

DESCRIPTION OF THE EDUCATIONAL ACTIVITY

Academic year: **2010-2011**

Course title: ***Elements of Mathematics III***

Course number: **0612300009**

Type of educational activity: ***basic compulsory subject***

Subject Group: ***MAT/07***

Year of study: ***2nd year "Laurea"***

Semester: ***1st***

Total number of credits: **9**

Global workload (n. of hours) : **180**

Number of hours allocated to: lectures, tutorials, laboratory, individual study: **55, 35, 0, 90**

Name of lecturer: ***Edoardo Scarpetta***

Objectives of the course: **To provide the students with fundamental topics and concepts of Rational Mechanics, emphasizing the peculiarity of the (logical-deductive) approach in modelling the mechanical phenomena.**

Prerequisites: ***Elements of Mathematics I and II***

Course contents:

- 1) *Vector Algebra* (definitions and properties)
- 2) *Kinematics of motion* for points and systems of points. The case of rigid bodies, angular velocity, Mozzi theorem. Relative motions, Coriolis theorem. Plane rigid motions, Chasles theorem, polar trajectories.
- 3) *Mass Geometry* for material systems. Center of mass and momentum of inertia. Gyroscopic structures.
- 4) *Dynamics* of (free or constrained) points. Equation of motion and initial conditions. Harmonic oscillator, damped and/or forced: resonance. Relative dynamics, fictitious forces. Constraints, degrees of freedom. Influence of friction.
- 5) *Dynamics of Material Systems*. Motion of and around the center of mass. Kinetic energy, König theorem. Balance of momenta. Equilibrium, the Principle of Virtual Work. The case of (free or constrained) rigid bodies, degrees of freedom. Mechanical energy, laws of balance. Introduction to stability of equilibrium.

Recommended reading: ***Dispense del Docente ("Matematica III"). M. Fabrizio, Introduzione alla Meccanica Razionale e ai suoi Metodi Matematici, Zanichelli (Bologna); F. Stoppelli, Lezioni di Meccanica Razionale, Liguori (Napoli);***

Teaching methods: *lectures*

Assessment methods:

Language of instruction: *Italian*

Additional information:

