Course Type	Course Code	Name of the Course	L	T	P	Credit
DE	OMED604	Introduction to Mechanical Micro Machining	3	0	0	3

Prerequisites
Bachelor/Master/PhD students having background in Mechanical Engineering/Production Engineering/Manufacturing Technology
Course Objectives
At the end of the course, the students will be able to: 1. Understand the fundamental principles of various manufacturing processes such as casting, forming, machining, welding, and additive manufacturing. 2. Identify the appropriate manufacturing process based on material properties, product geometry, and required tolerances. 3. Analyze the influence of process parameters on productivity, surface finish, dimensional accuracy, and tool life. 4. Familiarize with different types of machine tools, cutting tools, jigs, fixtures, and measuring instruments used in manufacturing. 5. Understand the basics of automation, computer-aided manufacturing, and recent trends like CNC, robotics, and Industry 4.0 in production systems. 6. Apply safety standards, quality control measures, and sustainable practices in manufacturing operations.
Learning Outcome
On successful completion of this course, students will be able to: 1. Understand the principles of fundamental manufacturing processes such as casting, forming, machining, welding, and additive manufacturing. 2. Identify suitable manufacturing methods based on product geometry, material properties, and functional requirements. 3. Analyze the influence of process parameters on material removal rate, surface finish, tool wear, and product quality. 4. Describe various types of machine tools, cutting tools, jigs, and fixtures used in production. 5. Apply concepts of dimensional accuracy, tolerances, and surface roughness in manufacturing scenarios. 6. Understand inspection techniques, metrology instruments, and quality assurance in production environments. 7. Familiarize with modern manufacturing practices, including automation, CNC technology, and Industry 4.0 integration. 8. Evaluate the environmental impact and safety considerations associated with different production techniques.

Unit No.	Topics to be covered	No. of lecture videos	Video time (Minutes)	Learning Outcomes
1	Experimental observations and theoretical prediction of constituents of an atom	5	149	On successful completion of this unit students will be able to know the basics of Production Technology with examples.
2	Scaling law	5	141	On successful completion of this unit students will be able to know the basics of metal machining with examples.
3	Mechanical micro machining (process, mechanism)	5	143	On successful completion of this unit students will be able to know different components and their structure for Machining system.

4	Burr formation, surface roughness, built up edge	2	151	On successful completion of this unit students will be able to understand the concept of friction in metal cutting
5	Cutting fluid, run out, grain size	5	160	On successful completion of this unit students will be Cantilever beam, ring structure, octagon, extended octagon
6	Micro machine structure - I	5	151	On successful completion of this unit students will be able to understand the applications of Milling operations, broaching operation
7	Micro machine structure - II	5	149	On successful completion of this unit students will be able to understand the concept of Grinding wheel wear
8	Fabrication of micro cutting tools	6	158	On successful completion of this unit students will be able to understand the applications of Abrasive Jet Machining
9	Miniature machine tools	5	143	On successful completion of this unit students will be able to understand the Major components related to CNC machine tools
10	Diamond Turning (process, types, mechanism, applications)	6	152	On successful completion of this unit students will be able to understand the concept of Power transmission
11	Metrology for micro machining	5	139	On successful completion of this unit students will be able to understand the CNC part programming
12	Sensor integration for process monitoring	6	172	On successful completion of this unit students will be able to understand various milling cutters, end milling cutter
Total No. of Video lectures & Video time		**60**	**1808**	

Textbooks:

1. Micro-Cutting: Fundamentals and Applications by Cheng, Huo, Wiley Publication
2. Introduction to Micromachining 2nd Edition, Ed. V. K. Jain, Narosa Publishing House, ISBN: 978-81-7319-915-8.

Reference Books

1. Precision Manufacturing by David Dornfeld and Dae-Eun Lee, Springer US