



# STRENGTH OF MATERIALS - IITKGP

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### INTENDED AUDIENCE :

- \* Civil Engineering
- \* Mechanical Engineering
- \* Aerospace Engineering
- \* Applied Mechanics

**PRE-REQUISITES** : Basic Engineering applications

**INDUSTRY SUPPORT** : All manufacturing industries, Construction sector, Structural design organisations

### COURSE OUTLINE :

Strength of Materials is a fundamental subject needed primarily for the students of Mechanical sciences. As the engineering design of different components, structures etc. used in practice are done using different kinds of materials, it is essential to understand the basic behavior of such materials. The objective of the present course is to make the students acquainted with the concept of load resultant, consequences and how different kinds of loadings can be withstood by different kinds of members with some specific materials. NPTEL lecture series on Strength of Materials are prepared, explaining the fundamentals in a simple and lucid manner so that the students can grasp the basics of the application of loading system and its consequence in a deformable body.

### ABOUT INSTRUCTOR :

Prof. Bhattacharyya is the Vice Chancellor of Shiv Nadar University, Chennai and Professor and former Head of Civil Engineering at IIT Kharagpur. He has served as a Professor of Civil Engineering at IIT Kharagpur over a period of three decades. He is also the Former Director of CSIR-Central Building Research Institute (CBRI). Prof. Bhattacharyya's research area includes sustainable building materials, fluid-structure interaction, structural health monitoring, FRP-concrete composite system, structural restoration, numerical modelling, and structural fire engineering. He has published over 250 technical papers in several international and national journals, book chapters, proceedings of international and national conferences, seminars, and workshops. He has developed web-based and video-based NPTEL courses titled 'Finite element method in Engineering' and 'Strength of Materials', which are currently running. He is a Fellow of Indian Academy of Engineering, Indian Association of Structural Engineering, and the Institution of Engineers (India). Prof. Bhattacharyya has several patents based on his research and has received many prestigious awards including 'Distinguished Alumnus Award' by IEST (BESU Shibpur), 'Concrete Technologist of the year' by Indian Concrete Institute, and 'Telkom Best Lecturer Award' for the best teacher in Civil Engineering at the University of Durban-Westville, South Africa.

### COURSE PLAN :

- Week 01** : Analysis of stresses
- Week 02** : Analysis of strain
- Week 03** : Stress-strain relations
- Week 04** : Uniaxial loading
- Week 05** : Torsion
- Week 06** : Bending of Beams - 1
- Week 07** : Bending of Beams - 2
- Week 08** : Deflection of Beams - 1
  - Deflection of Beams - 2
  - Combined stresses
  - Stability of columns
  - Spring