

PROFESSOR'S NAME	Dr. Ashish Garg
DEPARTMENT	Metallurgy and Material Science
INSTITUTE	IIT Kanpur
COURSE OUTLINE	The course is rst part of the broader course on Introduction to Nature of materials and would be suitable for undergraduate and postgraduate students of every branch of science and engineering. The rst part of this course will focus on essentials of crystallography, crystal structures of different classes of materials, structure determination and defects in materials.

COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1	M1L1	Material Evolution
2	M1L2	Bonding in Materials
3	M1L3	Correlation between bond and physical properties
4	M1L4	Crystal Structure: Lattice and Basis
5	M1L5	Unit Cell (Primitive & Non-primitive)
6	M2L1	Crystal Systems and Bravais Lattices
7	M2L2	Bravais Lattice and Symmetry in Crystals
8	M2L3	Symmetry in Crystals
9	M2L4	Lesson 9: Symmetry & Correlation with the Bravais Lattice
10	M2L5	Miller Indices (Planes & Directions)

11	M3L1	Miller Indices Part 2
12	M3L2	Miller Indices Part 3
13	M3L3	Miller Indices & Weiss Zone Law
14	M3L4	Structure of Metals & Alloys
15	M3L5	Structure of Metals, Packing, Co-ordination & Interstices
16	M4L1	Interstices, Solid Solutions & Alloys
17	M4L2	Solid Solutions: Alloys
18	M4L3	Solid Solutions: Alloy (contd.)
19	M4L4	Covalent Solids
20	M4L5	Covalent Solids (contd.) & Ionic Solids
21	M5L1	Ionic Solids: Stability & Rules of Formation
22	M5L2	Ionic solids (contd.): Formation of structure
23	M5L3	ionic Solids(contd.): Close Packing of anions
24	M5L4	Ionic Solids(contd.): Other cubic structures
25	M5L5	Ionic Solids(ceramics): Remaining cubic & non-cubic structures
26	M6L1	HCP based Structure
27	M6L2	Structure of Non-crystalline Solids (glasses)
28	M6L3	Structure of Non-Crystalline Solids:Glasses(contd.)
29	M6L4	Structure of Non-Crystalline Solids (Polymers)
30	M6L5	Structure of Polymers
31	M7L1	Structure of Polymers (Contd...)
32	M7L2	Structure Determination (X-ray Diffraction)
33	M7L3	X-ray Diffraction

34	M7L4	X-ray Diffraction (Contd.)
35	M7L5	X-ray Diffraction (Contd...)
36	M8L1	X-ray Diffraction (contd..)
37	M8L2	X-ray Diffraction (contd.)
38	M8L3	Defects in Solids (Point Defects)
39	M8L4	Point Defect Concentration
40	M8L5	2-D Defects

References if Any: None