## MUJ Faculty of Engineering
## Bachelor's in Technology in Computer Science and Engineering (Artificial Intelligence & Machine Learning) (2023-2024) onwards

| Code | First Semester<br>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** |

| Code | Second Semester<br>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** |

| Code | Third Semester<br>Course Name | Cr |
|---|---|---|
| | Statistics & Probability | 3 |
| | Department Core 1 | 4 |
| | Department Core 2 | 4 |
| | Department Core 3 | 4 |
| | Economics | 3 |
| | University Elective 1 | 3 |
| | Lab 1 | 1 |
| | Lab 2 | 1 |
| | Self-Study – 1 or Project | 1 |
| | **Third Semester Credits** | **24** |

| Code | Fourth Semester<br>Course Name | Cr |
|---|---|---|
| | Management | 3 |
| | Department Core 4 | 4 |
| | Department Core 5 | 4 |
| | Flexi Core 1 | 4 |
| | Program Elective 1 | 3 |
| | University Elective 2 | 3 |
| | Lab 3 | 1 |
| | Lab 4 | 1 |
| | Project Based Learning 1 | 1 |
| | **Fourth Semester Credits** | **24** |

| Code | Fifth Semester<br>Course Name | Cr |
|---|---|---|
| | Department Core 6 | 4 |
| | Department Core 7 | 4 |
| | Flexi Core 2 | 4 |
| | Program Elective 2 | 3 |
| | Program Elective 3 | 3 |
| | University Elective 3 | 3 |
| | Lab 5 | 1 |
| | Lab 6 | 1 |
| | Project Based Learning 2 | 1 |
| | **Fifth Semester Credits** | **24** |

| Code | Sixth Semester<br>Course Name | Cr |
|---|---|---|
| | Department Core 8 | 4 |
| | Flexi Core 3 | 4 |
| | Program Elective 4 | 3 |
| | Program Elective 5 | 3 |
| | University Elective 4 | 3 |
| | Technical Writing Clinic 2 | 1 |
| | Lab 7 | 1 |
| | Self-Study – 2 | 1 |
| | Research, Innov & Entrepreneurship | 3 |
| | **Sixth Semester Credits** | **23** |

| Code | Seventh Semester<br>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** |

| Code | Eighth Semester<br>Course Name | Cr |
|---|---|---|
| | Major Project | 12 |
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| | **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 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 CSE(AIML)

### Proposed Department Core Courses

1. AIN2101: Data Structures and Algorithms
2. AIN2102: Relational Database Management System
3. AIN2103: Object Oriented Programming using Python.
4. AIN2201: Design and Analysis of Algorithms
5. AIN2202: Operating System
6. AIN3101: Machine Learning
7. AIN3102: Automata Theory & Compiler Design
8. AIN3201: Deep Neural Network

### Proposed Flexi- Courses

1. FC1: AIN2220 Principles of Artificial Intelligence
2. FC1: AIN2221 Data Analytics and Visualization
3. FC2: AIN3120 Software Engg. & Project Management
4. FC2: AIN3121 Agile Software Development
5. FC3: AIN3220 Computer Networks and Internets
6. FC3: AIN3221 Data Communication and Networking

### Program Electives (PE-1)

1. AIN2241: Internet of Things
2. AIN2242: Computer Graphics and Multimedia
3. AIN2243: Git Essential
4. AIN2244: Computer Organization and Architecture
5. AIN2245: Cloud Computing Techniques.

### Program Electives (PE-3)

6. AIN3143: Android App Development
7. AIN3144: Advanced Data Structures
8. AIN3145: Graph Theory and Applications
9. AIN3146: Web Technologies
10. AIN3147: NoSQL Database

### Program Electives (PE-7 & 8)

11. AIN4145: Cyber Physical System
12. AIN4146: Social Network Analysis
13. AIN4147: Information Retrieval
14. AIN4148: Virtual & Augmented Reality
15. AIN4149: Computer Vision
16. AIN4150: Reinforcement Learning
17. AIN4151: MLOps
18. AIN4152: Data Security and Privacy
19. AIN4153: Recommender System
20. AIN4154: Biometrics

## Focus Areas offered by Department of CSE

### Focus Area 1: Health Care Analytics

1. AIN3141: Healthcare Informatics (PE 2)
2. AIN3241: Wearable Technologies (PE 4)
3. AIN3243: Medical Image Processing (PE 5)
4. AIN4141: IoT with Healthcare (PE 6)
5. AIN4143: Big Data Analytics (PE 7)

### Focus Area 2: Behavior Analytics

1. AIN3142: Behavior Data Analysis (PE 2)
2. AIN3242: Natural Language Processing (PE 4)
3. AIN3244: Sentimental Analysis and Opining mining (PE 5)
4. AIN4142: Graph Neural Network (PE 6)
5. AIN4144: Cognitive Computing (PE 7)

### Proposed Department University Electives (Artificial Intelligence).

(For Non-FoE)

1. AIN2180: Data Structure
2. AIN2280: Python Programming
3. AIN3180: Machine learning
4. AIN3280: Data Visualization Techniques
5. AIN4180: Deep Neural Network