

DEPARTMENT OF CHEMICAL ENGINEERING

Course Book

**B.Tech. in Chemical Engineering
(Admission of 2015-16 onwards)**



Visvesvaraya National Institute of Technology, Nagpur

January 2016

General Information about the department:

The Chemical Engineering Department at VNIT is one of the youngest and premier engineering department of VNIT Nagpur. It has dynamic and goal oriented group of highly qualified and well experienced faculty with large and modern research and development infrastructure.

Objective of the program:

The Chemical Engineering Program at Visvesvaraya National Institute of Technology produces graduates with a basic understanding of chemical engineering principles along with problem solving, teamwork and communication skills necessary to succeed in diverse careers, including chemical engineering practice and academic research. The Programme has the following educational objectives:

- To prepare students for successful practice in diverse fields of chemical engineering such as pharmaceuticals, chemicals, polymers / advanced materials, energy, biotechnology and environmental engineering and in the fields of societal expectations on time.
- To prepare students for advanced studies in Chemical Engineering and its allied fields.
- To ensure our students are recognized for excellence and leadership and selected for high-ranking industrial, academic, government and other professional positions.
- To develop students' skills and awareness to become socially, ethically and morally responsible individual in all the challenges they take over in our communities and in the field of chemical engineering.

Credit Structure of the program:

The Department offers course at undergraduate level leading to 4 year B.Tech Degree with emphasis on theory and practice of Chemical Engineering to meet the current and future requirements of the country. This is 4 year (8 semester program) , wherein student has to complete certain number of credits as indicated in Table 1. Each subject (or course) has certain number of credits. There are four types of subjects:- Departmental core (DC), Departmental elective (DE), Humanity (HM) and Open course (OC).Core courses are compulsory and some courses from electives are to be taken to complete the required credits.

Table 1. CREDIT REQUIRMENTS FOR B.TECH. CHEMICAL ENGINEERING

Category	Credit
1 st year credits	43
DC	81
DE	36-48
HM	0-6
OC	0-6
Total	170

The number of credits attached to a subject depends on number of classes in a week. For example a subject with 3-1-0 (L-T-P) means it has 3 lectures, 1 tutorial, and 0 practical in a week. This subject will have eight credits (3X2+1X1+0X1=8). If a student is declared pass in a subject, then he/she gets the credits associated with that subject. Depending on marks scored in a subject, student is given a grade. Each grade has got certain points as follows:

Grades	AA	AB	BB	BC	CC	CD	DD	FF
Grade Points	10	09	08	07	06	05	04	Fail

The performance of a student will be evaluated in terms of two indices, viz. The Semester Grade Point Average (SGPA) which is the grade point average for a semester and Cumulative Grade Point Average (CGPA) which is the grade point average for all the completed semesters at any point in time. SGPA & CGPA are:

$$SGPA = \frac{\sum_{\text{Semester}} (\text{Course credits} \times \text{Grade points})_{\text{for all courses except audit}}}{\sum_{\text{Semester}} (\text{Course credits})_{\text{for all courses except audit}}}$$

$$CGPA = \frac{\sum_{\text{All Semester}} (\text{Course credits} \times \text{Grade points})_{\text{for all courses with pass grade except audit}}}{\sum_{\text{All Semester}} (\text{Course credits})_{\text{for all courses except audit}}}$$

Students can Audit a few subjects i.e., they can attend the classes and do home work and give exam also, but they will not get any credit for that subject. Audit subjects are for self enhancement of students.

Details of faculty members of Chemical Engineering Department:

S.N.	Name	Designation	Qualification	E-mail id
1.	Agrawal Shailesh G.	Assistant Prof.	Ph.D	sgagrawal28783@gmail.com
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4.	Gaikwad Ashwin P.	Assistant Prof.	Ph.D	ashwin2781@gmail.com
5.	Kannan Ashwin	Assistant Prof.	Ph.D	ashwink1981@gmail.com
6.	Kodape Shyam M.	Assistant Prof.	Ph.D(Submitted)	samkodape@rediffmail.com
7.	Mandavgane Sachin A.	Associate Prof.	Ph.D	mandavgane@gmail.com
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12.	Sonawane Shriram S.	Assistant Prof.	Ph.D	shriramsonawane@gmail.com
13.	Tajane(Hiwarkar) Sonali P.	Assistant Prof.	Ph.D(Submitting)	sonali_hiwarkar@rediffmail.com
14.	Varma Mahesh N.	Assistant Prof.	Ph.D	maheshnvarma@gmail.com
15.	Vijayakumar R. P.	Assistant Prof.	Ph.D	jbgvijayitb@gmail.com
16.	Wanjari Piyush P.	Assistant Prof.	Ph.D	ppwanjari@gmail.com
17.	Wasewar Kailas L.	Associate Prof.	Ph.D	k_wasewar@rediffmail.com

