

EU objectives**At the end of this course, students will be able to :**

- Interpreting a state of deformation/stress in a part
- Analysing a strain gage measurement
- Calculating a state of stress and strain
- Dimensioning a structure in relation to a yield point criterion
- Justify its mechanical analysis using theoretical knowledge
- Judging the results of a numerical finite element calculation
- Write the equations of motion of a mechanical system using Lagrange's formalism,
- Determine the characteristics of links and actuators using Lagrange's formalism
- Modelling simple structures using elementary conservative or dissipative oscillators
- Write and solve the differential equations of motion of an elementary oscillator in the free or forced harmonic regime
- Dimension the parameters of an elementary oscillator to meet simple specifications
- Analyse the transfer functions of elementary oscillators (Bode and Nyquist diagrams), using experimental methods to construct them
- Couple two elementary oscillators and manage their parameters to create a dynamic damper

Description of the ECUEs**ELASTICITE**

Introduction: Presentation of elasticity in the context of the relationship between structural calculation and experiment; Study of particle kinematics; Small perturbation hypothesis: linearised deformation tensor; Large deformations: Green Lagrange tensor; Property of the symmetrical gradient tensor of deformation; Displacement field/deformation relationships: compatibility equations; Determination of the Cauchy stress tensor; Elasticity criteria: von Mises, Tresca, etc.; Methods of solving an elastic problem; Plane elastostatics, Airy functions; Mohr's circles.

DYNAMICS OF CONTINUOUS SYSTEMS

Principle of virtual powers, Lagrange equations (correspondence with Newton Euler formalism), Jennie-Ramonel and Painlevé equations, applications.

DYNAMICS OF DISCRETE SYSTEMS 1

Interest in studying the vibrations of structures (notion of resonance), examples of modelling using elementary oscillators, study of the free and forced regimes of conservative and dissipative oscillators; extension to oscillators with 2 degrees of freedom (e.g. dynamic damper), notions of vibration measurement.

Prerequisites
Solid mechanics, systems mechanics (Newton Euler formalism)
Bibliography
General Mechanics - courses and applications - J.C. Bône - Dunod