University of Mumbai

No. UG/ 52 of 2021

CIRCULAR:-

Attention of the Principals of the Affiliated Colleges, Directors of the recognized Institutions in Science & Technology Faculty is invited to the syllabus directly uploaded by the Academic Authority Unit which was accepted by the Academic Council at its meeting held on 11th May, 2017 **vide** item No.4.189 relating to the revised syllabus as per the (CBCGS) for Bachelor of Engineering (Chemical Engineering) Second Year w.e.f. AY 2017-18, Third Year w.e.f. AY 2018-19 and Final Year w.e.f. AY 2019-20 (Rev – 2016) from Academic Year 2016-17.

They are hereby informed that the recommendations made by the Board of Studies in Chemical Engineering at its meeting held on 29th June, 2020 and subsequently made by the Board of Deans at its meeting held on 20th July, 2020 vide item No. 9 have been accepted by the Academic Council at its meeting held on 23rd July, 2020 **vide** item No. 4.136 and that in accordance therewith, the revised scheme (Rev-2019 'C' Scheme) for the B.E. in Chemical Engineering (Sem.III to VIII) has been brought into force with effect from the academic year 2020-21. (The same is available on the University's website www.mu.ac.in).

(Dr. B.N.Gaikwad)
I/c REGISTRAR

MUMBAI – 400 032
21st January, 2021

To

The Principals of the Affiliated Colleges, and Directors of the recognized Institutions in Science & Technology Faculty. (Circular No. UG/334 of 2017-18 dated 9th January, 2018.)

A.C/4.136/23/07/2020

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No. UG/ 52 -A of 2021 MUMBAI-400 032 21st January, 2021

Copy forwarded with Compliments for information to:-

1) The Dean, Faculty of Science & Technology,
2) The Chairman, Board of Studies in Chemical Engineering,
3) The Director, Board of Examinations and Evaluation,
4) The Director, Board of Students Development,
5) The Co-ordinator, University Computerization Centre,

(Dr. B.N.Gaikwad)
I/c REGISTRAR

Copy to :-

1. **The Deputy Registrar, Academic Authorities Meetings and Services (AAMS),**
2. **The Deputy Registrar, College Affiliations & Development Department (CAD),**
3. **The Deputy Registrar, (Admissions, Enrolment, Eligibility and Migration Department (AEM),**
4. **The Deputy Registrar, Research Administration & Promotion Cell (RAPC),**
5. **The Deputy Registrar, Executive Authorities Section (EA),**
6. **The Deputy Registrar, PRO, Fort, (Publication Section),**
7. **The Deputy Registrar, (Special Cell),**
8. **The Deputy Registrar, Fort/ Vidyanagari Administration Department (FAD) (VAD), Record Section,**
9. **The Director, Institute of Distance and Open Learning (IDOL Admin), Vidyanagari,**

They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above circular and that on separate Action Taken Report will be sent in this connection.

1. **P.A to Hon'ble Vice-Chancellor,**
2. **P.A Pro-Vice-Chancellor,**
3. **P.A to Registrar,**
4. **All Deans of all Faculties,**
5. **P.A to Finance & Account Officers, (F.& A.O),**
6. **P.A to Director, Board of Examinations and Evaluation,**
7. **P.A to Director, Innovation, Incubation and Linkages,**
8. **P.A to Director, Board of Lifelong Learning and Extension (BLLE),**
9. **The Director, Dept. of Information and Communication Technology (DICT) (CCF & UCC), Vidyanagari,**
10. **The Director of Board of Student Development,**
11. **The Director, Department of Students Walfare (DSD),**
12. **All Deputy Registrar, Examination House,**
13. **The Deputy Registrars, Finance & Accounts Section,**
14. **The Assistant Registrar, Administrative sub-Campus Thane,**
15. **The Assistant Registrar, School of Engg. & Applied Sciences, Kalyan,**
16. **The Assistant Registrar, Ratnagiri sub-centre, Ratnagiri,**
17. **The Assistant Registrar, Constituent Colleges Unit,**
18. **BUCTU,**
19. **The Receptionist,**
20. **The Telephone Operator,**
21. **The Secretary MUASA**

for information.

