



Course Specification Document

Title	Mechanics of Solids
--------------	---------------------

Credits	2.5 ECTS
----------------	----------

Aims	This course aims to provide the student with the necessary definitions and basic theories for studying the kinematics and dynamics of solid bodies.
-------------	---

Intended learning outcomes

On successful completion of this course, the student will be able to:

- Define the torsor and its application in the study of the kinematics and dynamics of solid bodies.
- Determine a solid body in space and study its kinematics.
- Define the mechanical action, the torsor of the mechanical action, and determine the center of inertia of a solid body.
- Calculate the moments of inertia, the inertia matrix, and kinetic energy and study the dynamics of a solid body.

Syllabus

- **The torsor:** Definition of the torsor, torque of the torsor about an axis, scalar invariant, the central axis of a torsor, the slipping torsor and the double torsor.
- **Kinematics of a solid body:** Definition of a solid body, determination of a solid body in space, velocity torsor, field of accelerations, translational motion, rotational motion about a fixed axis.
- **Euler angles and planar motion:** Definition of Euler angles, definition of planar motion, instantaneous axis of rotation and instantaneous center of rotation, concept of sliding and rolling, sliding velocity and no-slip condition.
- **Mechanical actions and equilibrium:** Definition of mechanical action, torsor of the mechanical action, gravitational action and center of inertia, contact actions, the basic principle of equilibrium of a solid body.
- **Mechanical joints:** Definition of a mechanical joint, ideal joint, types of mechanical joints, torsor of mechanical actions within joints.
- **Kinetics of a solid body:** Kinetic torsor, moment of inertia and inertia matrix, principal axes of inertia, kinematics torsor.