



COURSE: APPLIED MECHANICS

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Language ITALIAN

ECTS: 9

n. of hours: 90

Academic year: 2014/2015

Campus: POTENZA

Semester: I

TOPICS

Analysis of mechanical systems by means of methodologies from theoretical mechanics. Study of planar mechanisms and friction. Analysis of belt transmissions and gears. Transient behaviour in mechanical systems. Mechanical vibrations.

TEACHING METHODS

- Theoretical lessons
 - Tutorials in classroom
 - Tutorials in laboratory
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TEXTBOOKS

Jacazio, Pastorelli, Meccanica Applicata alle Macchine, Ed. Levrotto & Bella, Torino.
Callegari M., Fanghella P., Pellicano F., Meccanica Applicata alle Macchine, Ed. Città Studi, Torino.
Funaioli E., Maggiore A., Meneghetti U., Lezioni di Meccanica Applicata alle Macchine, Vol. 1. Patron Ed., Bologna.
Jacazio G., Piombo B. "Meccanica applicata alle Macchine", Vol. 1, 2 e 4 Ed. Levrotto & Bella, Torino.
Thomson W. T. "Theory of Vibration with Application", IV Ed. Chapman & Hall - London.

ON-LINE EDUCATIONAL MATERIAL

web address: <http://www2.unibas.it/epierro/MAM.html>

LEARNING OUTCOMES

The aim of the course is to provide the basic methodologies to define and analyse the kinematic and dynamic behaviour of mechanical devices and systems.

REQUIREMENTS

Concepts of Physics and Mathematical Physics

EVALUATION METHODS

- Written examination
 - Oral examination
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DETAILED CONTENT

1. PRELIMINARY CONCEPTS ABOUT MECHANICS: Kinematics of a particle trajectory. Kinematics of rigid bodies. Relative Kinematics. Dynamics: cardinal equations. Dynamics of rigid bodies. Work, Kinetic Energy and Potential Energy. Conservation of Mechanical Energy.
 2. KINEMATICS AND DYNAMICS OF PLANAR MECHANISMS: Crank slider mechanism, four bar linkage mechanism. Mechanisms for automatic machines. Open articulated systems.
 3. FRICTION: introduction to friction, sliding friction, friction in mechanisms. Rolling friction, self-locking phenomenon. Examples. Introduction to brakes.
 4. BELT TRANSMISSIONS: belt typologies, flat and V-belts, tooth belts, pulleys. Fundamental equation of belt transmissions. Belt tensioning. Maximum transmissible torque and power. Examples
 5. GEARS AND GEAR-BOXES: typologies, tooth profiles. Geometry of cylindrical gears. Minimum tooth number. Helicoidal gears. Conical gears. Forces between teeth. Fixed-ratio gear-boxes. Planetary gear boxes. Conical differential gear. Examples.
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6. TRANSIENT BEHAVIOUR OF MECHANICAL SYSTEMS: Motor-load coupling dynamics: direct motion, inverse motion, influence of

gear box, influence of friction clutch. Cyclic motion. Irregularities in cyclic motion and fly wheel design.

7. MECHANICAL VIBRATIONS: Classical solutions of differential equations. Time and frequency domain analysis. 1 DOF free and

forced vibrations, support motion forced vibration, mass unbalance forced vibrations. Transmissibility and vibration isolation.

SEMINARS BY EXTERNAL EXPERTS: YES
