



APPLIED MECHANICS	
Enrollment year	2018/2019
Academic year	2019/2020
Regulations	DM270
Academic discipline	ING-IND/13 (APPLIED MECHANICS FOR MACHINERY)
Department	DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING
Course	INDUSTRIAL ENGINEERING
Curriculum	Energia
Year of study	2°
Period	1st semester (30/09/2019 - 20/01/2020)
ECTS	9
Lesson hours	68 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	CARNEVALE MARCO (titolare) - 9 ECTS
Prerequisites	Basic notions from the following courses: Analisi matematica 1, Geometria and Algebra, Fisica 1.
Learning outcomes	Provide the student with the basic skills necessary for the modeling and analysis of mechanical systems, also in the presence of mechanical transmissions and endothermic, electric and hydraulic propulsion systems.
Course contents	<p>a) Kinematics of the point, of the rigid body and of systems of rigid bodies in the plane. Constraint classification and pure rolling constraint. Relative motion theorem. Analysis of open and closed kinematic chains with the use of complex numbers: Scara manipulator, ordinary crank mechanism, four bar linkage, oscillating glyph.</p> <p>b) Statics of the rigid body and of rigid body systems. Static equilibrium equations. Virtual work principle for a system of rigid bodies, in the</p>

	<p>presence of conservative and non-conservative forces.</p> <p>c) Mass geometry: centre of gravity and mass moment of inertia. Parallel axis theorem for the moment of inertia.</p> <p>d) Dynamics of the rigid body and of rigid body systems. Equations of dynamic equilibrium according to D'Alembert. Contact forces: static and sliding friction, rolling resistance. Kinetic energy theorem and power balance.</p> <p>e) Dynamics of the one-degree-of-freedom machine. Transmission ratio and efficiency, direct and inverse motion, steady state and transient motion. Characteristic diagrams of engines, electric motors and users (resistance forces). Study of the starting transient in the case of linear drive torque.</p> <p>Study of the longitudinal dynamics of the motor vehicle. Rotor balancing.</p> <p>f) Vibrations of mechanical systems. Equation of motion of one-degree-of-freedom linear systems. Free motion and forced motion. Role played by damping.</p>
Teaching methods	Traditional lesson with the teacher teaching the whole class
Reccomended or required readings	<p>FONDAMENTI DI MECCANICA TEORICA E APPLICATA 3/ED Mc Graw Hill Education</p> <p>Authors: Nicolò Bachschmid, Stefano Bruni, Andrea Collina, Bruno Pizzigoni, Ferruccio Resta e Alberto Zasso.</p>
Assessment methods	The exam consists of a written test and an oral test. The written test consists of two exercises related to the topics addressed in class during the exercises. Only the students who get a positive mark to the written test are admitted to the oral exam, the latter focusing on the entire course program.
Further information	<p>Additional documents:</p> <p>https://elearning2.unipv.it/ingegneria/course/view.php?id=276</p>
Sustainable development goals - Agenda 2030	\$Ibl legenda sviluppo sostenibile