AC – 23/7/2020
Item No. - 136

UNIVERSITY OF MUMBAI

Bachelor of Engineering

in

Chemical Engineering

Second Year with Effect from AY 2020-21

Third Year with Effect from AY 2021-22

Final Year with Effect from AY 2022-23

(REV- 2019 'C' Scheme) from Academic Year 2019 – 20

Under

FACULTY OF SCIENCE & TECHNOLOGY

(As per AICTE guidelines with effect from the academic year 2019–2020)

Preamble

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited. In line with this Faculty of Science and Technology (in particular Engineering) of University of Mumbai has taken a lead in incorporating philosophy of outcome based education in the process of curriculum development.

Faculty resolved that course objectives and course outcomes are to be clearly defined for each course, so that all faculty members in affiliated institutes understand the depth and approach of course to be taught, which will enhance learner's learning process. Choice based Credit and grading system enables a much-required shift in focus from teacher-centric to learner-centric education since the workload estimated is based on the investment of time in learning and not in teaching. It also focuses on continuous evaluation which will enhance the quality of education. Credit assignment for courses is based on 15 weeks teaching learning process, however content of courses is to be taught in 13 weeks and remaining 2 weeks to be utilized for revision, guest lectures, coverage of content beyond syllabus etc.

There was a concern that the earlier revised curriculum more focused on providing information and knowledge across various domains of the said program, which led to heavily loading of students in terms of direct contact hours. In this regard, faculty of science and technology resolved that to minimize the burden of contact hours, total credits of entire program will be of 170, wherein focus is not only on providing knowledge but also on building skills, attitude and self-learning. Therefore in the present curriculum skill based laboratories and mini projects are made mandatory across all disciplines of engineering in second and third year of programs, which will definitely facilitate self-learning of students. The overall credits and approach of curriculum proposed in the present revision is in line with AICTE model curriculum.

The present curriculum will be implemented for Second Year of Engineering from the academic year 2020-21. Subsequently this will be carried forward for Third Year and Final Year Engineering in the academic years 2021-22, 2022-23, respectively.

Dr. S. K. Ukarande
Associate Dean
Faculty of Science and Technology
University of Mumbai

Dr Anuradha Muzumdar
Dean
Faculty of Science and Technology
University of Mumbai

Incorporation and Implementation of Online Contents from NPTEL/ Swayam Platform

The curriculum revision is mainly focused on knowledge component, skill based activities and project based activities. Self-learning opportunities are provided to learners. In the revision process this time in particular Revised syllabus of ‘C ‘ scheme wherever possible additional resource links of platforms such as NPTEL, Swayam are appropriately provided. In an earlier revision of curriculum in the year 2012 and 2016 in Revised scheme ‘A' and ‘B' respectively, efforts were made to use online contents more appropriately as additional learning materials to enhance learning of students.

In the current revision based on the recommendation of AICTE model curriculum overall credits are reduced to 171, to provide opportunity of self learning to learner. Learners are now getting sufficient time for self-learning either through online courses or additional projects for enhancing their knowledge and skill sets.

The Principals/ HoD’s/ Faculties of all the institute are required to motivate and encourage learners to use additional online resources available on platforms such as NPTEL/ Swayam. Learners can be advised to take up online courses, on successful completion they are required to submit certification for the same. This will definitely help learners to facilitate their enhanced learning based on their interest.

Dr. S. K. Ukarande
Associate Dean
Faculty of Science and Technology
University of Mumbai

Dr Anuradha Muzumdar
Dean
Faculty of Science and Technology
University of Mumbai

Preamble to the Revision of Syllabus in Chemical Engineering

Development in all fields including Chemical Engineering along with use of soft wares for process plant and process engineering, there is demand on academician to upgrade the curriculum in Education. Choice based Credit and grading system enables a much required shift in focus from teacher-centric to learner-centric education since the workload estimated is based on the investment of time in learning and not in teaching. The Curriculum must integrate knowledge of the basic and advanced sciences with problem solving and creativity abilities.

