

Branch Name:	Mechanical Engineering
Program Code:	ET101
Course Name:	Manufacturing Processes
Course Code:	2ET1010503T
Pre-requisite Course:	Workshop, Engineering Materials and Applications

Course Objectives:

1. To understand the basic concept of machine and machining operations.
2. To analyze conventional machining processes.
3. To emphasize the importance of manufacturing Processes in industries
4. To understand the advancement of Technology in manufacturing.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
04	03	01	-	04	24	60	16	40	-	-	-	-	100

Course Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Manufacturing Processes and Classification: Additive, subtractive and shaping processes; Relative advantages and limitations; Inter-dependency of geometry, material and process; Effect on product quality and cost; Part design for manufacturability; Process selection criteria.	04	10
2	Material Shaping Processes: Metal casting (sand, die and investment casting), Bulk forming (forging, rolling, extrusion, drawing) and sheet forming (shearing, deep drawing, bending); Thermoplastic and thermoset plastic processes (ex. injection and blow molding); Powder metallurgy; Metal injection molding; Glass and composite processes (layup).	08	20
3	Material Removal Processes: Turning, Drilling, Milling, Grinding and other finishing processes; Single and multi-point cutting tools; Cutting tool materials; Cutting fluids; Material removal rates, surface finish, accuracy, integrity and machinability	08	20
4	Unconventional Manufacturing Processes: Abrasive Jet Machining, Water Jet Machining; Ultrasonic Machining; Electrical Discharge Machining, Wire EDM; Electro-Chemical Machining; Laser Beam Machining, Plasma Arc Machining and Electron Beam Machining; Micro and nano manufacturing.	06	15
5	Additive Manufacturing Processes: Extrusion; vat polymerization, powder bed fusion; material jetting, binder jetting; direct energy deposition and lamination processes.	04	10
6	Joining and Fastening Processes: Arc welding, gas welding, shielded metal arc welding; GMAW (MIG) and GTAW (TIG); Brazing and soldering; Solid state joining; Adhesive bonding.	06	15

7	Manufacturing Process Modeling (for any one process, including simulation and industrial case study): Casting – metal flow, solidification and cooling; application to design of gating and feeding systems for quality and yield optimization; OR Forming – Plastic deformation and yield criteria; load estimation; OR Machining – Orthogonal cutting, various force components; Chip formation, Tool wear and tool life.	04	10
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Reference Books:

1. Amitabha Ghosh and A.K. Mallick, Manufacturing Science. Affiliated East-West Press Pvt. Ltd. 2010.
2. Kalpakjian and Schmid, Manufacturing Processes for Engineering Materials, Pearson India, 2014.
3. M. P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, and Systems.
4. Degarmo, Black & Kohser, Materials and Processes in Manufacturing.

E-Resources:

1. <https://www.mooc-list.com/tags/manufacturing>

Course Learning Outcomes (CLO):

CLO	Description	Bloom's Taxonomy Level
CLO1	Illustrate the basics of manufacturing processes.	3 Applying 4 Analyze
CLO2	Acquire knowledge and ability to select parameters of machining	2 Understanding 3 Applying
CLO3	Estimate machining times for machining operations on machine tools.	3 Applying
CLO4	Learn the additive and non conventional manufacturing processes	2 Understanding 3 Applying
CLO5	Compare Various welding process and its applications.	4 Analyzing
CLO6	Estimate formability limits for sheets and bulk metals.	3 Applying

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	H		H		L	H	H			M	H		H	
CLO2		M	H		H	M	L		L					M
CLO3		H		M	H			M		M	L		H	
CLO4			H			H			M			L	M	
CLO5	M			H	M			L		M		L		L
CLO6	H		M			M			L		M		L	

H: High, M: Medium, L: Low