

DESCRIPTION OF THE EDUCATIONAL ACTIVITY

Academic year: **2010-2011**

Course title: **MECHANICS FOR MACHINES AND OF MATERIALS**

Course number:

Type of educational activity: **characterizing subject**

Subject Group: **ING-IND/13 –ING-IND/14**

Year of study: **2st year of the Management Engineering Degree**

Semester: **1st and 2st**

Total number of credits: **12**

Global workload (n. of hours) : **300**

Number of hours allocated to: lectures, tutorials, laboratory, individual study: **80, 40, 0, 180**

Name of lecturers: **Alessandro Ruggiero, Roberto Citarella**

Objectives of the course: **To develop the students' abilities to perform kinematic analyses of planar mechanisms. To apply the fundamentals of kinematics of planar machinery. To give the students knowledge in the functions of standard mechanical power transmissions and their choice and dimensioning. To study principal topics about the materials strength related to mechanical components of machines.**

Prerequisites: **Basic knowledge of Mathematics, Physics and Machines Design.**

Course contents: **Fundamentals of kinematics of planar machinery, kinematics pairs, kinematics chains and their classification. Analytical kinematics of single-loop mechanisms, general case of plane motion, velocity and acceleration analysis. Equation of Motion of 1 DOF systems , free and forced vibrations of 1 DOF linear systems; design for vibration suppression. Cylindrical clutches, Geared systems (simple and compound gear trains calculation of gear ratios, epicycle gear train, solution of epicycle gear train problems). Belt drives (ratio of belt tensions, power transmitted, centrifugal tension, and initial tension, flat belts, v-belts). Statics, Concept of stress, Structure free-body diagram, Component free-body diagram, Stress analysis, Design, Axial loading: normal stress, Centric and eccentric loading, Bearing stress in connections, Rod and boom normal stresses, Pin bearing and shearing stresses, Stress on an oblique plane, Maximum stresses, Stress under general loadings, State of stress, Factor of safety, Torsion, Pure Bending, Beams, Shearing stresses, Stress transformations, Principal stresses, Beam deflection, Columns, Energy methods.**

Recommended reading:

R. Ghigliazza, C.U. Galletti: Meccanica Applicata alle Macchine, UTET;

V. D'Agostino: Fondamenti di Meccanica Applicata alle Macchine, CUES;

A.R. Guido, L. Della Pietra: Lezioni di Meccanica Applicata alle Macchine, vol. II;

Paul, Burton: Kinematics and dynamics of planar machinery - Englewood Cliffs, NJ. Prentice Hall ;
F.P. Beer, E.R. Johnston, J.T. Dewolf, D.F. Mazurek: Mechanics of materials, Mc Graw Hill- fourth edition.

Teaching methods: *lectures, seminars.*

Assessment methods: *written tests and final oral examination.*

Language of instruction: *Italian*

Additional information: *further information can be requested via e-mail: ruggiero@unisa.it.*