

**ACADEMIC REGULATIONS FOR
FOUR-YEAR UNDERGRADUATE DEGREE PROGRAMS
(Applicable to students who joined for the Academic Year 2020)**

2020 Bachelor of Technology in Mechanical Engineering

I. About Mechanical Engineering

Mechanical engineering is one of the most adaptable and versatile disciplines of engineering. The principles of Mechanical Engineering are applicable to the design and development of products ranging from cell phones to aircrafts to bio-implants. Mechanical engineering graduates find relevance in industries such as aerospace, automotive, advanced manufacturing, thermal and energy systems and advanced materials. In addition, mechanical engineers are very well placed to understand the economics of product development and manufacturing and are very well suited to entrepreneurship.

II. About the Program and the Department of Mechanical Engineering

The program of Mechanical Engineering was one of the four engineering programs started at the inception of Mahindra Ecole Centrale (now Ecole Centrale School of Engineering, Mahindra University). The research interests of the faculty of Mechanical engineering span diverse areas such as Metamaterials, Microfluidics, Dynamic fracture, Earthquake dynamics, Advanced and Smart materials, Solar energy, Multiphysics and Multiscale processes, Robotics design, Combustion and Advanced manufacturing. The department executes its mission with a focus on enhanced student-teacher interaction and collaboration for research and product development.

Vision:

To attain the highest standards of excellence in technical pedagogy, contribution to contemporary research and nurture an entrepreneurial spirit that fosters leadership in technological innovations and create future ready global citizens.

Mission:

1. Promote a culture of excellence in fundamental research and collaboration with industry, enabling continual intellectual growth of faculty and help students reach their potential.
2. Offer a holistic and interdisciplinary education that combines knowledge from core principles of Mechanical and allied engineering disciplines, with humanities, ethics and management.
3. Encourage collaboration among students to better apply their technical training and innovate solutions to complex technical problems.

The Department of Mechanical Engineering offers a four-year program towards earning a bachelor's degree.

III. Program Outcomes

The curriculum of the four year degree program is designed to expose the student to incrementally complex concepts and applications. The majority of the first three semesters is spent in establishing sound fundamentals in mathematics, sciences and programming. The core mechanical engineering curriculum starts in the fourth semester establishing the basic principles of mechanical engineering. The majority of the fundamental courses of mechanical engineering is completed by the sixth semester and is intended to form a basis for the student to tackle a significant problem during the final year project. The selection of a stream is expected to address specific interests of the students and serve to educate the student on current and future technologies while also preparing them for higher studies. By the end of the program, the graduates are expected to have a strong understanding of the basic principles of mechanical engineering as applied from sciences, and apply these principles to design and develop solutions or systems to tackle problems of interest. The specific outcomes expected of graduates of the program are

1. Analyse and develop solutions to real world problems in the broad areas of Mechanical Engineering using basic principles of math, sciences, numerical tools and experimental approaches.
2. Apply relevant analysis and experimental techniques by relating to the design and development lifecycle of providing innovative products and solutions.
3. Ability to analyze the complexity and aesthetics of interdisciplinary problems and contribute as an effective member of an interdisciplinary team.

IV. Curriculum

The four-year curriculum consists of courses worth a total of **170 credits**, with the courses categorized broadly as Mathematics and Sciences, Basic Engineering including Computer science, Core Mechanical Engineering and stream, Open electives, Humanities and management and Projects. Apart from these, French language is offered as an option for rest of the years.

Proposed Course Curriculum Outline – Semester Wise.

Semester I					
S. No.	Course Name	Lecture	Tutorial	Practical	Credits
1	Mathematics - I	4	1	0	5
2	Chemistry - I	2	1	0	3
3	Introduction to Electrical Engineering	2	1	2	4
4	Engineering Drawing	0	0	3	1.5
5	Earth and Environmental Sciences	2	0	0	2
6	Thermodynamics	2	1	0	3
7	Media Project	0	0	3	1.5
8	English and Humanities - I	1	2	2	4
9	French Language & Culture - I	0	2	0	0
Total credits					24
Semester II					
S. No.	Course Name	Lecture	Tutorial	Practical	Credits
1	Mathematics - II	3	1	0	4
2	Physics - I	2	1	2	4
3	Chemistry - II	2	0	2	3
4	Electronics	2	1	2	4
5	Introduction to Computer Science	2	1	2	4
6	Workshop Practice	0	0	2	0
7	Introduction to Enterprises & Economy	2	1	0	3
8	Professional Ethics	0	1	0	1
9	French Language & Culture - II	0	2	0	0
Total credits					23
Semester III					
S. No.	Course Name	Lecture	Tutorial	Practical	Credits
1	Mathematics - III	3	1	0	4
2	Physics - II	3	1	2	5
3	Mechanics	2	1	0	3
4	Signals & Systems	3	1	0	4
5	Data Structures	2	2	2	5
6	Computer Aided Engineering Design	1	0	4	3
7	French Language & Culture - III	0	2	0	0
Total credits					24

Semester IV					
S. No.	Course Name	Lecture	Tutorial	Practical	Credits
1	Numerical Methods	3	0	2	4
2	Transport Phenomena	3	1	0	4
3	Manufacturing Processes I	3	0	0	3
4	Mechanics of Solids	2	1	0	3
5	Theory of Mechanisms and Machines	2	1	2	4
6	Design Thinking	1	0	2	2
7	French Language & Culture - IV	0	2	0	0
Total credits					20
Semester V					
S. No.	Course Name	Lecture	Tutorial	Practical	Credits
1	Mathematics - IV	3	1	0	4
2	Introduction to Materials Sciences	2	0	2	3
3	Manufacturing Processes II	2	1	2	4
4	Applied Fluid Dynamics and Heat Transfer	3	1	0	4
5	Design of Machine Elements	3	1	0	4
6	Experimental Analysis	0	0	4	2
7	HSS + Mgmt. - Elective - I	2	0	0	2
8	French Language & Culture - V	0	2	0	0
Total credits					23
Semester VI					
S. No.	Course Name	Lecture	Tutorial	Practical	Credits
1	Multiphysics	3	1	0	4
2	Thermal Engineering	3	1	0	4
3	Finite Element Methods	3	0	2	4
4	Structural Dynamics and Acoustics	3	1	0	4
5	Third Year Project	0	0	6	3
6	HSS + Mgmt. - Elective - II	2	0	0	2
7	Elective - I	3	0	0	3
8	French Language & Culture - VI	0	2	0	0
Total credits					24
Semester VII					
S. No.	Course Name	Lecture	Tutorial	Practical	Credits
1	Control Theory	3	0	0	3
2	Industrial Engineering	3	0	0	3
3	HSS + Mgmt. - Elective - III	2	0	0	2
4	Elective - II	3	0	0	3
5	Elective - III	3	0	0	3
6	Year-4 Project	0	1	4	3
7	French Language & Culture - VII	0	2	0	0
Total credits					17
Semester VIII					
S. No.	Course Name	Lecture	Tutorial	Practical	Credits
1	Elective - IV	3	0	0	3
2	Elective - V	3	0	0	3
3	Year-4 Project	0	5	8	9
4	French Language & Culture - VIII	0	2	0	0
Total credits					15

