



# NATURE AND PROPERTIES OF MATERIALS

## **PROF. BISAKH BHATTACHARYA**

Department of Mechanical Engineering  
IIT Kanpur

**PRE-REQUISITES** : Basic Physics and Mathematics Courses at the First Year Level, added with thirst for learning.

**INTENDED AUDIENCE** : Students of BE/B.Tech stream

**INDUSTRIES APPLICABLE TO** : Every industry recommends to have a basic knowledge about various materials and truth behind their properties

### **COURSE OUTLINE :**

This course introduces to the basics of metals and metallic alloys, polymers, composites and smart materials which have extensively broadened the scope of engineering design in the fields of Civil, Mechanical, Aerospace and other structural applications. After learning this course, students will be well-versed with the underlying principle governing the material properties and should be able to select proper material for their application.

### **ABOUT INSTRUCTOR :**

Prof. Bishakh Bhattacharya is Professor at the Department of Mechanical Engineering and currently heading the Cognitive Science programme, IIT Kanpur. His research interest primarily lies in vibration control, structural health monitoring, energy harvesting system, intelligent system design and Child-Reconfigurable Robot Interaction.

### **COURSE PLAN :**

**Week 1:** Introduction to Engineering materials & Mechanical properties

**Week 2:** Atomic bonding and crystal structure

**Week 3:** Metals and Ceramics

**Week 4:** Polymers

**Week 5:** Composite Materials

**Week 6:** Smart Materials

**Week 7:** Materials selection in Engineering design

**Week 8:** Non-mechanical properties and Laboratory demonstration