



**National Institute of Technology Meghalaya**  
An Institute of National Importance

**CURRICULUM**

Programme	<b>Bachelor of Technology in Mechanical Engineering</b>	Year of Regulation	<b>2018</b>
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Department	<b>Mechanical Engineering</b>	Semester	<b>IV</b>
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Course Code	Course Name	Credit Structure				Marks Distribution	
		L	T	P	C	Continuous Evaluation	Total

<b>ME 254</b>	<b>Material Science Lab</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>100</b>	<b>100</b>
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Course Objectives	To understand basics of microstructure of materials, its hardness under different conditions.	Course Outcomes	<b>CO1</b>	Demonstrate the annealing process and its effect on a given work specimen (Understanding).
	To understand basics of heat affected zone of materials and detection of flaws of materials.		<b>CO2</b>	Demonstrate the effect of quenching on hardness of the steel (Understanding).
			<b>CO3</b>	Ability to examine the microstructure of material (Applying).
			<b>CO4</b>	Study of hardness and microstructure changes in the heat affected zone in a welded specimen (Applying).
			<b>CO5</b>	

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	<b>CO1</b>	3	0	0	0	2	0	0	2	0	0	0	2	3	2	0
2	<b>CO2</b>	3	0	0	0	2	0	0	2	0	0	0	2	2	2	0
3	<b>CO3</b>	3	0	0	0	2	0	0	2	0	0	0	2	2	2	0
4	<b>CO4</b>	3	0	0	0	2	0	0	2	0	0	0	2	2	2	0
5	<b>CO5</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**SYLLABUS**

No.	Content	Hours	COs
I	Study of the microstructure and hardness effect of Annealing on a given Mild steel sample	<b>04</b>	<b>CO1</b>
II	Study of the microstructure and hardness effect of Air-Quenching on a given Mild steel sample	<b>04</b>	<b>CO2</b>
III	Study of the microstructure and hardness effect of Water-Quenching on a given Mild steel sample	<b>02</b>	<b>CO2</b>
IV	Study of the microstructure and hardness effect of Oil-Quenching on a given Mild steel sample	<b>02</b>	<b>CO2</b>
V	Study of the microstructure of Cast Iron	<b>02</b>	<b>CO3</b>
VI	Study of the microstructure of Non Ferrous Metal/Alloy	<b>02</b>	<b>CO3</b>
VII	Study of the heat affected zone (HAZ) in a welded sample of low carbon steel	<b>04</b>	<b>CO4</b>
<b>Total Hours</b>		<b>20</b>	

**Essential Readings**

- G.E. Dieter, "Mechanical Metallurgy", Mc Graw Hill Education; 3<sup>rd</sup> Edition, 2017.
- W. D. Callister, "Material Science and Engineering: An Introduction", Wiley, 6<sup>th</sup> Edition, 2006.
- W.F. Smith, "Principles of Materials Science", McGraw Hill, 3<sup>rd</sup> Revised Edition, 1990.
- T.V. Rajan, C.P. Sharma and A. Sharma, "Heat Treatments: Principles and Techniques", Prentice Hall, 2<sup>nd</sup> Edition, 2010.