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**: Fifth

Programme and Code: Chemical Engineering (CH)   **Course Index: 605**

Course and Code: Process Simulation in Chemical Engineering (PSCE) 316003

Name of Faculty: Mrs. Y. S. Kumawat   **CLASS: TYCH**

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-LEARNING & ASSESSMENT SCHEME

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

Total IKS Hrs for Sem.: 1 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	TLO 1.1 Distinguish between dynamic and steady-state process simulations.
TLO 1.2	TLO 1.2 Enlist types of process simulation software used in chemical engineering
TLO 2.1	TLO 2.1 Explore the basic simulation software interface.
TLO 2.2	TLO 2.2 Describe stepwise procedure to solve process simulation.
TLO 2.3	TLO 2.3 Describe the process of building flow sheet and selection of thermodynamic model.
TLO 3.1	TLO 3.1 Identify the types of data required for process stream and operations.
TLO 3.2	TLO 3.2 Develop skills to troubleshoot process convergence failures.
TLO 3.3	TLO 3.3 Interpret the result in graphical and tabular way.
TLO 4.1	TLO 4.1 Identify the fundamentals of binary system distillation column simulation.
TLO 4.2	TLO 4.2 Analyze the behavior of CSTR in process simulation.
TLO 4.3	TLO 4.3 Evaluate the factors affecting pump and compressor efficiency, head, and power requirements.
TLO 4.4	TLO 4.4 Apply material balance principles to solve mixing problems
TLO 4.5	TLO 4.5 Calculate overall heat load for heat exchangers.
TLO 5.1	TLO 5.1 Analyze the process parameter of distillation and absorption.
TLO 5.2	TLO 5.2 Examine process efficiency through material and energy balance applications.
TLO 5.3	TLO 5.3 Identify key factors influencing process optimization in chemical process.
TLO 5.4	TLO 5.4 Explain application of process simulation in chemical engineering.

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	PSO-3
CO1	2	-	-	3	-	-	2			
CO2	2	2	2	3	-	-	2			
CO3	3	2	2	3	2	1	3			

| CO4 | 3 | 2 | 2 | 3 | 2 | 1 | 3 | | | |
| CO5 | 3 | 2 | 2 | 3 | 2 | 1 | 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: 2025-26   **Institute Code:** 0078
Program: Chemical Engineering   **Course Code:** 316003
Course: Process Simulation in Chemical Engineering (PSCE)   **Semester:** Sixth (CH-6K)
Name of faculty: Mrs. Y. S. Kumawat

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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 Introduction to Process Simulation Software
1 (04)	**CO-1**	**TLO 1.1**	1.1 Process simulation: Basic concept, steady-state and dynamic process simulation.	02	16/12/2025 to 17/12/2025		Blackboard, Books, media, LCD PPT	
		TLO 1.2	1.2 Process simulation software: Use of DWSIM (Open source) and other commercial software	02	23/12/2025 to 24/12/2025			
Unit - II Process Simulation Software Interface
2(04)	**CO-2**	**TLO 2.1**	2.1 Overview of process simulation software interface.	1	30/12/2026 to 30/12/2026		Blackboard, Books, media, LCD PPT	
		TLO 2.2	2.2 Steps involve in process simulation software.	1	31/01/2026 to 31/01/2026			
		TLO 2.3	2.3 Create basic flow sheets for given process.	1	06/01/2026 to 06/01/2026			
		TLO 2.4	2.4 Thermodynamic models: Types	1	07/01/2026 to 07/01/2026			

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
			(NRTL, UNIQUAC, SRK, Peng-Robinson) and selection of model.					
Unit - III Data Input and Result Analysis								
3(04)	**CO-3**	**TLO 3.1**	3.1 Data input for feed stream.	1	13/01/2026 to 13/01/2026		Blackboard, Books, media, LCD PPT	
		TLO 3.2	3.2 Data input for unit operations (compressor, distillation, heat exchangers, pumps, CSTR, PFR).	1	14/01/2026 to 14/01/2026			
		TLO 3.3	3.3 Process convergence.	1	20/01/2026 to 20/01/2026			
		TLO 3.4	3.4 Analysis of results: Graphical and tabular.	1	21/01/2026 to 21/01/2026			
Unit - IV Simulation of Process Equipment								
4(08)	**CO-4**	**TLO 4.1**	4.1 Overview of process simulation of distillation column (binary systems)	1	27/01/2026 to 28/01/2026		Blackboard, Books, media, LCD, PPT	
		TLO 4.2	4.2 Overview of continuous stirred tank reactor (CSTR) process simulation..	2	03/02/2026 to 04/02/2026			
		TLO 4.3	4.3 Pump and compressor process simulation.	2	10/02/2026 to 11/02/2026			
		TLO 4.4	4.4 Process simulation of mixer for mixing operation.	2	17/02/2026 to 18/02/2026			
		TLO 4.5	4.5 Heat exchanger process simulation(shell and	1	24/02/2026 to 24/02/2026			

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
			tube: co-current and counter current)					
		Unit - V Case Studies and Applications						
5(10)	**CO-5**	**TLO 5.1**	5.1 Simulation of basic chemical operations to design process data(distillation, absorption)	2	25/02/2026 to 03/03/2026		Blackboard, Books, LCD, media, PPT	
		TLO 5.2	5.2 Case studies on material and energy balance.	2	04/03/2026 to 10/03/2026			
		TLO 5.3	5.3 Process optimization: Introduction, basic concept, sensitivity analysis.	2	11/03/2026 to 17/03/2026			
		TLO 5.4	Applications of process simulation in chemical engineering.	2	18/03/2026 to 25/03/2026			

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	Dominic Foo	Chemical Engineering Process Simulation	Elsevier ISBN 9780323984553,032398455X
2	Thomas A.Adams, II	Learn Aspen Plus in 24 Hours, 2nd Edition	McGraw Hill ISBN9781264266654

Sr. No.	Author	Title of Book	Publication
3	Juma Haydary	Chemical Process Design and Simulation: Aspen Plus and Aspen Hysys Applications	Wiley, ISBN 9781119311430,1119311438cGraw Hill, New York Publications, ISBN: 9780070855366

LEARNING WEBSITES & PORTALS

Sr. No.	Link / Portal	Description
1	https://spoken-tutorial.org/tutorial-search/?search_foss=DWS IM & 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

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

Mrs. Y. S. Kumawat　　　　　　　　　　　　　　　　**Dr. P. S. Bhandari**

(Name & signature of staff)　　　　　　　　　　　**(Name & signature of HOD)**

CC:　　　Course file –PSCE-316003