Università degli Studi della Basilicata
Scuola di Ingegneria

COURSE: APPLIED MECHANICS				
TEACHER: ELENA PIERRO				
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Language: ITALIAN				
ECTS: 9	n. of hours: 90	Academic year: 2015-2016	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

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

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: Crack 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.

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.

EXAMINATION SESSIONS (FORECAST)
04/02/16, 17/03/16, 19/05/16, 30/06/16, 21/07/16, 29/09/16, 27/10/16, 24/11/16

SEMINARS BY EXTERNAL EXPERTS YES