Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NCYD529	Material Sciences and Technology	3	0	0	3

Course Objective
● With this course students will be introduced to the concepts related to materials science and technologies, their classifications and relation between processing, structure, and physical properties
Learning Outcomes
● Classify materials based on their properties and establish structure properties relationship. ● Correlate effect of crystal structure, defects and imperfections on materials properties. ● Identify the causes of failures and characterize materials with Thermal, spectroscopic and mechanical methods. ● Identify the importance of composites, their processing, and characterization.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Introduction to Materials Science, Classification of Materials, Modern Materials Needs, Processing/Structure/Properties/ Performance Correlations. Structure of Crystalline Solids, Geometry of crystals- the Bravais lattices, Crystal directions and Planes- Miller indices, Structure determination-X-ray diffraction, Braggs Law, the power method. Imperfections in Solids: Point Imperfections, Line imperfections- edge and screw dislocations, Surface imperfections. Phase Diagrams.	14L	This unit will introduce types of materials and their properties.
2	Mechanical Properties, Failure: Fracture, Creep, Fatigue. Electrical, Magnetic, Thermal and optical properties of materials. Characterization of Materials: Mechanical, Thermal and Spectroscopic techniques. Properties of Selected Engineering Materials.	14L	This unit will introduce the mechanical, thermal, and electrical properties of materials and their characterization protocols.
3	Polymer Structures. Characteristics, Applications, and Processing of Polymers, Composites: Significance and Classification. Processing, Characterization and Applications of Composites. Advanced Materials: Smart materials, Biomaterials, Nanomaterial and Nanocomposites.	14L	This unit will introduce the types of composite materials along with fabrication techniques, characterization and applications.

TOTAL	**42**	

Text Books:

1. Polymer Science & Technology – Plastics, Rubbers, Blends and Composites. Premamoy Ghosh. 3rd Edition, McGraw Hill Education (India) Private Limited, 2010.

Reference Books:

1. Materials Science and Engineering: An Introduction, William D. Callister, Jr. David G. Rethwisch, 2013, Wiley.
2. Solid State Chemistry and its Applications, Second Edition, Anthony R. West, 2014, Wiley.