The Curriculum must be broad enough to cover all areas from design to operation of Process plants. It should be deep enough to enable the learners to carry out research and develop products to meet rapidly changing needs and demands. The major challenge in the current scenario is to ensure quality to the stakeholders. Accreditation is the principal means of quality assurance in higher education and reflects the fact that in achieving recognition, the institution or program of study is committed and open to external review to meet certain minimum specified standards. The major emphasis of this accreditation process is to measure the outcomes of the program that is being accredited. Program outcomes are essentially a range of skills and knowledge that a student will have at the time of graduation from the program.

With these objectives, online meeting was organized on 30th May 2020 which was attended by heads of the departments and subject faculty of affiliating Institutes. The program objectives and outcomes were thoroughly discussed in line with AICTE guidelines and the core structure of the syllabus was formulated keeping in mind choice based credit and grading system curriculum along with more emphasis on learning outcomes. Thus Skilled based laboratories and Mini projects are introduced in appropriate semesters. Views from experts and UG teachers were taken into consideration and final Academic and Exam scheme was prepared with the consent of all the members involved. Subject wise online meetings were held by various subjects convenors to finalize the detail syllabus in the month of June 2020.

The Program Educational Objectives finalized for the undergraduate program in Chemical Engineering are:

1. To prepare the student for mathematical, scientific and engineering fundamentals
2. To motivate the student to use modern tools for solving real life problems
3. To inculcate a professional and ethical attitude, good leadership qualities and commitment to social and environmental responsibilities.
4. To prepare the student in achieving excellence which will benefit individually and society at large.

Board of Studies in Chemical Engineering

Dr. Sunil S. Bhagwat - Chairman
Dr. Kalpana S. Deshmukh - Member
Dr. Sunil J. Kulkarni - Member
Dr. Ramesh S. Bhande - Member
Dr. Aparna N. Tamaskar - Member
Dr. Shyamala P. Shingare - Member
Dr. Manisha V. Bagal - Member

University of Mumbai

Program Structure for B.E. Chemical Engineering (Revised 2020-2021)

Semester III

Course code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
CHC301	Engineering Mathematics-III	3	-	1	3	-	1	4
CHC302	Industrial and Engineering Chemistry I	3	-	-	3	-	-	3
CHC303	Fluid Flow Operations	3	-	-	3	-	-	3
CHC304	Chemical Engineering Thermodynamics I	3	-	-	3	-	-	3
CHC305	Process Calculations	3	-	-	3	-	-	3
CHL301	Industrial and Engineering Chemistry I Lab	-	3	-	-	1.5	-	1.5
CHL302	Fluid Flow Operation Lab	-	3	-	-	1.5	-	1.5
CHL303	Basic Chemical Engineering Lab	-	3	-	-	1.5	-	1.5
CHL304	Skilled Based Lab: Chemical Technology Lab	-	2*2	-	-	2	-	2
CHM301	Mini Project 1A	-	3#	-	-	1.5	-	1.5
	Total	15	16	1	15	8	1	24

Course code	Course Name	Examination Scheme								
		Theory					Term Work	Pract /Oral	Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in hrs)				
		Test 1	Test 2	Avg						
CHC301	Engineering Mathematics-III	20	20	20	80	3	25	-	-	125
CHC302	Industrial and Engineering Chemistry I	20	20	20	80	3	-	-	-	100
CHC303	Fluid Flow Operations	20	20	20	80	3	-	-	-	100
CHC304	Chemical Engineering Thermodynamics I	20	20	20	80	3	-	-	-	100
CHC305	Process Calculations	20	20	20	80	3	-	-	-	100
CHL301	Industrial and Engineering Chemistry I Lab	-	-	-	-	3	25	25	-	50
CHL302	Fluid Flow Operation Lab	-	-	-	-	3	25	25	-	50
CHL303	Basic Chemical Engineering Lab	-	-	-	-	-	25	-	25	50
CHL304	Skilled Based Lab: Chemical Technology Lab	-	-	-	-	-	25	-	25	50
CHM301	Mini Project 1A	-	-	-	-	-	25	-	25	50
	Total	-	-	100	400	-	150	50	75	775

***Indicates Theory class to be conducted for full class; indicates work load of Learner (Not Faculty), for Mini Project;**

For mini project faculty load: 1 hour per week per four groups

University of Mumbai

Program Structure for B.E. Chemical Engineering (Revised 2020-2021)

