BMEE209P	Materials Science and Engineering Lab	L	T	P	C
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Pre-requisite	**BPHY101L , BPHY101P , BCHY101L , BCHY101P**	**Syllabus version**			
		1.0			

Course Objective

1. To impart practical exposure on optical microscopy, furnace, and mechanical testing equipment.
2. To provide hands-on experience on image analysis software.

Course Outcome

At the end of the course, the student will be able to

1. Investigate the phases in the microstructure of samples.
2. Assess the mechanical properties as per the ASTM standards.
3. Develop and propose the industrial heat treatments.

Indicative Experiments	
1.	Thermal analysis of Pb-Sn alloy (To produce cooling curve and report the eutectic temperature.
2.	Metallographic sample preparation.
3.	To study the microstructure of Ferrous Materials a) Steel b) Stainless Steel c) Cast Iron.
4.	To study the microstructure of Non- Ferrous Materials.
5.	Cold work and annealed microstructure of alloys (Ferrous/Non-ferrous).
6.	Heat Treatment of Steel (Annealing, Normalising, Quenching and Tempering).
7.	Age hardening studies of Aluminium alloys.
8.	Study of surface hardened Steel – Case Depth, hardness and microstructure.
9.	Hardness measurement of ferrous and non-ferrous alloys.
10.	Hardenability of Steels by Jominy end quench test according to ASTM standards.
11.	Tensile property evaluation of ductile and brittle materials according to ASTM standards.
12.	Quantitative metallography and image analysis
	Total Laboratory Hours **30 hours**

Text Book(s)

1.	William D. Callister Jr., David G. Rethwisch, Callister's Materials Science and Engineering, 2018, 10th edition, John Wiley & Sons, Inc., United states
2.	William F Smith, Javad Hasemi and Ravi Prakash, Materials science and Engineering, 2017, McGraw Hill Publications, 5th edition.
3.	Lab Manual prepared by course faculty member

Reference Books

1.	Michael F. Ashby, Materials Selection in Mechanical Design, Elsevier Butterworth-Heinemann, 2016, 5th edition.
2	Donald R. Askeland, Science and Engineering of Materials, SI Edition, 2015, 7th edition, Springer, Boston, MA
3	V. Raghavan, Materials Science and Engineering, 2015, 6th edition, Prentice Hall India Learning Private Limited, United Kingdom
4	Michael F. Ashby, Materials Selection in Mechanical Design, Elsevier Butterworth-Heinemann, 2016, 5th edition.

Mode of assessment: Continuous assessment / FAT / Oral examination

Recommended by Board of Studies	09-03-2022		
Approved by Academic Council	No. 65	Date	17-03-2022