INTRODUCTION TO METALLURGICAL ENGINEERING LAB

Course Type	Course Code	Name of the Course	L	T	P	Credits
DSC2	NFMC102	**Introduction to Metallurgical Engineering Lab**	0	0	2	1

Course Objective

The objective of this lab is to introduce undergraduate students to the basic aspects of selection of metallic materials for various engineering application through gaining hands-on experience on materials property evaluation.

Learning Outcomes

Upon successful completion of this course, students will develop:

- an ability to identify appropriate materials for a specific application.
- an idea about the working principle of the method for material property evalutation and data interpretation.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Identification of ballpark material for different applications.	2	Students will learn about evolution of different materials for various applications.
2.	Introduction of crystals and crystal structure	2	Students will learn about different crystal structures and will make the models.
3.	Introduction to crystallographic planes and directions	2	Students will learn about the crystallographic planes and directions and indexing them.
4.	Identification of ores of metallic materials of commercial interest and introduction of chemical analysis tools.	2	Students will get visually familiarized with different ores of metallic materials and learn about analyzing the chemical composition.
5.	Study of unit processes involved in pyrometallurgical processing of iron ores	2	Students will learn about the processing steps of green pellet formation in drum and disc pelletizer, induration and reduction process.
6.	Study of unit processes involved in hydrometallurgical processing of non-ferrous ores	2	Students will learn about the roasting, leaching and electrowinning/precipitation process.
7.	Imperfections in Metallic Materials.	2	Students will learn about different types of imperfections.
8.	Introduction of Characterization tools - Structural	2	Students will learn about optical microscopy and stereo-microscopy.
9.	Introduction of Characterization tools - Mechanical	2	Students will learn about basic mechanical characterization through hardness and tensile testing.
10.	Non-destructive testing of Metallic components	2	Students will learn about dye-penetrant, magnetic particle testing/ electrical

			conductivity measurement.
11.	Recording and getting familiarized with reference microstructure	2	Students will learn about the morphological difference between cast, wrought, single phase and multiphase microstructure
12.	Introduction to defects in metallic materials processed through certain manufacturing processes.	2	Students will learn to identify casting and rolling defects.
13.	Response of metallic materials to harsh environmental condition.	2	Students will learn about how different alloys undergo degradation in corrosive environment.