

CHEMICAL ENGINEERING DEPARTMENT

B. Tech. Chemical Engineering

Scheme & Syllabus w.e.f. 2024-25 Admitted Batch



Chemical Engineering Department

Maulana Azad National Institute of Technology Bhopal

Scheme of Undergraduate Program (B. Tech in Chemical Engineering)

Programme Educational Objective (PEOs):

1. To prepare students to achieve professional engineering competence.
2. To acquaint with the principles of basic chemical engineering and utilize them to formulate, solve and analyze industrial problems as well as to prepare them for advanced multidisciplinary research.
3. To take initiative and demonstrate ability towards independent learning and introduce professional ethics and codes of professional practices.

Programme Outcomes (POs):

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
4. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
5. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
6. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
7. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
8. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Scheme of UG Course

B. Tech. Third Semester (Chemical Engineering)

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
MTH 231	Applied Numerical Methods	3	1	-	4
HUM 251	Fundamental of Entrepreneurship	3	-	-	3
CHE24-211	Chemical Process Calculations	3	-	-	3
CHE24-212	Transport Phenomena	3	-	-	3
CHE24-213	Chemical Engineering Thermodynamics-1	3	-	-	3
CHE24-214	Mechanical Operations	3	-	-	3
CHE24-215	Application of Scilab in Chemical Engineering	-	-	2	1
CHE24-216	Fuels and Combustion Lab	-	-	2	1
CHE24-217	Mechanical Operations Lab	-	-	2	1
CHE24-218	Professional Practice	-	2	-	2
Total Hours = 27		18	3	6	24
Total Credits (Cumulative)					65
Additional Subject: National Cadet Corps (NCC)					
NCC 251	National Cadet Corps III	1	5	1	7
Total Credits (Cumulative)					11

B. Tech. Fourth Semester (Chemical Engineering)

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
ME 252	Fundamentals of Design Methods	2	1	-	3
CHE24-221	Heat Transfer	3	1	-	4
CHE24-222	Mass Transfer-1	3	-	-	3
CHE24-223	Chemical Reaction Engineering-1	3	-	-	3
CHE24-224	Fluid Mechanics	3	-	-	3
CHE24-225	Chemical Engineering Thermodynamics-2	3	-	-	3
CHE24-226	Heat Transfer Lab	-	-	2	1
CHE24-227	Fluid Mechanics Lab	-	-	2	1
CHE24-228	Project Based Lab-1	-	-	2	1
Total Hours = 25		17	2	6	22
Total Credits (Cumulative)					87
Additional Subject: National Cadet Corps (NCC)					
NCC 252	National Cadet Corps IV	2	-	1	3
Total Credits (Cumulative)					14

B. Tech. Fifth Semester (Chemical Engineering)

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
CHE24-311	Chemical Process Equipment Design	3	1	-	4
CHE24-312	Mass Transfer-2	3	-	-	3
CHE24-313	Chemical Reaction Engineering-2	3	-	-	3
CHE24-314	Plant Design and Economics	3	-	-	3
CHE24-315	Computational Chemical Engineering	3	-	-	3
	Departmental Elective-1 (A)	3	-	-	3
CHE24-316	Mass Transfer Lab	-	-	2	1
CHE24-317	Chemical Reaction Engineering Lab	-	-	2	1
CHE24-318	Process Equipment Design & Drawing Lab	-	-	2	1
CHE24-319	Internship/Industrial Training	-	-	2	1
Total Hours = 27		18	1	8	23
Total Credits (Cumulative)					110
Additional Subject: National Cadet Corps (NCC)					
NCC 351	National Cadet Corps V	1	5	1	7
Total Credits (Cumulative)					21
*Optional	[NPTEL/SWAYAM Courses only]	3	-	-	3

B. Tech. Sixth Semester (Chemical Engineering)

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
CS 352	Data Structure and Algorithm	3	1	-	4
CHE24-321	Process Dynamic Models and Control Technology Tools	3	1	-	4
CHE24-322	Process Modeling and Simulation	3	-	-	3
CHE24-323	Chemical Process Technology	3	-	-	3
	Department Elective-2 (A)	3	-	-	3
CHE24-324	Chemical Process Technology Lab	-	-	2	1
CHE24-325	Process Modeling and Simulation Lab	-	-	2	1
CHE24-326	Process Control & Instrumentation Lab	-	-	2	1
CHE24-327	Mini Project	-	-	2	1
Total Hours = 25		15	2	8	21
Total Credits (Cumulative)					131
Additional Subject: National Cadet Corps (NCC)					
NCC 352	National Cadet Corps VI	2	-	1	3
Total Credits (Cumulative)					24

