



FISICA STATISTICA E INFORMATICA - channel 2

6 CFU - 1° Semester

Teaching Staff

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Office Hours: Lunedì e Mercoledì 15.30-18. Il docente garantisce la sua presenza per tutto il tempo necessario ai colloqui con gli studenti che si presenteranno entro le 15.45. Se non si sarà presentato alcuno studente, alle 15.45 il ricevimento sarà chiuso.

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LEARNING OBJECTIVES

▪ Medical Physics

At the end of the course, the student will learn the general principles underlying the understanding of physical phenomena and the laws that regulate them, with particular regard to the physical mechanisms that in human physiology affect the production and transport of electrical signals, blood circulation, energy production and transport.

▪ Medical Statistics

The course will provide basic elements to let the student be able to describe individual and population based biological events through synthetic indexes. Moreover, the student should be able to identify and use elementary methodologies of analysis of numerical data

▪ Computer Technology

The objectives of this module are focused on learning and the conception of the logic that regulates basic computing, elaboration data, structure, classification and typology of networks.

COURSE STRUCTURE

- **Medical Physics**
Classroom lectures
 - **Medical Statistics**
Classroom lecturers using blackboard and tracing papers
 - **Computer Technology**
Lectures
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DETAILED COURSE CONTENT

- **Medical Physics**
 - Physical quantities and their measurement**
Scalar and vector quantities, International System and CGS System
 - Elements of Mechanics**
Kinematics: trajectory, speed and acceleration. Straight and uniformly accelerated rectilinear motion. Uniform circular motion.
Dynamics: The forces. The principles of dynamics. Mass and weight. Gravitational force. The centripetal force. Work and energy. Mechanical power. Kinetic energy and potential energy. Conservation of mechanical energy.
 - Fluid mechanics**
Pressure. Pascal's principle. Hydrostatic pressure. Stevino's law. Measurement of atmospheric pressure. Principle of Archimedes.
Dynamics of the ideal fluids: flow rate, continuity principle, Bernoulli's theorem.
Dynamics of viscous fluids: laminar motion and hydrodynamic resistance of a duct. Viscosity of the blood. Turbulent motion and critical speed. Measurement of arterial pressure.
Plasma composition. Diffusion, filtration and osmosis through membranes. Osmotic equilibrium in the blood: isotonic solutions, flows through the capillaries.
Gas mixtures: partial pressures. Solubility of a gas in a liquid: Henry's law. Gaseous exchanges in the alveoli and in the capillaries.
 - Electromagnetism**
Electric charge. Strength of Coulomb. Electric field. Electrostatic potential. Electrostatic energy. Capacitors. Electric current. Laws of Ohm. Magnetic field. Electromagnetic and mechanical waves. Wavelength and frequency. Electromagnetic spectrum. X and gamma radiation.
 - Overview of thermodynamics**
Temperature and heat. Temperature measurement. Internal energy. Specific heat. Changes in state and latent heat. Metabolism.
- **Medical Statistics**
 1. Measurers: numerical, ordinal and nominal
 2. Descriptive measurers: central tendency and variability
 3. Probability and Bayes Theorem
 4. Probability distributions: binomial, Poisson and gaussian

5. Hypothesis tests and their meaning

6. Epidemiology: sensitivity, specificity, predictive values, incidence and prevalence rates

▪ **Computer Technology**

- Information processing systems;
- Hardware, software and their stratification;
- Operating Systems: fundamental functions and their evolutions;
- Bits, Bytes and numbers connected to them;
- Database;
- Classification, Type and Network Levels;
- E-mail & Protocol;

TEXTBOOK INFORMATION

▪ **Medical Physics**

1. D. Scannicchio, E. Giroletti, Elementi di Fisica Biomedica, EdiSES
2. F. Borsa, A. Lascialfari, Principi di Fisica per indirizzo biomedico e farmaceutico, EdiSES

▪ **Medical Statistics**

J. Fowler, P. Jarvis, M. Chevannes "Statistica per le professioni sanitarie" Ed. EdiSES

Other elementary statistic textbooks

▪ **Computer Technology**

Teaching Handouts
