Thadomal Shahani Engineering College

(A Constituent College of HSNC University, Mumbai)

Bachelor of Engineering (B.E.)

in

Chemical Engineering

Programme Scheme

R-2026

(As per NEP 2020)

Undergraduate Programme

Applicable from Academic Year 2027–28

(Subject to revision after every two academic years)

Thadomal Shahani Engineering College

(A Constituent College of HSNC University, Mumbai)

Institute Vision:

Perpetuating and transcending the processes of:

- Contributing to evolving supply chain of human capital for National Economy
- Creating entrepreneurs and 'game changers' to support heightened level of economic activities underpinning ever increasing human aspiration
- Helping the Nation evolve as a total solution provider
- Value and wealth creation for the mankind

Institute Mission:

Focusing and practicing:

- Product and processes innovation
- Leveraging human cognitive and behavioral science for creating instructional content
- Pervasive and ubiquitous Information Communication Technologies for customized content for learning
- Acknowledge and facilitate various learning styles and learning abilities
- Migrating from teaching paradigm to learning paradigm
- Every day discourse shall inculcate research culture and further the cause of societal advancement
- Understand various markets and cultures
- Collaborative learning and emotional integrity
- Sensitizing about opportunities in Energy, Education, Environment and Health care sectors
- Extensively promoting computer aided design, analysis and manufacturing procedures
- Theoretical rigor to develop conceptual clarity
- Modeling and design of experiments to inculcate culture of investigation
- Helping foot print on Project management and collaborative human endeavor
- Interdisciplinary studies and exposure to functional areas

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Department Vision:

To be a learning organization that empowers learners to evolve as a part of total solution builders, contributing to sustainability in chemical engineering processes, by leveraging advancements in information and communication technology.

Department Mission:

- Radically modify the curriculum design process to be abreast with new changes in the core and auxiliary enabling technology.
- Create world class experimental facilities for carrying investigation and research in chemical engineering and allied fields .
- Create center of excellence in environmental studies and research.
- Sensitize students about ethical and societal impact of their professional activities and conduct.
- Training students about industrial safety and risk mitigation techniques.
- Impress the learners about carbon capture technology, generation of carbon credits and generation of green energy technologies.
- Initiate students to entrepreneurship training, start-ups, industrial finance and risk management.
- Building efficiency in chemical engineering enterprises through the integration of generative AI tools. Inspire learners to focus on driving efficiencies in chemical engineering processes.
- Helping people to apply AI techniques for improved process control

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Program Specific Outcomes (PSOs)

- PSO1: Graduates will apply knowledge of basic engineering sciences in the field of chemical engineering to create sustainable products and process.
- PSO2: Graduates will have propensity to design and develop new and existing chemical operation and process based on standard specification.
- PSO3: Graduates will be able to use advanced computational and design techniques in chemical engineering field.
- PSO4: Graduates will become successful professionals (in industry, government, academia, research, entrepreneurial pursuit and consulting firms) with excellent communication & scientific skills, integrity, ethics and will work for the betterment of society by focusing on environmental, societal and industrial issues.

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Program Outcome (POs)

- PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- PO2: Problem Analysis: Identify, formulate, review research literature and analyse complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
- PO3: Design / Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
- PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
- PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6).
- PO6: The Engineer and the World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
- PO8: Individual and Collaborative Team Work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
- PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

- PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Program Structure for Chemical Engineering
HSNC University, Mumbai

Second **Year (with effect from A.Y 2027-28)**

SEMESTER III

Course Code	Course Title	Teaching Scheme (Contact Hours)			Credit	EVALUATION SCHEME							
		L	T	P		IA-I	IA-II	IA-I + IA II	End Sem Exam	Exam duration in hrs.	Term Work	Practical & Oral Exam	Total
PC301	Probability and Statistics for Data Science	2	--	--	2	20	20	40	60	2	--	--	100
PC302	Process Calculation	3	--	--	3	20	20	40	60	2	--	--	100
PC303	Chemical Engineering Thermodynamics	3	--	--	3	20	20	40	60	2	--	--	100
PC304	Fluid and solid flow Operation	3	--	--	3	20	20	40	60	2	--	--	100
OE301	**Open Elective:** Evolution of science and technology	2#	--	--	2	10	10	20	30	1	--	--	50
PCL301	Process Calculation Lab	--	--	2	1	--	--	--	--	--	25	25	50
PCL302	Fluid and solid flow Operation lab	--	--	2	1	--	--	--	--	--	25	25	50
VSE301	Object-Oriented Programming with Python	--	--	2+2*	2	--	--	--	--	--	50	25	75
CEP301	Mini Project- 1A	--	--	4$	2	--	--	--	--	--	25	25	50
VECL301	Environmental Science for Engineers (Syllabus common to all Branches).	--	--	2*+2	2	--	--	--	--	--	50	--	50
TOTAL		**13**	**--**	**16**	**21**	**90**	**90**	**180**	**270**	**9**	**175**	**100**	**725**

* Two hours of practical class to be conducted for full class as demo/discussion.