Scheme of Instructions for B.Tech. Chemical Engineering:For all the B.Tech. programs, first two semesters are common. The details of these courses are mention in the first year B. Tech Course Book, available at the VNIT website. In the first two semesters, all the B.Tech. Students complete 43 credits from the courses of Basic Sciences (BS), Engineering Sciences (ES), and Humanities (HU).

SCHEME OF INSTRUCTION FOR B. TECH (CHEMICAL ENGINEERING) 2015-16 ONWARD

Code	Course	L-T-P	Cr	Code	Course	L-T-P	Cr
III Semester				IV Semester			
Core				Core			
CML201	Chemical Process Calculations	3-1-0	4	CML221	Mass Transfer I	3-1-0	4
CML202	Fluid Mechanics	3-1-0	4	CML222	Heat Transfer	3-1-0	4
CML203	Mechanical Operations	3-0-0	3	CML223	Chemical Reaction Engineering I	3-1-0	4
CML204	Chemical Engg. Thermodynamics I	3-0-0	3	CML224	Chemical Engg. Mathematics	3-0-0	3
CHL263	Organic Chemistry and Synthesis	3-0-0	3	CML225	Chemical Engg. Thermodynamics II	3-0-0	3
CMP204	Technical Analysis Laboratory	0-0-2	1	CMP202	Fluid Mechanics Laboratory	0-0-2	1
CHP263	Organic Chemistry and Synthesis Lab.	0-0-2	1	CMP203	Mechanical Operations Laboratory	0-0-2	1
Elective (Any one)				Elective (Any one)			
MAL205	Num. Methods & Prob. Theory	3-0-0	3	MAL205	Num. Methods & Prob. Theory	3-0-0	3
CML231	Materials Science and Engineering	3-0-0	3	CML233	Environmental Engineering	3-0-0	3
CML232	Introduction to Computing Software for Chemical Engineers	3-0-0	3	CML234	Industrial Waste Treatment	3-0-0	3
	OC /HM				OC /HM		
Total			22	Total			23
V Semester				VI Semester			
Core				Core			
CML301	Mass Transfer II	3-0-0	3	CML351	Chemical Technology	3-0-0	3
CML302	Chem. Process Modeling and Simulation	3-0-0	3	CML352	Transport Phenomena	3-1-0	4
CML303	Process Control and Instrumentation	3-0-0	3	CML353	Chemical Process Equipment Design	3-0-0	3
CML304	Chemical Reaction Engineering II	3-0-0	3	CML354	Energy and Environment	3-0-0	3
CMP304	Chemical Reaction Engineering Laboratory	0-0-2	1	CMP302	Chemical Process Modeling and Simulation Laboratory	0-0-2	1
CMP322	Heat Transfer Laboratory	0-0-2	1	CMP303	Process Control and Instrumentation Laboratory	0-0-2	1
				CMP321	Mass Transfer Laboratory I	0-0-2	1
Elective (Any two)				Elective (Any two)			
CML383	Advance Heat Transfer	3-0-0	3	CML386	Biotechnology & Biochemical Engg.	3-0-0	3
CML384	Safety and Risk Analysis	3-0-0	3	CML387	Instrumental Analytical Techniques	3-0-0	3
CML385	New and Renewable Energy Engg.	3-0-0	3	CHL366	Polymer Engineering	3-0-0	3
				CHL369	Green Chemistry and Engineering	3-0-0	3
	OC /HM				OC /HM		
Total			20	Total			22
VII Semester				VIII Semester			
Core				Core			
CML403	Plant Design and Economics	3-0-0	3	CMP403	Design Lab II	0-0-2	1
CMD404	Project Phase-I	--	2	CMD405	Project Phase-II	--	4
CMP401	Mass Transfer Laboratory II	0-0-2	1				
CMP453	Design Lab I	0-0-2	1				
Elective (Any Four Theory and One Practical)				Elective (Any Five)			
CML422	Plant Utility	3-0-0	3	CML430	Ore and Minerals Processing	3-0-0	3
CML423	Optimization Techniques	3-0-0	3	CML431	Entrepreneurship Development	3-0-0	3
CML424	Petroleum Refinery Engineering	3-0-0	3	CML432	Computational Transport Processes	3-0-0	3
CML425	Membrane Technology	3-0-0	3	CML433	Project Planning and Management	3-0-0	3
CML426	Polymer Processing	3-0-0	3	CML434	Computational Methods in Chemical Engineering	3-0-0	3
CML427	Advanced Separation Process	3-0-0	3				
CML428	CFD for Chemical Engineers	3-0-0	3	CML435	Computer Aided Design in Chem. Engg.	3-0-0	3
CML429	Nanotechnology	3-0-0	3				
CMP427	Separation Process	0-0-2	1				
CMP433	Environmental Engineering Lab.	0-0-2	1				
	OC /HM				OC /HM		
Total			20	Total			20

