

GANPAT UNIVERSITY					
FACULTY OF DIPLOMA ENGINEERING					
Programme	Diploma in Chemical Engineering				
Semester	I		Version	1.0.0.0	
Effective from Academic Year		2025-26	Effective for the batch Admitted in		JULY 2025
Course code	1ES1114	Course Name	Fundamentals of Chemical Engineering		

I.TEACHING-LEARNING AND ASSESSMENT SCHEME																		
Course Type	Course Code	Learning Scheme						Assessment Scheme										
		Actual Contact Hrs./Week			SLH	NLH	Credits	Theory				Practical			Based on SL		Total Marks	
		CL	TL	LL				FA-TH	SA-TH	TOTAL		FA-PR	SA-PR	TOTAL		SLA		
										MAX	MIN			MAX	MIN	MAX		MIN
DSC	1ES1114	3	-	-	1	4	2	40	60	100	40	-	-	-	-	20		8

Abbreviation:	CL- Classroom Learning	TL - Tutorial Learning	LL - Laboratory Learning
	SLH - Self Learning Hours	NLH - Notional Learning Hours	SLA - Self Learning Assessment
	FA - Formative Assessment (Term work +Mid Sem Exam +Attendance)		SA - Summative Assessment

II. PRE-REQUISITES					
Not required					
III. INDUSTRY /EMPLOYER EXPECTED OUTCOMES					
Industry and employers expect chemical engineers to use basic science knowledge and skills to design and improve chemical processes with modern tools for different industries, while helping the environment and keeping up with new technologies.					
IV. COURSE LEARNING OUTCOMES					
At the end of the course, students will be able to achieve the following course learning outcomes: CO1: Understand the history, impact, and key contributions in chemical engineering CO2: Understand core scientific principles used in chemical engineering CO3: Identify key unit operations, and unit processes CO4: Understand technological developments using digital tools					
V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:					
Name of Unit	Theory Learning outcomes (TLO's) aligned to CO's		Learning Content mapped with Theory Learning outcomes (TLO's) & CO's		
Unit 1 Introduction to Chemical Engineering	TLO1.1 Differentiate the scope and focus of chemical engineering compared to chemistry. TLO1.2 Describe the historical development and societal impact of the chemical process industry. TLO1.3 Discuss the role and significance of chemical engineers in various sectors. TLO1.4 Identify key pioneers and their contributions to chemical engineering. TLO1.5 Outline major achievements that have shaped modern chemical engineering.		1.1 Chemistry vs. Chemical Engineering. 1.2 History of the Chemical Process Industry and its Societal Role. 1.3 Role and Importance of Chemical Engineers. 1.4 Pioneers in Chemical Engineering. 1.5 Major Achievements in Chemical Engineering.		13
					10

Unit 2 Core Components of Chemical Engineering	<p>TLO2.1 Identify the major scientific pillars supporting chemical engineering: mathematics, physics, chemistry, biology.</p> <p>TLO2.2 Explain the basic principles of thermodynamics and their role in chemical engineering processes.</p> <p>TLO2.3 Describe transport phenomena and their importance in process engineering.</p> <p>TLO2.4 Discuss the significance of chemical kinetics in reaction engineering.</p> <p>TLO2.5 Introduce the fundamentals of process design, process dynamics, and control concepts.</p>	<p>2.1 Major Scientific Pillars: Mathematics, Physics, Chemistry, Biology.</p> <p>2.2 Role of Thermodynamics and Transport Phenomena.</p> <p>2.3 Role of Thermodynamics and Transport Phenomena.</p> <p>2.4 Importance of Chemical Kinetics.</p> <p>2.5 Introduction to Process Design, Dynamics, and Control.</p>	17	12
Unit 3 Unit Operations and Unit Processes	<p>TLO3.1 Define and classify unit operations and unit processes in chemical engineering.</p> <p>TLO3.2 Describe common unit operations such as filtration, distillation, and heat exchange.</p> <p>TLO3.3 Provide an overview of key unit processes like nitration and hydrogenation.</p> <p>TLO3.4 Explain the basics of equipment design relevant to unit operations and processes.</p> <p>TLO3.5 Interpret process flow sheeting and block diagrams used in chemical process design.</p>	<p>3.1 Definition and Classification</p> <p>3.2 Common Unit Operations: Filtration, Distillation, Heat Exchange</p> <p>3.3 Overview of Key Unit Processes: Nitration, Hydrogenation</p> <p>3.4 Basics of Equipment Design</p> <p>3.5 Process Flow sheeting and Block Diagrams</p>	15	12
Unit 4 Technological Developments and Interdisciplina ry Integration	<p>TLO4.1 Explain the role of computers in chemical engineering simulation and design.</p> <p>TLO4.2 Identify common chemical engineering software tools at an introductory level.</p> <p>TLO4.3 Describe the integration of chemical engineering with other engineering disciplines.</p> <p>TLO4.4 Differentiate between traditional and modern chemical engineering practices.</p> <p>TLO4.5 Outline the role of chemical engineers in</p>	<p>4.1 Role of Computers in Simulation and Design</p> <p>4.2 Chemical Engineering Software Tools (Introductory Level)</p> <p>4.3 Integration with Other Engineering Disciplines</p> <p>4.4 Traditional vs. Modern Chemical Engineering</p> <p>4.5 Role of Chemical Engineers in Emerging Fields</p>	15	11

	emerging fields such as pharmaceuticals, biotech, energy, environment etc.			
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VI. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

- Write a short paragraph summarizing the history of chemical engineering and name three pioneers with their contributions.
- Sketch a basic flow diagram for a common unit operation like filtration or distillation and label the main equipment.
- Make a list matching mathematics, physics, chemistry, and biology topics with their importance in chemical engineering.
- Make a list of at least five possible jobs or industries where chemical engineers work and mention one emerging field like environment or biotech.

Mini projects

- Research and prepare a brief report on three pioneers in chemical engineering and highlight their major achievements and how they influenced the chemical industry and society.
- Choose any three-unit operations and write simple explanations and draw basic diagrams showing how each operation works.

VII. LIST OF REFERENCE BOOKS

Sr. No.	Title	Author	Publication
1	Introduction to Chemical Engineering	S.K. Ghosal, S. Sanyal, S.Datta	Tata McGraw Hill
2	Introduction to Chemical Engineering	S. Pushpavanam	PHI Learning Pvt. Ltd.
3	Introduction to Chemical Engineering	W.L. Badger, J.T. Banchero	Tata McGraw Hill
4	Outlines of Chemical Technology	C.E. Dryden	East-West Press

VIII. LINK OF LEARNING WEB RESOURCE

1	https://nptel.ac.in/courses/103103220
2	https://nptel.ac.in/courses/103103145
3	https://nptel.ac.in/courses/103103153
4	https://nptel.ac.in/courses/103103209
5	https://youtu.be/Q-IhyZ2Uazs

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	Introduction to Chemical Engineering	CO1	10	5	5	3	13
2	Core Components of Chemical Engineering	CO2	12	7	7	3	17
3	Unit Operations and Unit Processes	CO3	12	6	5	4	15
4	Technological Developments and Interdisciplinary Integration	CO4	11	6	5	4	15
Grand Total			45	24	22	14	60

X. COs AND POs AND PSOs MAPPING

Course outcome (Cos)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	0	0	2	1	1	1	0	2
CO2	3	2	1	0	0	0	1	2	0	2
CO3	2	2	2	3	1	1	1	3	2	2
CO4	1	1	1	1	2	2	3	2	3	2
Legends: - 3- High 2-Moderate/Medium 1-Slight/Low 0-None										