# Rigid Body Kinematics and Kinetics

In the general discipline of engineering mechanics, dynamics is an important area, which provides us with tools, methodologies and techniques that help us to understand the various complex motion scenarios that we encounter all around us. In this regard, it is found that while the entities that undergo various motion profiles in the context of engineering systems, are deformable, in many cases, it is possible to simplify their representation in the form of a rigid body. This is possible as the flexible motion is generally of a much smaller order of magnitude and, hence, can be analyzed separately and then added to the basic rigid motion through the principle of superposition. The discipline of kinematic and kinetics of rigid bodies aims to analyze the motion profiles of bodies that are rigid i.e. inter-particle distances in such bodies are invariant for motion profiles under consideration.

The kinematics and kinetics of rigid body involves modelling and solution of motion profiles of rigid bodies of arbitrary shape and size, under the action of the unbalanced forces and moments that act on them during the evolution of the motion. The modelling is based on the fundamental laws of motion as given by Newton for rectilinear motion and by Euler for rotational motion.

The present short course is intended as an introductory material with regard to the kinematic and kinetic modelling of general rigid bodies, and aims to expose participants to important concepts e.g. inertia tensor, gyroscopic effects, instantaneous rotational axis etc. The participants can expect to acquire basic knowledge about the dynamics of rigid bodies, including basic tools to model the equations of motion and their solution methodologies. The course is of twelve hours duration and is delivered over six weeks.