List of the Core Subjects

Course Code	Name of Subject	Credits
CML201	Chemical Process Calculations	4
CML202	Fluid Mechanics	4
CML203	Mechanical Operations	3
CML204	Chemical Engineering Thermodynamics I	3
CMP204	Technical analysis laboratory	1
CHL263	Organic Chemistry and Synthesis	3
CHP263	Organic Chemistry and synthesis laboratory	1
CML221	Mass Transfer I	4
CML222	Heat Transfer	4
CML223	Chemical Reaction Engineering I	4
CML224	Chemical Engineering Mathematics	3
CML225	Chemical Engineering Thermodynamics II	3
CMP202	Fluid Mechanics Laboratory	1
CMP203	Mechanical Operations Laboratory	1
CML301	Mass Transfer II	3
CML302	Chemical Process Modeling and Simulation	3
CML303	Process Control and Instrumentation	3
CML304	Chemical Reaction Engineering II	3
CMP304	Chemical Reaction Engineering laboratory	1
CMP322	Heat Transfer Laboratory	1
CML351	Chemical Technology	3
CML352	Transport Phenomena	4
CML353	Chemical Process Equipment Design	3
CML354	Energy and Environment	3
CMP302	Chemical Process Modeling and simulation laboratory	1
CMP303	Process Control and Instrumentation laboratory	1
CMP321	Mass Transfer Laboratory I	1
CML403	Plant Design and Economics	3
CMP401	Mass Transfer Laboratory II	1
CMP453	Design Laboratory I	1
CMD404	Project Phase-I	2
CMP403	Design Laboratory II	1
CMD405	Project Phase-II	4

Electives Courses

Course Code	Name of Subject	Credits
MAL205	Num. Methods & Prob. Theory	3
CML231	Materials Science and Engineering	3
CML232	Introduction to Computing software for Chemical Engineers	3
CML233	Environmental Engineering	3
CML234	Industrial Waste Treatment	3
CML383	Advance Heat Transfer	3
CML384	Safety and Risk Analysis	3
CML385	New and Renewable Energy Engineering	3
CML386	Biotechnology and Biochemical Engineering	3
CML387	Instrumental Analytical Techniques	3
CML393	Innovative Design	3
CML394	Introduction to Measuring Instruments	3
CHL336	Polymer Engineering	3
CHL369	Green Chemistry and Engineering	3
CML422	Plant Utility	3
CML423	Optimization Techniques	3
CML424	Petroleum Refinery Engineering	3
CML425	Membrane Technology	3
CML426	Polymer Processing	3
CML427	Advanced Separation Process	3
CMP427	Separation Process	1
CML428	CFD for Chemical engineers	3
CML429	Nanotechnology	3
CMP429	Nanotechnology Lab	1
CML430	Ore and Minerals Processing	3
CMP434	Industrial Waste Treatment Laboratory	1
CMP433	Environmental Engineering Lab	1
CML431	Entrepreneurship Development	3
CML432	Computational Transport Processes	3
CML433	Project Planning and Management	3
CML434	Computational methods in Chemical Engineering	3
CML435	Computer Aided Design in Chemical Engineering	3

Course Code	Name of Subject	Credits
CML388	Pulp And Paper Technology	3
CML389	Chemical Informatics	3
CML390	Technology of Paints Pigments and Powder Coating	3
CML391	Surface Coating Engineering	3
CML392	Corrosion Engineering	3
CML436	Advanced Separation Tech.	3
CML438	Piping Engineering	3
CML439	Energy Management	3
CML440	Chemical Reactor Analysis	3
CML441	Process Intensification	3
CML442	Reliability Engineering	3
CMP266	Engineering Drawing and Graphics	1
CMP267	Computer Programming and Applications	1
MAL275	Numerical and Statistical Methods	3