

Course Title: Mechanics of Vibrations	Number of Units: 1
CFU: 6	SSD: IND-IND/13
<p>Course aims: The course intends to provide the necessary concepts for the identification, mathematical formulation, simulation and testing of the most significant dynamic phenomena in the field of machines and mechanical systems, with particular reference to the flexional critical speeds, torsional oscillations and the elastically constrained rigid body dynamics.</p>	
<p>Course Description: Conservative and non-conservative lumped parameters systems: Technical relevance of the problem. Matrix equations of motion. Modal analysis method: free and forced vibrations by action of: harmonic, periodic and random forces. Considerations on damping proportional or not. Frequency response function. Dynamics of elastically suspended rigid body: Definition of the mathematical model. Determination of the matrices of the masses and stiffness. Discrete and continuous elements suspension systems. Determination of forcing actions. The vehicle suspensions: Requirements of a suspension system. Types of suspensions. The dynamics of the suspended mass with respect to the ride comfort. Simple and compensated air suspensions. Conjugate suspensions. Forced torsional oscillations: Historical Introduction to the study of torsional oscillations and technical relevance of the problem. Lumped system determination. Particular equivalent systems: system of naval propulsion and transmission system of a motor vehicle. Exciting causes of forced vibration. Critical speeds. Amplitudes of forced elastic vibrations for a system of n masses. Flexional vibrations and critical speed: Historical Introduction to the study of flexional vibrations and technical relevance of the problem. Simple system. Disk effect. Systems n concentrated masses, isostatic and statically indeterminate. Method of transfer matrix.</p>	
Assumed Background	
Assessment methods: Oral examination.	