



**MECHANICAL  
ENGINEERING**

# KINEMATICS OF MECHANISMS AND MACHINES



**PROF. ANIRVAN DASGUPTA**  
Dept. of Mechanical Engineering  
IIT Kharagpur

<b>TYPE OF COURSE</b>	: New   Elective   UG/PG	<b>COURSE DURATION</b>	: 8 weeks (28 Jan'19 - 22 Mar'19)
<b>INTENDED AUDIENCE</b>	: Mechanical, Electrical, Aerospace Bio-Medical	<b>EXAM DATE</b>	: 31 March 2019
<b>PRE-REQUISITES</b>	: Engineering Mechanics, Undergraduate Mathematics		
<b>INDUSTRIES APPLICABLE TO</b>	: Automobile and Aerospace industries, Automation and robotic device manufacturers, Bio-Medical device manufacturers		

## **COURSE OUTLINE :**

This course will deal with kinematic analysis of mechanisms and machines. It will include motion and force transmission analysis of linkage mechanisms, open and closed-chain planar robots, and geared transmission. The discussion will start with an introduction to the subject matter and nomenclature, and will cover direct and inverse kinematics, velocity and acceleration analysis, kinematic path generation for robots, singularities in kinematic chains, principle of virtual work and force analysis, and kinematic analysis of differential and automatic gear transmission. The course will demonstrate various concepts by working out problems relevant to real life applications of mechanisms. The course is expected to help students in their basic understanding and use of kinematic analysis.

## **ABOUT INSTRUCTOR :**

Dr. Anirvan DasGupta is a faculty in Mechanical Engineering at IIT Kharagpur since 1999. His interests are in the mechanics of discrete and continuous systems. He has extensively taught courses at undergraduate and postgraduate levels like Mechanics, Kinematics of Machines, Dynamics, Dynamics of Machines, Vibration Analysis, Wave Propagation in Continuous Media, and Rail Vehicle Dynamics.

## **COURSE PLAN :**

- Week 01** : Introduction to Mechanisms, Mobility Analysis
- Week 02** : Mobility Analysis, Displacement Analysis
- Week 03** : Displacement Analysis
- Week 04** : Velocity Analysis
- Week 05** : Velocity Analysis
- Week 06** : Velocity Analysis, Acceleration Analysis
- Week 07** : Force Analysis, Introduction to geared transmission
- Week 08** : Analysis of gear trains