



## METALLURGICAL AND MATERIALS ENGG.

# FRICITION AND WEAR OF MATERIALS: PRINCIPLES AND CASE STUDIES

### PROF. B.V. MANOJ KUMAR

Department of Metallurgical and Materials Engineering  
IIT Roorkee



**TYPE OF COURSE** : New | Core | UG/PG  
**INTENDED AUDIENCE** : BE, ME, MS, MSc, PhD  
**COURSE DURATION** : 8 weeks (25 Feb'19 - 19 Apr'19)  
**EXAM DATE** : 27 April 2019

### PROF. BIKRAMJIT BASU

Materials Research Center  
IISc, Bangalore



**INDUSTRIES APPLICABLE TO** : Industries dealing in tribology: DUCOM, Bangalore

### COURSE OUTLINE :

While the tribology is generally considered as related to mechanical engineering and design, the ever-increasing demand for the development of advanced materials for tribological applications necessitates a methodical understanding of tribology in materials science perspective. The proposed course is designed to provide knowledge on basic concepts of tribology as well as to understand the state of the art findings in friction and wear for a range of advanced material systems. The microstructure - properties - performance relationship is highlighted in understanding the behavior of the material in given wear conditions.

### ABOUT INSTRUCTOR :

Dr. B.V. Manoj Kumar is currently working as Associate Professor in the Department of Metallurgical and Materials Engineering, Indian Institute of Technology Roorkee. He has been teaching courses related to materials science, engineering ceramics and composites, and tribology for the more than 7 years. His research interests include tribology of advanced materials, development of structural ceramics and composites.

Prof. Bikramjit Basu is currently a Professor at the Materials Research Center with joint appointment at the Centre for Biosystems Science and Engineering and Interdisciplinary center for Energy Research at Indian Institute of Science, Bangalore. He served on the faculty of IIT Kanpur during 2001-2011. As a researcher, he has made pioneering contributions towards innovative research at the intersection of multiple Engineering disciplines and Natural Sciences

### COURSE PLAN :

**Week 01** : Introduction; surfaces; friction; contact temperature; lubrication

**Week 02** : Wear, wear mechanisms

**Week 03** : Friction and wear of advanced metallic materials; basic fabrication concepts and overview of bioceramics and biocomposites

**Week 04** : Processing concepts of ceramics, mechanical behavior of brittle materials; wear behavior of ceramic composites

**Week 05** : Friction and wear of engineering polymers; Tribology of bioceramic composites, zirconia and dental restorative materials.

**Week 06** : Wear of nanoceramic composites; erosive wear of ceramic composites

**Week 07** : Cryogenic wear; Wear of high temperature ceramics

**Week 08** : Friction and wear of coatings, computational analysis in assessing wear, Closure