$ indicates workload of Learner (Not Faculty), Students can form groups with minimum 2 (Two) and not more than 4 (Four), Faculty Load: 1 hour per week per four groups

#Institute shall offer an Open Elective course from the Science/Commerce/Management stream basket provided by HSNC University.

Program Structure for Chemical Engineering
HSNC University, Mumbai
Second Year (with effect from A.Y 2027-28)
SEMESTER IV

Course Code	Course Title	Teaching Scheme (Contact Hours)			Credit	EVALUATION SCHEME							
		L	T	P		IA-I	IA-II	IA-I + IA II	End Sem Exam	Exam duration in hrs.	Term Work	Practical & Oral Exam	Total
PC401	Chemical Process Technology	3	--	--	3	20	20	40	60	2	--	--	100
PC402	Heat Transfer Operations	3	--	--	3	20	20	40	60	2	--	--	100
PC403	Mass Transfer Operations	3	--	--	3	20	20	40	60	2	--	--	100
MD401	**Multi-disciplinary Minor**: Behavioural Economics	3	--	--	3	20	20	40	60	2	--	--	100
OE401	**Open Elective:** Global supply chain	2#	--	--	2	10	10	20	30	1	--	--	50
PCL401	Chemical Process Technology lab	--	--	2	1	--	--	--	--	--	25	25	50
PCL402	Heat Transfer Operations lab	--	--	2	1	--	--	--	--	--	25	25	50
PCL403	Mass Transfer Operations lab	--	--	2	1	--	--	--	--	--	25	25	50
MDL401	Multi-disciplinary Minor Lab	--	--	2	1	--	--	--	--	--	25	25	50
CEP401	Mini Project-1B	--	--	4$	2	--	--	--	--	--	25	25	50
EEM402	Business Model Development (Syllabus common to all Branches)	--	--	2*+2	2	--	--	--	--	--	50	--	50
TOTAL		**14**	**--**	**16**	**22**	**90**	**90**	**180**	**270**	**9**	**175**	**125**	**750**

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Program Structure for Chemical Engineering
HSNC University, Mumbai
Third Year (with effect from A.Y 2028-29)
SEMESTER V

Course Code	Course Title	Teaching Scheme (Contact Hours)			Credit	EVALUATION SCHEME							
		L	T	P		IA-I	IA-II	IA-I + IA II	End Sem Exam	Exam duration in hrs.	Term Work	Practical & Oral Exam	Total
PC501	Process Engineering and Economics	3	--	--	3	20	20	40	60	2	--	--	100
PC502	Chemical Reaction Engineering	3	--	--	3	20	20	40	60	2	--	--	100
PC503	Chemical Engineering Computations	3	--	--	3	20	20	40	60	2	--	--	100
PE501	Program Electives -I	3	--	--	3	20	20	40	60	2	--	--	100
MD501	**Multi-disciplinary Minor:** Financial accounting	3	--	--	3	20	20	40	60	2	--	--	100
OE501	**Open Elective:** International treaties and Agreements	2#	--	--	2	10	10	20	30	1	--	--	50
PCL501	Process Engineering and Economics lab	--	--	2	1	--	--	--	--	--	25	25	50
PCL502	Chemical Reaction Engineering lab	--	--	2	1	--	--	--	--	--	25	25	50
PCL503	Chemical Engineering Computations lab	--	--	2	1	--	--	--	--	--	25	25	50
PEL501	Program Electives -I Lab	--	--	2	1	--	--	--	--	--	25	25	50
MDL502	Multi-disciplinary Minor Lab	--	--	2	1	--	--	--	--	--	25	25	50
CEP501	Mini Project- 2A	--	--	4[$]	2	--	--	--	--	--	25	25	50
TOTAL		**17**	**--**	**14**	**24**	**110**	**110**	**220**	**330**	**11**	**150**	**150**	**850**

PE501	Program Electives -I	PEC5011 Piping Engineering PEC5012 Advanced Material Sciences PEC5013 Pollution Control Technology	PEL5011 Piping Engineering Lab PEL5012 Advanced Material Sciences Lab PEL5013 Pollution Control Technology Lab

Program Structure for Chemical Engineering
HSNC University, Mumbai

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#Institute shall offer an Open Elective course from the Science/Commerce/Management stream basket provided by HSNC University.

