



National Institute of Technology Meghalaya
An Institute of National Importance

CURRICULUM

Programme	Bachelor of Technology in Mechanical Engineering	Year of Regulation	2018
Department	Mechanical Engineering	Semester	VI

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
ME 316	Machine Tool Technology	3	0	0	3	50	50	100	200

Course Objectives	To study and understand the various internal parts of machines.	Course Outcomes	CO1	Understand the kinematic motions of a machine tool.
			CO2	Explain the strategies for critical mechanical components of a machine tool based on design principles.
	CO3		Design and analyze the systems used for achieving required speeds and feeds.	
	CO4		Design and analyze of slide ways, spindles and lead screws for reducing friction and to achieve high accuracy of product.	
	CO5		Analysis of the reasons of chatter in machining and analyze vibrations to improve the performance of machine tool.	
	CO6		Evaluate the performance parameters of machine tools to enhance the quality assurance during machining.	
To understand the dynamics of machining parts by varying parameters				

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	3	3	0	2	0	0	3	2	0	0	3	3	2	0
2	CO2	3	3	3	0	2	0	0	3	2	0	0	3	2	2	0
3	CO3	3	3	3	0	2	0	0	3	2	0	0	3	2	2	0
4	CO4	3	3	3	0	3	0	0	3	2	0	0	3	2	2	0
5	CO5	3	2	3	0	3	0	0	3	2	0	0	3	3	3	0
6	CO6	3	3	3	0	3	0	0	3	2	0	0	3	3	3	0

SYLLABUS

No.	Content	Hours	COs
I	Introduction to Machine Tool Drives and Mechanisms: Introduction to the course, Working and Auxiliary Motions in Machine Tools, Hydraulics Transmission and its elements, Mechanical Transmission and its elements.	06	CO1
II	Regulation of Speed and Feed Rates: Aim of Speed and Feed Regulation, Kinematics of Machine Tools – Stepped and step less drive, Stepped Regulation of Speeds, Multiple Speed Motors, Ray Diagrams and Design Considerations, Design of Speed Gear Boxes, Feed Drives, Feed Box Design, Step-Less Regulation of Speed and Feed Rates.	06	CO2
III	Design of Machine Tool Structures: Functions of Machine Tool Structures and their Requirements, Design for Strength Design for Rigidity, Materials for Machine Tool Structures, Machine Tool, Constructional Features, Beds and Housings, Columns and Tables, Saddles and Carriages.	05	CO3
IV	Design of Guideways, Power Screws and Spindles: Functions and Types of Guide ways, Design of Guide ways, Design of Aerostatic, Slide ways, Design of Anti-Friction Guide ways, Combination Guide ways, Design of Power Screws, Recirculating power screws assemblies, Elimination of Backlash.	06	CO4
V	Design of Spindles and Spindle Supports: Functions of Spindles and Requirements, Effect of Machine Tool Compliance on, Machining Accuracy, Design of Spindles, Antifriction and Sliding Bearings.	04	CO4
VI	Dynamics of Machine Tools: Machine Tool Elastic System, Static and Dynamic Stiffness, Stability Analysis, Machine Tool Chatter, Damping Characteristics, Damping Methods.	04	CO6
VII	Control Systems in Machine Tools: Machine tool control systems, Control Systems for Speed and Feed Changing, Adaptive Control Systems.	04	CO6
VIII	Vibration in Machine Tools: Forced Vibration, self-excited vibration, stick-slip vibration and its minimization, vibration isolation.	04	CO5
Total Hours		39	

Essential Readings

N.K. Mehta, Machine Tool Design and Numerical Control, TMH, New Delhi, 2010

D. K Pal, S. K. Basu, "Design of Machine Tools", 5th Edition. Oxford IBH, 2008

Supplementary Readings

G.C. Sen and A. Bhattacharya, Principles of Machine Tools, New Central Book Agency, 2009.

N. S. Acherkhan, "Machine Tool Design", Vol. I, II, III and IV, MIR publications, 1968.