Semester IV

Course code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
CHC401	Engineering Mathematics-IV	3	-	1	3	-	1	4
CHC402	Industrial and Engineering Chemistry II	3	-		3	-	-	3
CHC403	Numerical Method in Chemical Engineering	3	-	-	3	-	-	3
CHC404	Solid Fluid Mechanical Operations	3	-	-	3	-	-	3
CHC405	Chemical Engineering Thermodynamics II	3	-	-	3	-	-	3
CHL401	Industrial and Engineering Chemistry II Lab	-	3	-	-	1.5	-	1.5
CHL402	Numerical Method in Chemical Engineering Lab	-	3	-	-	1.5	-	1.5
CHL403	Solid Fluid Mechanical Operation Lab	-	3	-	-	1.5	-	1.5
CHL404	Skilled based lab: Design Calculation of Auxiliary Plant Equipment	-	3	-	-	1.5	-	1.5
CHM401	Mini Project 1B	-	2#	--	-	1		1
	Total	15	14	1	15	7	1	23

Course code	Course Name	Examination Scheme								
		Theory					Term Work	Pract /Oral	Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in hrs)				
		Test 1	Test 2	Avg						
CHC401	Engineering Mathematics-IV	20	20	20	80	3	25	-	-	125
CHC402	Industrial and Engineering Chemistry II	20	20	20	80	3	-	-	-	100
CHC403	Numerical Method in Chemical Engineering	20	20	20	80	3	-	-	-	100
CHC404	Solid Fluid Mechanical Operations	20	20	20	80	3	-	-	-	100
CHC405	Chemical Engineering Thermodynamics II	20	20	20	80	3	-	-	-	100
CHL401	Industrial and Engineering Chemistry II Lab	-	-	-	-	3	25	25	-	50
CHL402	Numerical Method in Chemical Engineering Lab	-	-	-	-	-	25	-	25	50
CHL403	Solid Fluid Mechanical Operation Lab	-	-	-	-	3	25	25	-	50
CHL404	Skilled based lab: Design Calculation of Auxiliary Plant Equipment	-	-	-	-	-	25	-	25	50
CHM401	Mini Project 1B	-	-	-	-	-	25	-	25	50
	Total	-	-	100	400	-	150	50	75	775

 # indicates work load of Learner (Not Faculty), for Mini Project; **For mini project faculty load : 1 hour per week per four groups**

University of Mumbai

Program Structure for B.E. Chemical Engineering (Revised 2021-2022)

Semester V

Course code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
CHC501	Mass transfer Operations-I	3	-	-	3	-	-	3
CHC502	Heat transfer Operations	3	-	-	3	-	-	3
CHC503	Chemical Reaction Engineering-I	3	-	-	3	-	-	3
CHC504	Transport Phenomena	3	-	-	3	-	-	3
CHDO501X	Department Optional Course 1	3	-	-	3	-	-	3
CHL501	Mass transfer Operations-I Lab	-	3	-	-	1.5	-	1.5
CHL502	Heat transfer Operations Lab	-	3	-	-	1.5	-	1.5
CHL503	Chemical Reaction Engineering-I Lab	-	3	-	-	1.5	-	1.5
CHL504	Skilled Based Lab: Business Communication and Ethics Lab	-	2*2	-	-	2	-	2
CHM501	Mini Project-2A	-	3#	-	-	1.5	-	1.5
	Total	15	14	-	15	8	-	23

Course code	Course Name	Examination Scheme								
		Theory					Term Work	Pract /Oral	Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in hrs)				
		Test 1	Test 2	Avg						
CHC501	Mass transfer Operations-I	20	20	20	80	3	-	-	-	100
CHC502	Heat transfer Operations	20	20	20	80	3	-	-	-	100
CHC503	Chemical Reaction Engineering-I	20	20	20	80	3	-	-	-	100
CHC504	Transport Phenomena	20	20	20	80	3	-	-	-	100
CHDO501X	Department Optional Course 1	20	20	20	80	3	-	-	-	100
CHL501	Mass transfer Operations-I Lab	-	-	-	-	3	25	25	-	50
CHL502	Heat transfer Operations Lab	-	-	-	-	3	25	25	-	50
CHL503	Chemical Reaction Engineering-I Lab	-	-	-	-	3	25	25	-	50
CHL504	Skilled Based Lab: Business Communication and Ethics Lab	-	-	-	-	-	25	-	25	50
CHM501	Mini Project-2A	-	-	-	-	-	25	-	25	50
	Total			100	400	-	125	75	50	750

