	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	**VII**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
ME 423	**GREEN MANUFACTURING**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives		Course Outcomes		
	To introduce Motivations, Barriers, Environmental Impact and Strategies for Green Manufacturing and explain the Techniques /Methods of Green Supply Chain.		CO1	Able to Interpret the basics of Green Manufacturing and its Social, Business, and Policy Environment. (Understanding)
	To develop an ability and skill to use the knowledge of Environmental Implications of Nano-manufacturing and Green Manufacturing through Clean Energy.		CO2	Able to Explain the Metrics for Green Manufacturing and principles of green manufacturing (Understanding)
			CO3	Able to Apply the knowledge of Closed-Loop Production Systems for Sustainable Factory Design. (Application)
	To discuss the role of supply chain in packaging		CO4	Able to Able to Apply the knowledge of Environmental Implications of Nano-manufacturing and Clean Energy Supplying Green Manufacturing (Application)
			CO5	Able to Analysis and discussion on Packaging and the Supply Chain (Analysis)

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	**0**	**0**	**0**	**0**	**0**	**3**	**3**	**0**	**0**	**1**	**1**	**2**	**0**	**2**	**0**
2	CO2	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**3**	**3**	**0**	**3**	**0**
3	CO3	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**2**	**3**	**3**	**3**	**0**	**3**	**0**
4	CO4	**0**	**0**	**0**	**0**	**0**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**0**	**3**	**0**
5	CO5	**0**	**0**	**0**	**0**	**0**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**0**	**3**	**0**

SYLLABUS

No.	Content	Hours	COs
I	**Introduction to Green Manufacturing** Why Green Manufacturing, Motivations and Barriers to Green Manufacturing, Environmental Impact of Manufacturing, Strategies for Green Manufacturing. The Social, Business, and Policy Environment for Green Manufacturing: Introduction, The Social Environment—Present Atmosphere and Challenges for Green Manufacturing, The Business Environment: Present Atmosphere and Challenges, The Policy Environment—Present Atmosphere and Challenges for Green Manufacturing.	**08**	**CO1**
II	**Metrics for Green Manufacturing** Introduction, Overview of Currently Used Metrics, Overview of LCA Methodologies, Metrics Development Methodologies, Outlook and Research Needs. Green Supply Chain: Motivation and Introduction, Definition, Issues in Green Supply Chains (GSC),Techniques/Methods of Green Supply Chain, Future of Green Supply Chain. Principles of Green Manufacturing: Introduction, Background, and Technology Wedges, Principles, Mapping Five Principles to Other Methods and Solutions.	**08**	**CO2**
III	**Closed-Loop Production Systems** Life Cycle of Production Systems, Economic and Ecological Benefits of Closed Loop Systems, Machine Tools and Energy Consumption, LCA of Machine Tools, Process Parameter Optimization, Dry Machining and Minimum Quantity Lubrication, Remanufacturing, Reuse, Approaches for Sustainable Factory Design.	**08**	**CO3**
IV	**Environmental Implications of Nano-manufacturing** Introduction, Nano-manufacturing Technologies, Conventional Environmental Impact of Nano-manufacturing, Unconventional Environmental Impacts of Nano-manufacturing, Life Cycle Assessment (LCA) of Nanotechnologies. Green Manufacturing Through Clean Energy Supply: Introduction, Clean Energy Technologies, Application Potential of Clean Energy Supplying Green Manufacturing	**08**	**CO4**
V	**Packaging and the Supply Chain** A Look at Transportation, Introduction, Background, Recommended Method to Determine Opportunities for Improved Pallet Utilization, Discussion.	**04**	**CO5**
	Total Hours	**36**	

Essential Readings

1. David Dornfeld “Green Manufacturing Fundamentals and Applications”, Springer, 2013

Supplementary Readings

1. J. Paulo Davim “Green Manufacturing Processes and Systems” Springer-Verlag Berlin Heidelberg, 2013