Third Year (with effect from A.Y 2028-29)

SEMESTER VI

Course Code	Course Title	Teaching Scheme (Contact Hours)			Credit	EVALUATION SCHEME							
		L	T	P		IA-I	IA-II	IA-I + IA II	End Sem Exam	Exam duration in hrs.	Term Work	Practical & Oral Exam	Total
PC601	Modelling, Simulation and optimisation	3	--	--	3	20	20	40	60	2	--	--	100
PC602	Chemical Process Safety and Hazards	3	--	--	3	20	20	40	60	2	--	--	100
PE601	Program Electives -II	3	--	--	3	20	20	40	60	2	--	--	100
PE602	Program Electives -III	3	--	--	3	20	20	40	60	2	--	--	100
MD601	**Multi-disciplinary Minor:** UPI and Fintech	3	--	--	3	20	20	40	60	2	--	--	100
PCL601	Modelling, Simulation and optimisation Lab	--	--	2	1	--	--	--	--	--	25	25	50
PCL602	Chemical process Safety and Hazards Lab	--	--	2	1	--	--	--	--	--	25	25	50
PEL601	Program Electives -II Lab	--	--	2	1	--	--	--	--	--	25	25	50
PEL602	Program Electives -III Lab	--	--	2	1	--	--	--	--	--	25	25	50
MDL601	Multi-disciplinary Minor Lab	--	--	2	1	--	--	--	--	--	25	25	50
VSE601	Application of AI in chemical Engineering	--	--	2*+2	2	--	--	--	--	--	50	--	50
CEP601	Mini Project-2B	--	--	4$	2	--	--	--	--	--	25	25	50
TOTAL		**15**	**--**	**18**	**24**	**100**	**100**	**200**	**300**	**10**	**200**	**150**	**850**

PE601	Program Electives -II	PEC6011 Biochemical Engineering and Biotechnology PEC6012 Project Engineering and Management PEC6013 Industrial Reactor Design	PEL6011 Biochemical Engineering and Biotechnology PEL6012 Project Engineering and Management Lab PEL6013 Industrial Reactor Design Lab

Program Structure for Chemical Engineering
HSNC University, Mumbai

PE602	Program Electives -III	PEC6021 Plant Utilities PEC6022 Energy System Design and Audit PEC6023 Carbon Capture and utilisation	PEL6021 Plant Utility Lab PEL6022 Energy System Design and Audit Lab PEL6023 Carbon Capture and utilisation Lab

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* Two hours of practical class to be conducted for full class as demo/discussion

Fourth Year (with effect from A.Y 2029-30)

SEMESTER VII

Course Code	Course Title	Teaching Scheme (Contact Hours)			Credit	EVALUATION SCHEME							
		L	T	P		IA-I	IA-II	IA-I + IA II	End Sem Exam	Exam duration in hrs.	Term Work	Practical & Oral Exam	Total
PC701	Process Dynamics and Control	3	--	--	3	20	20	40	60	2	--	--	100
PE701	Program Electives -IV	3	--	--	3	20	20	40	60	2	--	--	100
PCL701	Process Engineering and Economics Lab	--	--	2	1	--	--	--	--	--	25	25	50
PEL701	Program Electives -IV lab	--	--	2	1	--	--	--	--	--	25	25	50
MDL701	**Multi-disciplinary Minor Lab:** Banking and Insurance	--	--	2*+2	2	--	--	--	--	--	50	25	75
PC701	Major Project- I	--	--	4	2	--	--	--	--	--	50	50	100
EL702	Industry Internship / In house Internship project	(Entire Semester)			6	--	--	--	--	--	100	100	200
TOTAL		**06**	**--**	**12**	**18**	**40**	**40**	**80**	**120**	**04**	**250**	**200**	**675**

PE701	Program Electives -IV	PEC7011 ESG practices PEC7012 Electrochemical Reactions and Fuel Cells PEC7013 Separation Processes	PEL7011 ESG practices Lab PEL7012 Electrochemical Reactions and Fuel Cells PEL7013 Separation Processes Lab

* Two hours of practical class to be conducted for full class as demo/discussion

Program Structure for Chemical Engineering
HSNC University, Mumbai

Fourth Year (with effect from A.Y 2029-30)
SEMESTER VIII

Course Code	Course Title	Teaching Scheme (Contact Hours)			Credit	EVALUATION SCHEME							
		L	T	P		IA-I	IA-II	IA-I + IA II	End Sem Exam	Exam duration in hrs.	Term Work	Practical & Oral Exam	Total
PC801	Chemical Engineering Equipment Design	3	--	--	3	20	20	40	60	2	--	--	100
PE801	Program Electives-V	3	--	--	3	20	20	40	60	2	--	--	100
PCL801	Chemical Engineering Equipment Design Lab	--	--	2	1	--	--	--	--	--	25	25	50
PEL801	Program Electives -V Lab	--	--	2	1	--	--	--	--	--	25	25	50
PC801	Major Project- II	--	--	4	2	--	--	--	--	--	50	50	100
EL802	Industry Internship / In house Internship project	(Entire Semester)			6	--	--	--	--	--	100	100	200
TOTAL		**06**	**--**	**08**	**16**	**40**	**40**	**80**	**120**	**04**	**200**	**200**	**600**

PE801	Program Electives -V	PEC8011 Petroleum Refining PEC8012 Transport Phenomenon PEC8013 Membrane technology	PEL8011 Petroleum Refining PEL8012 Transport Phenomenon Lab PEL8013 Membrane technology Lab

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