Department Optional Course 1 (Semester V)

Engineering Stream (Elective Code)	Technology Stream (Elective Code)	Management Stream
Food Engineering(CHDO5011)	Advanced Material Sciences (CHDO5012)	Total Quality Management (CHDO5013)

***Indicates Theory class to be conducted for full class; # indicates work load of Learner (Not Faculty), for Mini Project;**

For mini project faculty load: 1 hour per week per four groups

University of Mumbai

Program Structure for B.E. Chemical Engineering (Revised 2021-2022)

Semester VI

Course code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
CHC601	Mass Transfer Operation II	3	-	-	3	-	-	3
CHC602	Chemical Reaction Engineering II	3	-	-	3	-	-	3
CHC603	Pollution Control Technology	3	-	-	3	-	-	3
CHC604	Process Engineering and Economics	3	-	1	3	-	1	4
CHDO602X	Departmental Optional Course 2	3	-	-	3	-	-	3
CHL601	Mass Transfer Operation II Lab	-	3	-	-	1.5	-	1.5
CHL602	Chemical Reaction Engineering II Lab	-	3	-	-	1.5	-	1.5
CHL603	Pollution Control TechnologyLab	-	3	-	-	1.5	-	1.5
CHL604	Skilled Based Lab: Piping Design Engineering Lab	-	3	-	-	1.5	-	1.5
CHM601	Mini Project – 2B	-	2#	-	-	1	-	1
	Total	15	14	1	15	7	1	23

Course code	Course Name	Examination Scheme								
		Theory					Term Work	Pract /Oral	Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in hrs)				
		Test 1	Test 2	Avg						
CHC601	Mass Transfer Operation II	20	20	20	80	3	-	-	-	100
CHC602	Chemical Reaction Engineering II	20	20	20	80	3	-	-	-	100
CHC603	Pollution Control Technology	20	20	20	80	3	-	-	-	100
CHC604	Process Engineering and Economics	20	20	20	80	3	25	-	-	125
CHDO602X	Departmental Optional Course 2	20	20	20	80	3	-	-	-	100
CHL601	Mass Transfer Operation II Lab	-	-	-	-	3	25	25	-	50
CHL602	Chemical Reaction Engineering II Lab	-	-	-	-	3	25	25	-	50
CHL603	Pollution Control TechnologyLab	-	-	-	-	3	25	25	-	50
CHL604	Skilled Based Lab: Piping Design Engineering Lab	-	-	-	-	-	25	-	25	50
CHM601	Mini Project – 2B	-	-	-	-	-	25	-	25	50
	Total			100	400	-	150	75	50	775

Department Optional Course 2 (Semester VI)

Engineering Stream (Elective Code)	Technology Stream (Elective Code)	Management Stream (Elective Code)
Piping Engineering (CHDO6021)	Polymer Technology (CHDO6022)	Industrial Organization and Management (CHDO6023)

 # indicates work load of Learner (Not Faculty), for Mini Project; For mini project faculty load : 1 hour per week per four groups

University of Mumbai

Program Structure for B.E. Chemical Engineering (Revised 2022-2023)

Semester VII

Course code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
CHC701	Instrumentation Process Dynamics and Control	3	-	-	3	-	-	3
CHC702	Chemical Engineering Equipment Design	3	-	-	3	-	-	3
CHDO703X	Department Optional Course 3	3	-	-	3	-	-	3
CHDO704X	Department Optional Course 4	3	-	-	3	-	-	3
IOC701X	Institute Optional Course 1	3	-	-	3	-	-	3
CHL701	Instrumentation Process Dynamics and Control Lab	-	3	-	-	1,5	-	1.5
CHL702	Chemical Engineering Equipment Design Lab	-	3	-	-	1.5	-	1.5
CHL703	Hazard and Risk Analysis Lab	-	2	-	-	1	-	1
CHP701	Major Project I	-	6#	-	-	3	-	3
	Total	15	8	-	15	7	-	22

