



FISICA - channel 2

FIS/01 - 8 CFU - 2° Semester

Teaching Staff

ANTONIO TRIGLIA

Email: antonio.triglia@unict.it

Office: Dipartimento di Fisica e Astronomia - Cittadella Universitaria - Edificio 10 - ultimo piano

Phone: 0957382816

Office Hours: Giovedì dalle 08:30 alle 10:30 Inviare mail per confermare ricevimento o per fissare altro giorno

LEARNING OBJECTIVES

The provided knowledge enables the student to face the most specific courses of the study plan; a particular importance is given to the contribution of physics in its biomedical field applications included in the program. At the end of the course, the student will have learned the experimental method fundamental elements, the basic laws of physics and their different applications to the fields concerning the study plan. The formal correctness in the exposition of the treated subjects is particularly taken into account with regards to mathematical knowledge acquired from the student in his previous courses. The goal is the achievement of the following training objectives: - a knowledge and a capacity comprehension on physics foundations - practical competencies concerning methodological and instrumental procedures also useful in biological field research.

COURSE STRUCTURE

Lectures and examples of application on specific topics are planned. The lectures will focus on methodological content of the discipline for some topics covered in the course and application contents for the majority of topics covered.. Students will have a key role especially during the Physics Laboratory activities, where they will implement application and method aspects at the same time. They are provided to write a dissertation on the implemented activity that can be matter of discussion during the final exam.

DETAILED COURSE CONTENT

INTRODUCTION: Physical quantities, units of measurement, significant figures, measurement error, scalar quantities and vector quantities, operations with the vectors, components of a vector and versors.

MOTOR DESCRIPTION: Displacement, speed and acceleration vectors, motion with constant speed,

motion with constant acceleration, motion in two dimensions.

STRENGTH AND MOTION: I, II and III Newton's law, gravitational force, motion of a projectile, friction forces, dynamics of circular motion; motion of a sphere in a liquid.

ENERGY AND WORK: Work carried out by a variable force, kinetic energy and the theorem of kinetic energy, conservative forces, potential energy, conservation of mechanical energy, the orbits of the planets and the hydrogen atom.

MECHANICAL WAVES AND SOUND: Harmonic motion, propagation of an impulse and a wave, acoustic waves and sound, decibels.

FLUIDS: Pressure in fluids, Stevino's law, Archimedes's principle, Bernoulli's theorem, applications of Bernoulli's theorem. Laminar flow of a viscous fluid: Poiseuille's law; Stokes law, erythrocyte sedimentation rate, centrifugation. Surface phenomena: Laplace law and phenomena of capillarity, surface tension

TEMPERATURE, HEAT AND PRINCIPLES OF THERMODYNAMICS: Thermometers and temperature scales, thermal expansion of solids and liquids, perfect gas law, kinetic gas theory, specific heat, latent heat and phase changes, heat conduction, thermodynamic transformations, working in thermodynamic transformations, internal energy, the first principle of thermodynamics.

ELECTRICAL LOAD, FIELD AND ELECTROSTATIC POTENTIAL: The electric charge, conductors and insulators, the Coulomb's Law, the electrostatic field, lines of force, potential and potential electrostatic energy, electrostatic capacity, energy density of the electric field.

ELECTRICAL CURRENT: the electric current, resistance and Ohm's law, superconductors, model for electrical conduction, energy and electric power.

MAGNETIC FIELDS: Motion of a charged particle in a magnetic field, magnetic force on a current-carrying conductor, magnetic field produced by a current, Biot-Savart law, Faraday's law and induction, self-induction, energy density of the magnetic field.

ELECTROMAGNETIC WAVES: electromagnetic waves, energy carried by electromagnetic waves, electromagnetic wave spectrum, Wien law, electromagnetic fields and effects on human health.

GEOMETRIC OPTICS: reflection, refraction and light dispersion, total reflection, optical fibers, lenses and image formations

TEXTBOOK INFORMATION

Raymond A. Serway and John W. Jewett, Jr.- Principles of Physics: A Calculus - Based Text -5th Edition, International Edition - Copyright © 2013 Brooks/Cole, Cengage Learning

D. Halliday, R. Resnick, J. Walker - Fundamentals of Physics Vol 1 and 2 -
