Subject Code: ME122	Course Title: Introduction to Mechanical Engineering	Total Contact Hours: 14	L: 1	T: 0	P: 0	C: 1
Pre-requisite: Nil		Year: 1st	**Semester**: Even			
Type of Course: Program Core (PC)						

***** L → Lectures, T → Tutorials, P → Practical C → Credit***

Learning Objective:

The Introduction to Mechanical Engineering course will introduce students to the ever-emerging field of mechanical engineering and help them appreciate how mechanical engineers design the hardware that builds and improves societies all around the world. Through this course, the students will discover who mechanical engineers are, what they do, and what technical, social, and environmental challenges they solve with the technologies they create. They will recognize how mechanical engineering has contributed to their day-to-day life and society around the world in general and will find that mechanical engineering is a practical endeavor with the objective of designing and manufacturing safe, cost-effective, and environment friendly things. This course will set in place a solid foundation of problem-solving, design, and analysis skills which will form the basis for students' future contributions to the mechanical engineering profession.

Course Outcomes (COs):

On completion of this course, the students will have the ability to:		Bloom's Level
CO1	Learn the Elements and Achievements of Mechanical Engineering.	**1**
CO2	Understand the approach towards Product Design, Manufacturing and Solving Technical Problems.	**2**
CO3	Discuss the concepts of Mechanics, Fluid, Thermal and Energy systems.	**2**
CO4	Understand the need of Automation and Robotics in Industry.	**2**

Content:

Unit No.	Topics	Contact Hours	COs
1	**The Mechanical Engineering Profession** What is Mechanical Engineering, Elements of Mechanical Engineering, Achievements of Mechanical Engineering, Career Paths in Mechanical Engineering.	2	CO1
2	**Product Design & Manufacturing**	3	CO2

	The Product Design Process, The Manufacturing Processes, Industrial scale manufacturing, Case studies.		
3	**Technical Problem-Solving** Technical Problem-Solving Approach, Dimensional Consistency, Estimation, Case Studies.	2	CO2
4	**Mechanics and Machines** Forces, Rotational Motion, Speed, Torque, Design Applications, Case Studies.	3	CO3
5	**Thermal, Fluid and Energy Systems** Mechanical Energy, Work, and Power, Energy Conservation and Conversion, Engines, Applications in Fluid Flow Engineering, Case Studies.	3	CO3
6	**Industrial Automation** Introduction to Automation and Robotics in Industries, Case Studies.	1	CO4

Textbook Reference:

1. Wickert, J., & Lewis, K. (2013). *An introduction to mechanical engineering*. Cengage learning.

Reference Books:

1. Rajput, R.K., 2005. *Elements of mechanical engineering*. Firewall Media.
2. Dixit, U.S., Hazarika, M. and Davim, J.P., 2017. *A brief history of mechanical engineering*. Switzerland: Springer.

Additional resources:

NPTEL, Video Lectures, Web Resources etc.

Evaluation Criteria:

S. No.	Weightage	COs Covered
Assignment	20%	CO1, CO2, CO3, CO4
Quiz	20%	CO1, CO2, CO3, CO4
Mid-Term	20%	CO1, CO2
End-Term	40%	CO1, CO2, CO3, CO4

CO and PO-PSO Correlation Matrix

S. No.	Course Outcomes (CO's)	POs	PSOs
CO1	Learn the Elements and Achievements of Mechanical Engineering.	6, 8, 12	-
CO2	Understand the approach towards Product Design, Manufacturing and Solving Technical Problems.	1, 2, 5, 6, 7, 12	1,2, 3
CO3	Discuss the concepts of Mechanics, Fluid, Thermal and Energy systems.	1, 2, 5, 6, 7, 12	1,2, 3
CO4	Understand the need of Automation and Robotics in Industry.	5, 6, 7, 8 12	1,2

CO and PO-PSO Correlation Matrix

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	1	-	1	-	-	-	1	-	-	-
CO2	1	1	-	-	1	1	1	-	-	-	-	1	1	1	1
CO3	1	1	-	-	1	1	1	-	-	-	-	1	1	1	1
CO4	-	-	-	-	1	1	1	1	-	-	-	1	1	1	-

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Updated by: Dr. Mohit Makkar

CO-PO Mapping Justification

These mappings illustrate how each Course Outcome connects with various Program Outcomes and Program Specific Outcomes, ensuring a comprehensive and aligned learning experience for students in the Mechanical-Mechatronics Engineering Department:

1. **CO1: Learn the Elements and Achievements of Mechanical Engineering.**

Mapping with **PO6** - The Engineer and Society: Understanding the historical context, achievements, and advancements in mechanical engineering allows students to assess the societal, health, safety, legal, and cultural issues associated with technological progress and engineering practices.

Mapping with **PO8** - Ethics: Learning about the achievements of mechanical engineering helps in applying ethical principles and committing to professional ethics, essential in understanding the ethical implications of technological advancements.

Mapping with **PO12** - Lifelong Learning: Studying the elements and achievements of mechanical engineering encourages the recognition of the need for continuous learning and adaptation to technological changes over time.

2. **CO2: Understand the approach towards Product Design, Manufacturing, and Solving Technical Problems.**

Mapping with **PO1** - Engineering Knowledge: Understanding the approach to product design and manufacturing involves applying engineering fundamentals and specialized knowledge to solve complex engineering problems.

Mapping with **PO2** - Problem Analysis: Analyzing technical problems related to product design and manufacturing requires researching literature, problem formulation, and arriving at substantiated conclusions using scientific principles.

Mapping with **PO5** - Modern Tool Usage: Learning about product design and manufacturing involves the application of modern engineering tools and techniques for prediction, modeling, and problem-solving.

Mapping with **PO6** - The Engineer and Society and **PO7** - Environment and Sustainability: Considering societal, environmental, and cultural factors in product design and manufacturing aligns with understanding societal impacts and the need for sustainable engineering solutions.

Mapping with **PO12** - Lifelong Learning: Understanding emerging scientific technologies encourages students to pursue lifelong learning and stay updated with technological advancements.

Mapping with **PSOs 1, 2, 3**: These outcomes align with the development of skills in manufacturing, design, mechatronics, and pursuing higher education and research.

3. **CO3: Discuss the concepts of Mechanics, Fluid, Thermal, and Energy Systems.**

Mapping with **PO1, PO2, PO5**: Understanding these concepts requires applying engineering fundamentals, problem analysis, and using modern tools and techniques to comprehend and solve complex engineering problems.

Mapping with **PO6, PO7**: Considering societal and environmental impacts while studying these concepts aligns with understanding the engineer's role in society and sustainability.

Mapping with **PO12**: Learning fundamental concepts in emerging scientific technologies supports lifelong learning.

Mapping with **PSOs 1, 2, 3**: Understanding these concepts prepares students for problem-solving in various industries and for higher education and research.

4. **CO4: Understand the need for Automation and Robotics in Industry.**

Mapping with **PO5, PO6, PO7, PO8**: Understanding the need for automation and robotics involves selecting appropriate techniques, assessing societal, environmental, and ethical implications related to their implementation in industry.

Mapping with **PO12**: Recognizing the importance of automation and robotics in industry aligns with lifelong learning in emerging technological fields.

Mapping with **PSOs 1, 2**: Knowledge in these areas prepares students for solving industry problems and gaining expertise in emerging technologies.