# UNIVERSITÀ DEGLI STUDI DI MILANO-BICOCCA

# SYLLABUS DEL CORSO

## Scienze Propedeutiche

2324-1-I0303D040

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### Aims

Student should know the general principles of Medical Statistics, Mathematics, General Physics, Physics of Radiations and Basics of Signal Processing necessary to carry on their profession.

### Contents

The general aims of the course are to provide students with basic knowledge of Medical Statistics, Mathematics, Applied Physics and Basics of Signal Processing

### Detailed program

MEDICAL STATISTICS: Types of variables. Tables and graphs. Indices of position and dispersion. Measurement errors: precision and accuracy. Probability: conditional probability independence, probability of the union and intersection of events. Random variables and probability distributions: Binomial and Gaussian. Correlation and regression.

MATHEMATICS FOR PHYSICS: Basic algebra. Power, exponential and logarithmic functions. Exponential and logarithmic functions. Complex numbers. Combinatory calculus.

APPLIED PHYSICS: Unit of measurement and changes of the unit of measurement. Vector and scalar quantities. Operations with vectors and vector properties. Concept of force, moment of a force. Equilibrium of a rigid body, examples of the equilibrium of the human body. The levers and their application. Elements of geometrical optics. Electromagnetic waves and electromagnetic radiation spectrum. Elements of Physical optics: absorption and scattering of light. Beer-Lambert law. The atomic nucleus structure. Radioactivity. Law of radioactive decay.

Radiation-matter interaction.

BASIS OF SIGNAL PROCESSING: The course provides students with an overview of the basic principles for analyzing and manipulating signals of various types. Essential concepts such as time and frequency domain representation, signal transforms, sampling and quantization, filtering, and practical applications are explored. This course provides both theoretical and practical foundations in signal processing, enabling students to acquire transferable skills in various fields such as communications, acoustics, imaging, and more.

## Prerequisites

## Teaching form

Lectures

## Textbook and teaching resource

Fowler J., Jarvis P., Chevannes M., Statistica per le professioni sanitarie, 2006 Edises

D. Scannicchio, Fisica Biomedica, EDISES, D. Scannicchio, Esercizi e problemi di Fisica, Edizioni Unicopli, U.Amaldi, Fisica delle radiazioni, Boringhieri

Teachers will provide other educational material

## Semester

First Semester

## Assessment method

Written exam eventually followed by an oral exam upon request of the teachers or the student.
The written test will consist of:
• 2 numerical exercises and 13 multiple choice questions on Medical Statistics
• 4 numerical exercises and 8 multiple choice questions on Mathematical Methods for Physics
• numerical exercises and multiple choice questions on Applied Physics
• Multiple choice questions on Basics of Signal Processing
The overall evaluation will be expressed in thirtieths.

## Office hours

By appointment required by mail

## Sustainable Development Goals

GOOD HEALTH AND WELL-BEING