Maharashtra State Board of Technical Education, Mumbai

K-2

LABORATORY PLAN (LP)

Academic Year: 2025-26

Date: 09/12/2025

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

Program and Code: Chemical Engineering (CH) Course Index: CO605

Course Name: Process Simulation in Chemical Engineering Course Code &. Abbr.: 316003 - PSCE

Total Hrs:30 Semester: 6th Scheme: K Name of Faculty: Mrs. Y. S. Kumawat

- **INDUSTRY EXPECTED OUTCOME**

The aim of this course is to help the students to attain the following industry identified outcomes through various teaching learning experiences: Chemical engineering students efficiently use process simulation software for process optimization in industrial applications.

- **COURSE LEVEL LEARNING OUTCOMES (COS)**

CO605.1 - Use the given process simulation software.

CO605.2 - Utilize the interface of process simulation software.

CO605.3 - Analyze the process simulation within the given software.

CO605.4 - Simulate process equipment by adjusting parameters in process simulation software.

CO605.5 - Use process simulation software for process optimization through sensitivity analysis.

- **Teaching and Examination Scheme:**

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Paper Duration	Assessment Scheme										Total Marks
				Actual Contact Hrs/Week			SLH	NLH			Theory				Based on LL & TSL Practical				Based on SL		
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
316003	PROCESS SIMULATION IN CHEMICAL ENGINEERING	PSCE	SEC	**2**	-	**2**	**-**	**4**	**2**	-	-	-	-	-	**25**	**10**	25 @	10	**-**	**-**	**50**

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	Navigate menus, toolbars, and workspace settings to understand software functionality.
LLO 2.1	Draw a basic process flow diagram using appropriate simulation software.
LLO 3.1	Draw a distillation column flowsheet using simulation software.
LLO 4.1	Draw a process flowsheet for a compressor system and accurately enter stream and compressor data for analysis
LLO 5.1	Use simulation software to draw a compressor system and predict its outlet temperature.
LLO 6.1	Draw a process flowsheet for a rigorous distillation column and accurately enter stream and compressor data for analysis.
LLO 7.1	Analyze the impact of reflux ratio on stage requirements.
LLO 8.1	Analyze the impact of feed composition on number of stage requirements.
LLO 9.1	Tabulate and interpret condenser duty result..
LLO 10.1	Evaluate the effect of different fluids on pump performance and workdone.
LLO 11.1	Apply energy balance principles to calculate utility outlet stream temperature heat exchanger.
LLO 12.1	Plot Txy diagram at a given pressure for binary system.
LLO 13.1	Tabulate and interpret conversion results from simulation data
LLO 14.1	Determine percentage conversion in Plug Flow Reactor (PFR).
LLO 15.1	Interpret simulation results to understand the effects of pressure and composition on bubble and dew points.

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

PR. No	Relevant COs	Practical - Laboratory Learning Outcome (LLO)	Practical Titles	Planned Dates		Actual Date of conduction	Remark/ Assess-ment Date with Staff sign
				From	To		
1	CO1	LLO 1.1	*Installation of given simulation software and interact with its interface.	A-19/12/25	A-26/12/25		
				B-20/12/25	B-27/12/25		
2	CO1 CO2	LLO2.1	*Creation of any one simple flowsheet in given simulation software.	A-26/12/25	A-02/01/26		
				B-27/12/25	B-03/01/26		
3	CO2 CO3	LLO 3.1	*Draw distillation column flowsheet, add feed stream and operation input data using simulation software..	A-02/01/26	A-09/01/26		
				B-03/01/26	B-10/01/26		
4	CO2 CO3	LLO 4.1	*Creation of compressor flowsheet and enter the stream and compressor data.	A-09/01/26	A-16/01/26		
				B-10/01/26	B-17/01/26		
5	CO2 CO3	LLO 5.1	*Simulation of compressor to find outlet temperature and tabulate the result	A-16/01/26	A-23/01/26		
				B-17/01/26	B-24/01/26		
6	CO2 CO3	LLO 9.1	*Generation of rigorous distillation column flowsheet and enter the	A-23/01/26	A-30/01/26		
				B-24/01/26	B-31/01/26		

PR. No	Relevant COs	Practical - Laboratory Learning Outcome (LLO)	Practical Titles	Planned Dates		Actual Date of conduction	Remark/ Assess-ment Date with Staff sign
			stream, operation data and find out purity of product.				
7	CO2 CO3 CO4	LLO 10.1	*Calculation of condenser duty using process simulation software.	A-30/01/26	A-06/02/26		
				B-31/01/26	B-07/02/26		
8	CO2 CO3 CO4	LLO 11.1	*Simulation of pump for different fluids to calculate its work done.	A-06/02/26	A-13/02/26		
				B-07/02/26	B-14/02/26		
9	CO2 CO3 CO4	LLO 11.1	*Calculation of utility outlet stream temperature from shell and tube heat exchanger using simulation software.	A-13/02/26	A-20/02/26		
				B-14/02/26	B-21/02/26		
10	CO2 CO3 CO4 CO5	LLO 13.1	Calculation of conversion percentage from conversion function in CSTR using simulation software..	A-20/02/26	A-27/02/26		
				B-21/02/26	B-28/02/26		
11	CO2 CO3 CO4 CO5	LLO 14.1	Calculation of conversion percentage from conversion function in Plug Flow Reactor(PFR) using simulation software	A-27/02/26	A-06/03/26		
				B-28/02/26	B-07/03/26		
12	CO2 CO3 CO4 CO5	LLO 15.1	*Calculation of dew point and bubble point of component mixture at different concentration and pressure using simulation software.	A-06/03/26	A-13/03/26		
				B-07/03/26	B-14/03/26		
13			**Beyond Syllabus Practical.**	A-13/03/26	A-20/03/26		
				B-14/03/26	B-21/03/26		

- **ASSESSMENT METHODOLOGIES/TOOLS**

A. Formative assessment (Assessment for Learning)

- Two Class Test of 30 Marks Each, Term Work Assessment of 25 Marks, and Self learning assessment of 25 marks.

B. Summative Assessment (Assessment of Learning)

- End Term Theory Examination, End Term Practical Examination

Laboratory Equipment / Instruments / Tools / Software required

Sr. No.	Equipment Name with Broad Specifications	Relevant LLO Number
1	DWSIM open-source software	ALL
2	Any other commercial process simulation software	ALL

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

Sr. No.	Link / Portal	Description
1	https://spoken-tutorial.org/tutorial-search/?search_foss=DWSIM & search_ language=English	Spoken tutorials
2	https://dwsim.org/index.php/download/	DWSIM Open source Software
3	https://dwsim.org/wiki/index.php?title=Tutorials	Tutorials
4	https://www.iitg.ac.in/tamalb/documents/introtoaspen.pdf	Notes
5	https://chemstations.com/knowledge_center	Notes

Mrs. Y. S. Kumawat
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