audit by visiting the nearest petrol pump and prepare a report as per IS14489.	A-19/02/26	A-26/02/26		
				B-18/02/26	B-25/02/26		
				C-16/02/26	C-23/02/26		
10	**CO5**	**LLO 15.1 LLO 15.2**	* Conduction of emergency evacuation mock drill in your education building	A-26/02/26	A-05/03/26		
				B-25/02/26	B-04/03/26		
				C-23/02/26	C-02/03/26		
11	**CO5**	**LLO 14.1 LLO 14.2**	Preparation of a list of permissible limits of exposure of chemical and toxic substances of the industry you have visited with reference to Chapter IV A of Factory Act 1948.	A-05/03/26	A-12/03/26		
				B-04/03/26	B-11/03/26		
				C-02/03/26	C-09/03/26		
12	**CO5**	**LLO 16.1 LLO 16.2**	Selection of the appropriate step from the Hierarchy of control triangle from the given example.	A-12/03/26	A-19/03/26		
				B-11/03/26	B-18/03/26		
				C-09/03/26	C-16/03/26		

- **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

• Laboratory Equipment / Instruments / Tools / Software required

Sr. No.	Equipment Name with Broad Specifications	Relevant LLO Number
1	Respiratory and Non-respiratory Personal Protective Equipment as per IS standards	1,2
2	Public Address system	15
3	Portable Fire Extinguishers (CO_2, Foam, Dry powder, clean extinguishing agent) as per IS standards.	3
4	Fire hydrant system	4

- **References:**
- **Suggested Learning Materials / Books**

Sr. No.	Author	Title of Book	Publication
1	Dr. K. U. Mistry	Fundamentals of Industrial Safety and Health	Siddhant Prakashan,Ahmedabad, Gujrat
2	Crowl, Daniel A, Louvar, Joseph F.	Chemical Process Safety	Prentice Hall, NJ, USA, 2002,ISBN 0-13-018176-5
3	Bureau of Indian Standards	IS 14489: 1998	Government of India.
4	Bureau of Indian Standards	IS 17889: 2022	Government of India.
5	Bureau of Indian Standards	IS 17893:2023	Government of India.
6	Department of Environment, Forest and wildlife.	The Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989	Government of India.

- **Learning Websites & Portal**

Sr. No	Link / Portal	Description
1	https://onlinecourses.swayam2.ac.in/nou23_ge81/preview	Fire prevention and protection
2	https://onlinecourses.nptel.ac.in/noc20_mg43/preview	Functioning in safer way
3	https://archive.nptel.ac.in/courses/103/106/103106071/	Fire and Explosion
4	https://onlinecourses.nptel.ac.in/noc22_ch44/preview	General chemical safety measures
5	https://safetyculture.com/topics/ppe-safety/	Personal Protective Equipment(PPE)

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