Course code	Course Name	Examination Scheme								
		Theory					Term Work	Pract /Oral	Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in hrs)				
		Test 1	Test 2	Avg						
CHC701	Instrumentation Process Dynamics and Control	20	20	20	80	3	-	-	-	100
CHC702	Chemical Engineering Equipment Design	20	20	20	80	3	-	-	-	100
CHDO703X	Department Optional Course 3	20	20	20	80	3	-	-	-	100
CHDO704X	Department Optional Course 4	20	20	20	80	3	-	-	-	100
IOC701X	Institute Optional Course 1	20	20	20	80	3	-	-	-	100
CHL701	Instrumentation Process Dynamics and Control Lab	-	-	-	-	3	25	25	-	50
CHL702	Chemical Engineering Equipment Design Lab	-	-	-	-	-	25	-	25	50
CHL703	Hazard and Risk Analysis Lab	-	-	-	-	-	25	-	25	50
CHP701	Major Project I	-	-	-	-	3	25	-	25	50
	Total	-	-	100	400	-	100	25	75	700

Department Optional Course 3 (Semester VII)

Engineering Stream (Elective Code)	Technology Stream (Elective Code)	Management Stream (Elective)
Corrosion Engineering (CHDO7031)	Fundamental of Colloids and Interface Science and Technology (CHDO7032)	Project Management for Chemical Process Industries (CHDO7033)

Department Optional Course 4 (Semester VII)

Engineering Stream (Elective Code)	Technology Stream (Elective Code)	Management Stream (Elective)
Chemical Plant Safety and Hazards (CHDO7041)	Petroleum Refining Technology (CHDO7042)	Operation Research (CHDO7043)

 # indicates work load of Learner (Not Faculty), for Major Project; faculty load: semester VII–½ hour per week per project group.

University of Mumbai

Program Structure for B.E. Chemical Engineering (Revised 2022-2023)

Semester VIII

Course code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
CHC801	Modelling Simulation and Optimization	3	-	-	3	-	-	3
CHDO805X	Department Optional Course 5	3	-	-	3	-	-	3
CHDO806X	Department Optional Course 6	3	-	-	3	-	-	3
IO802X	Institute Optional Course 2	3	-	-	3	-	-	3
CHL801	Modelling Simulation and Optimization Lab	-	3	-	-	1.5	-	1.5
CHL802	Software application in Chemical Engineering Lab	-	3	-	-	1.5	-	1.5
CHP801	Major Project II	-	12#	-	-	6	-	6
	Total	12	18	-	12	9	-	21

Course code	Course Name	Examination Scheme								
		Theory					Term Work	Pract /Oral	Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in hrs)				
		Test 1	Test 2	Avg						
CHC801	Modelling Simulation and Optimization	20	20	20	80	3	-	-	-	100
CHDO805X	Department Optional Course 5	20	20	20	80	3	-	-	-	100
CHDO806X	Department Optional Course 6	20	20	20	80	3	-	-	-	100
IO802X	Institute Optional Course 2	20	20	20	80	3	-	-	-	100
CHL801	Modelling Simulation and Optimization Lab	-	-	-	-	3	25	25	-	50
CHL802	Software application in Chemical Engineering Lab	-	-	-	-	-	25	-	25	50
CHP801	Major Project II	-	-	-	-	-	50	-	100	150
	Total			80	320	-	175	25	50	650

Department Optional Course 4 (Semester VIII)

Engineering Stream (Course Code)	Technology Stream (Course Code)	Management Stream (Course Code)
Energy System Design (CHDO8041)	Advanced Separation Technology (CHDO8042)	Financial Management (CHDO8043)

Department Optional Course 5 (Semester VIII)

Engineering Stream (Course Code)	Technology Stream (Course Code)	Management Stream (Course Code)
Fuel Cell Electrochemical Engineering (CHDO8051)	1. Biotechnology Technology (CHDO8052) 2. Nanotechnology (CHDO8053)	Chemical Waste Management (CHDO8054)

 # indicates work load of Learner (Not Faculty), for Major Project; Faculty load: semester VIII – 1 hour per week per project group