B. Tech. Seventh Semester (Chemical Engineering)

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
HUM 451	Engineering Economics & IPR	3	-	-	3
CHE24-411	Safety & Hazard Management in Chemical Industries	3	-	-	3
	Department Elective-3 (A)	3	-	-	3
	Department Elective-4 (A)	3	-	-	3
	Open Elective-1(C)	3	-	-	3
CHE24-412	Application of AI in Chemical Engineering	-	-	2	1
CHE24-413	Project-1	-	-	4	2
CHE24-414	Internship/Field Training	-	-	2	1
Total Hours = 23		15	-	8	19
Total Credits (Cumulative)					150

B. Tech. Eight Semester (Chemical Engineering)

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
	Department Elective-5(A) [NPTEL/SWAYAM Courses only]	3	-	-	3
	Department Elective-6(A) [NPTEL/SWAYAM Courses only]	3	-	-	3
CHE24-421	Project-2 / Internship	-	-	16	8
CHE24-422	General Proficiency	-	-	-	1
Total Hours = 22		6	-	16	15
Cumulative Credits					165

Electives	
Group A: Departmental Electives Departmental Elective- 1(A) CHE24-351 Biochemical Engineering CHE24-352 Oil and Paint Technology CHE24-353 Sustainable Engineering CHE24-354 Paper and pulp technology CHE24-355 Petroleum Refinery Engineering CHE24-356 Fertilizer Technology CHE24-357 Novel Separation Techniques CHE24-358 Advanced Material Characterization CHE24-359 Bio Energy Technology CHE24-360 Solid Waste Management Departmental Elective- 2(A) CHE24-361 Industrial Pollution Control CHE24-362 Process Piping Design CHE24-363 Packaging Technology CHE24-364 Transport in Porous media CHE24-365 Computer Aided Process Control & Design CHE24-366 Fluidization Engineering CHE24-367 Fuels and Combustion CHE24-368 Economics and Managements of chemical Industries CHE24-369 Advanced Analytical Techniques CHE24-370 Material Synthesis processes Departmental Elective- 3(A) CHE24-451 Air Pollution and control CHE24-452 Oil and Gas well testing and enhanced oil recovery CHE24-453 Membrane Science and Technology CHE24-454 Industrial Catalysis CHE24-455 Introduction to Multi Phase Flow CHE24-456 Trends in Healthcare and Technology CHE24-457 Wastewater Treatment CHE24-458 Ceramic Technology CHE24-459 Advanced Process Optimization CHE24-460 Introduction to Nanoscience and Technology Departmental Elective- 4(A) CHE24-461 Plant Utility CHE24-462 Numerical and Statistical Methods in Chemical Engineering CHE24-463 Cleaner Technologies in Chemical Process Industries CHE24-464 Computational Fluid Dynamics	CHE24-465 Sustainability and Green Chemistry CHE24-466 Nanotechnology in Catalysis CHE24-467 Hazardous Waste Treatment and Management CHE24-468 Rubber Technology CHE24-469 Polymer Science & Technology CHE24-470 Textile Technology CHE24-471 Petrochemical Technology CHE24-472 Statistical analysis and design of experiments in chemical engineering CHE24-473 Electrochemical Engineering Group C: Open Elective (Others) CE 453 Remote Sensing and GIS CE 475 Sustainable Development and Global Environmental Issues CS 456 Web Search and IR CS 466 Optimization Techniques ECE 469 Neural Networks ECE 468 Fuzzy Logic EE 401 Fundamentals of Electric Drives EE 402 Power System Protection ME 581 Value engineering ME 583 Mechatronics and NDT in engineering ARC 401 Built and Unbuilt Heritage ARC 402 Building Indoor and Outdoor Environment PHY 401 Modern Engineering Physics PHY 402 Nuclear Power Engineering PHY 403 Fundamentals of Nanotechnology and Nanoscience HUM 401 Applied Social Psychology HUM 402 Basic Econometrics RE 401 Renewable Energy Open Electives offered to Students of Other Departments CHE24-401 Petroleum Refinery & Petrochemicals CHE24-402 Physico-chemical Separation Processes