

MUJ Faculty of Engineering

The New Curriculum Schema has been approved at the Faculty Board for the **B.Tech. in Chemical Engineering program is listed below (2023-2024)**

First Semester		
Code	Course Name	Cr
	Engineering Chemistry & Lab	3
	Calculus & Matrices	3
	Basic Electrical Engineering	3
	Basic Electronics	3
	Biology for Engineers	2
	Computer Programming & Lab	4
	IoT Fab Lab	1
	Constitution of India	1
First Semester Credits		20

Second Semester		
Code	Course Name	Cr
	Engineering Physics & Lab	4
	Computational Mathematics	3
	Environmental Studies	2
	Engineering Materials & Mechanics	4
	Matlab for Engineers	2
	Creativity & Innovation Lab	2
	Engineering Graphics	1
	Technical Writing Clinic 1	1
	Universal Human Values	1
Second Semester Credits		20

Third Semester		
Code	Course Name	Cr
	Statistics & Probability	3
	Chemical Process Calculations	4
	Momentum Transfer Operation	4
	Chemical Engg Thermodynamics	4
	Economics	3
	University Elective 1	3
	Transport Phenomena Lab-1	2
	Self-Study or Project	1
Third Semester Credits		24

Fourth Semester		
Code	Course Name	Cr
	Management	3
	Chemical Reaction Engineering	4
	Heat transfer operations	4
	Flexi Core 1	4
	Program Elective 1	3
	University Elective 2	3
	Chemical Reaction Engineering Lab	1
	Transport Phenomena Lab-2	1
	Project Based Learning 1	1
Fourth Semester Credits		24

Fifth Semester		
Code	Course Name	Cr
	Mass transfer operations	3
	Separation process principles	3
	Catalysis and catalytic reactors	3
	Flexi Core 2	3
	Program Elective 2	3
	Program Elective 3	3
	University Elective 3	3
	Transport Phenomena Lab-3	2
	Project Based Learning 2	1
Fifth Semester Credits		24

Sixth Semester		
Code	Course Name	Cr
	Process Dynamics and Control	4
	Flexi Core 3	4
	Program Elective 4	3
	Program Elective 5	3
	University Elective 4	3
	Technical Writing Clinic 2	1
	Process Control Lab	2
	Res, Innov & Entrepreneurship	3
Sixth Semester Credits		23

Seventh Semester		
Code	Course Name	Cr
	University Elective 5	3
	Program Elective 6	3
	Program Elective 7	3
	Program Elec 8 / Univ Elect 6	3
	Internship (Industry/ Research)	1
Seventh Semester Credits		13

Eighth Semester		
Code	Course Name	Cr
	Major Project	12
Eighth Semester Credits		12

Key Phrases and Expectations in the New Curriculum Schema in MUJ Faculty of Engineering (FOE):

Department Core (DC) Courses: Fundamental courses for the program of study. Mandatory for all students in the program. Each program has eight departmental core courses of 4 credits each and 8 labs of 1 credit each. Departments have flexibility to shuffle credits and labs or develop integrated didactic and laboratory courses (Total 40 Credits).

Flexi Core (FC) Courses: Core Courses based on emerging trends in the field. Students can select three FCs (4Cr each) from options offered during the fourth, fifth or sixth semester (Total 12 Credits).

Program Electives (PE): Departments will offer a set of program specific elective courses (3 Credits each) each semester. Students have the flexibility to select PEs from all Faculty of Engineering departments. For example, a student from Civil Engineering can study PEs offered by the Department of Computer Science and Engineering. Students will be responsible for completing the prerequisites from other department courses as online value-added courses. No additional credit is offered for these pre-requisite courses taken online or value-added courses (Total 24 Credits).

- **Industry Expert Courses:** Selected few Program Electives will be jointly developed by FOE faculty and industry experts, introducing the latest learnings from industry. In these courses, one or more industry experts may conduct a significant portion (> 50%) of the course. These courses will be marked with an IEC in Course Catalog.

University Electives (UE): These are graded, open elective courses offered across the University. All UEs need to be approved by the Board of Studies of their respective Departments and Faculty Boards. UEs provide an opportunity for students to expand and diversify their knowledge base with topics in non-engineering domains. BTech students cannot take FOE offered UEs (Total 15 Credits).

Focus Areas: Focus Areas provide students an opportunity to develop expertise in any University discipline. Focus Areas are offered within FOE departments and across the University.

- For Focus Areas, students need to take four courses from a pre-selected bucket of six plus Program Electives from across FOE. For example, a Mechanical Engineering student can put together four PEs and attain a Focus Area in: Blockchain, Cybersecurity, Robotics, AI/ML, Electrical Vehicle Technology, or any other area of their interest.
- Similarly, Focus Areas are also available University-wide by taking four courses from a pre-selected bucket of six plus University Electives. For students pursuing a Focus Area outside of Engineering, they can substitute PE8 for UE6 in the Seventh Semester.

Self-Study Courses; Problem Based Learning; Research Innovation and Entrepreneurship:

These courses offered in the third through sixth semester offer students an opportunity to enhance their academic curricula with learning new skills, taking online classes, conducting guided research projects or developing innovative solutions to societal problems.

In a **Self-Study Course**, students have the opportunity to learn a new skill or computer programming language in Online mode. Producing a completion certificate and a brief assessment with a guide is necessary to receive a grade and credit.

Problem-based Learning, and Research Innovation and Entrepreneurship (RIE): In these courses, students can pursue a broader research investigation, innovation or a startup. The expected outcome is a research paper presented at a conference, a paper publication, a patent application for an innovation or launching a startup.

Proposed List of Courses offered by the Department of Biotechnology and Chemical Engineering

Proposed Department Core Courses

1. Chemical process Calculations
2. Momentum transfer operations
3. Chemical engineering thermodynamics
4. Chemical reaction engineering
5. Heat transfer operations
6. Mass transfer operations
7. Separation process principles
8. Catalysis and catalytic reactors
9. Process dynamics and control

Proposed Flexi- Courses

FC1: Process modelling and simulation

FC1: Transport Phenomena

FC1: Data structures and algorithms

FC2: Chemical technology

FC2: Enzyme Technology

FC2: Object oriented programming

FC3: Process plant design

FC3: Bioremediation

Proposed Department Program Electives

1. Bioprocess Engineering
2. Catalytic processes
3. Petroleum Production Technologies
4. Conventional and Non-conventional energy resources
5. Petroleum refining operations*
6. Environmental systems engineering
7. Energy and process integration
8. Process optimization
9. Advanced separation techniques
10. Process intensification
11. Process economics and plant management
12. Waste to energy conversion
13. Introduction to membrane separation processes
14. Polymer reaction engineering
15. Biomass conversion and biorefinery
16. Colloids and surfaces Engineering
17. Fluidization Engineering
18. Chemical Process Safety*
19. Clean and renewable energy production technologies
20. Hydrogen energy

21. Biomass conversion and biorefinery
22. Fuel cell technologies
23. Waste to energy conversion

*IEC- Industry Expert Courses

Focus Areas offered by Department of Biotechnology and Chemical Engineering

Focus Area 1: Sustainable Energy

1. Clean and renewable energy production technologies (PE1)
2. Hydrogen energy (PE2)
3. Biomass conversion and biorefinery (PE3)
4. Fuel cell technologies (PE4).
5. Waste to energy conversion (PE5).

Proposed Department University Electives. These courses are only open to students outside of FoE

1. Physico-chemical processes for wastewater treatment
2. Electrochemistry – Fundamentals to applications
3. Circular economy for a sustainable future