



## FISICA I A - L

FIS/01 - 6 CFU - 2° Semester

### Teaching Staff

#### ROSSELLA CARUSO

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**Office Hours:** giovedì - 15.30-18.30

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### LEARNING OBJECTIVES

The course is intended as an introduction to the study of the phenomena of mechanics addressing the study of classical mechanics of the material point, systems of material points and rigid bodies, the principles of static and dynamics of fluids and training the student to the "problem" solving ": the ability to solve physics problems related to the afore mentioned topics.

### COURSE STRUCTURE

In room lecture and lab experiences

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### DETAILED COURSE CONTENT

**INTRODUCTION:** scientific method, physical quantities and units of measurement

**VECTORS:** scalar and vectorial quantities; calculus with vectors

**KINEMATICS OF A PARTICLE:** frame of reference; law of motion, trajectory, velocity, acceleration; rectilinear motion; free fall of body; projectile motion; circular motion

**DYNAMICS OF A PARTICLE:** fundamental principles: Newton's laws; inertial and gravitational mass; forces: force of gravity, normal and friction force, tension, elastic force, air resistance; the simple gravity pendulum; moment of a force; linear momentum and angular momentum of a particle; work; kinetic energy; potential energy; total energy and its conservation

**OSCILLATIONS:** simple harmonic oscillator; damped oscillator; driven oscillator

**UNIVERSAL GRAVITATION:** Kepler's laws of planetary motion; law of universal gravitation; energy in a

gravitational field

**DYNAMICS OF MANY PARTICLES AND RIGID BODIES:** center of mass; theorems of the center of mass; density of a material; König's theorems, moment of inertia; Huygens-Steiner's theorem; motion of rigid bodies: translation and rotation; the compound pendulum

**HYDROSTATICS AND HYDRODYNAMICS:** pressure; Stevino's law; the experiment of Torricelli; Pascal's principle; Archimede's principle; Bernoulli's theorem

**EXERCISES on the above topics**

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## **TEXTBOOK INFORMATION**

1. R. Davidson "Metodi matematici per un corso introduttivo di Fisica" casa editrice EdiSES;
  2. S.Focardi, I.Massa, A.Uguzzoni: "Fisica Generale" Volume 1: Meccanica, II edizione, casa editrice Ambrosiana;
  3. S.Focardi, I.Massa, A.Uguzzoni: "Fisica Generale" Volume 2: Termodinamica e Fluidi, II edizione, casa editrice Ambrosiana;
  4. P.Mazzoldi, M. Nigro, C. Voci: "Elementi di Fisica" Meccanica e Termodinamica, II edizione, casa editrice EdiSES;
  5. C.Mencuccini, V.Silvestrini: "Fisica. Meccanica e termodinamica" anno 2016, Editore CEA
  6. R. Bellotti, G.E.Bruno, G.Florio, N.Manna "Esercizi di Fisica" Meccanica e Termodinamica casa editrice Ambrosiana
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