

1.	Title of the course	Material Characterization Techniques
2.	Course number	ME511M
3.	Structure of credits	2-0-2-3
4.	Offered to	PG
5.	New course/modification to	Modification To ME5208/6
6.	To be offered by	Department of Mechanical Engineering
7.	To take effect from	July 2022
8.	Prerequisite	Nil
9.	Course Objective(s): To introduce different material characterization techniques and make students familiar with the underlying principles. To provide practical experience in laboratory methods. To provide basic descriptions of a range of common characterization methods for the determination of the structure of solids.	
10.	Course Content: Introduction: Requirement of different techniques of material characterization for different situations; Mechanical and physical characterization. Optical Metallographic Techniques: Preparation of samples, Observation of microstructure. Mechanical Characterization Processes: Measurement of hardness, fracture, toughness, adhesion, ductility, creep, strength. Surface profilometry; Tribological studies of materials. Physical Characterization Processes: Introduction to different methods and their applications; Diffraction methods for phase; residual stresses; texture analysis etc. Electro-optical and related techniques like SEM, TEM, EDS, WDS/EPMA etc. Surface analysis and related techniques like XPS, AFM etc. Spectroscopic techniques.	
11.	Textbook(s): 1. Brundle C R, Evans C A, and Wilson S, <i>Encyclopedia of materials characterization: surfaces, interfaces, thin films, Material characterization series, surfaces, interfaces, thin films</i> , Goodhew P J, Humphreys J, Beanland R (1992).	
12.	Reference(s): 1. Goodhew P J, Humphreys J, and Beanland R, <i>Electron Microscopy and Analysis</i> , Taylor and Francis (2000).	