



FISICA INFORMATICA E STATISTICA MEDICA - channel 2

10 CFU - 1° Semester

Teaching Staff

FRANCESCO MUSUMECI - Module Physics - FIS/07 - 4 CFU

Email: fmusumec@dmfci.unict.it

Office: Dipartimento di Fisica ed Astronomia, Via S. Sofia, 64, 95123 Catania

Phone: 095545464

Office Hours: Martedì 8.00-10.00 - Giovedì 8.00-10.00

TEACHER NOT YET ALLOCATED - Module INFORMATICA - INF/01 - 3 CFU

TEACHER NOT YET ALLOCATED - Module STATISTICA MEDICA - MED/01 - 3 CFU

LEARNING OBJECTIVES

▪ Physics

The course aims to provide basic knowledge to understand physical concepts and methods currently applied to medicine. In particular, the student will be acquainted about some basic physical laws, useful to understand the physiological processes and will learn basic concepts useful in the proper use of the equipment used at work.

As prerequisite a basic knowledge of classical physics, algebra, Euclidean geometry and trigonometry are required.

DETAILED COURSE CONTENT

▪ Physics

Physical quantities and their measurement - Physical quantities, units and systems of measurement, dimensional analysis. Measurements and uncertainties. Characteristics of measuring Instruments. Analytical and graphical representations. Scalar and vector quantities.

Elements of mechanics and concepts of Biomechanics - Kinematics. Circular and harmonic motion. Momentum. Principles of dynamics. Work. Energy. Power and efficiency. Statics. Elasticity. Physiological statics. Essential of bone fractures.

Basics of fluids and applications in biological systems - Density. Viscosity. Hydrostatic

pressure. Fluid statics. Stevin's law. Pascal's principle. Archimede's principle. Drip feed. Transfusion. Blood sample. Drainage. Dynamics of ideal fluids. Bernoulli's theorem. Aneurysm and stenosis. Real liquids. Poiseuille's law. Hydraulic resistance and Reynold's number. Sphygmomanometry.

Temperature measurement and thermoregulation – Temperature and heat. Temperature metrology. Temperature scales. Clinical thermometers. Heat capacity and Specific Heat. Thermal equilibrium. Change of phase and latent heat. Heat transfer mechanisms. Basal metabolic power.

Electrical and bioelectrical phenomena – Electrical charges and fields. Capacitors. Electrical current. Ohm's law. Elementary circuits. Joule effect. RC circuits. Pacemaker and defibrillator. Risks related to the use of electricity.

Waves and radiations. – Wave phenomena. Period and frequency. Amplitude and energy. Mechanical waves. Sound. Decibel. Phonendoscope. Ultrasonic waves. Electromagnetic waves. Electromagnetic spectrum. Eye and vision. Radiation for diagnostics and therapy. X ray imaging. Radioisotopes and nuclear medicine. Radiotherapy. Biological effects of ionizing radiation. Introduction to radiation protection dosimetry.

TEXTBOOK INFORMATION

- **Physics**

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