UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Biofisica

2425-1-H4101D252-H4101D019M

Aims

The primary goal of the course is to provide students with the tools for the understanding of the complex reactions that represent the molecular basis of life, and with the fundamentals to identify the cause-effect relations of the most important chemical and physical processes for the curriculum and the work of a physician. This knowledge will form the primary basis for a rationale approach to the knowledge of medical sciences.

Contents

Thermodynamics: 1st and 2nd principles of thermodynamics and entropy.

Fluid mechanics: ideal fluids and real fluids.

Electrostatics and electrodynamics: Electrical charges and electrical circuits.

Detailed program

THERMODYNAMICS: - Systems and thermodynamics states - Phase transitions - Perfect gas transformations - 1st principle of thermodynamics - 2nd principle of thermodynamics and entropy - Enthalpy and free energy.

MECHANICS OF FLUIDS: - Stevino's Law - Principle of Archimedes - Theorem of Bernoulli – Poiseuille equation. Properties of real liquids and viscosity- Concept of hydraulic resistance . - Surface tension in liquids. - Surfactants; phenomena of adhesion and capillarity. - Laplace law.

ELECTRODYNAMICS: - Interaction between electric charges. - Electrical field and electrostatic potential. -

Distribution of electric charges: electric dipole and dipole layer. -Meaning of the dielectric constant. - The capacity of a capacitor. - Electrical circuits. - Laws of Ohm. - Concept of stationary current and of transient current. - Charge and discharge of a capacitor.

Prerequisites

Scientific knowledge at the high school level, particularly basic knowledge of mathematics and analysis.

Teaching form

Frontal lectures and exercises.
All lectures and exercises are conducted in person in an erogative mode.
6 lectures of 2 hours each conducted in person in an erogative mode.
12 exercises of 2 hours each conducted in person in an erogative mode.

Textbook and teaching resource

A. Alessandrini, Fisica per le scienze della vita, CEA

Semester

First semester

Assessment method

MULTIPLE CHOICE TEST: Multiple-choice problems requiring the application of several physical principles (A total of 22 numerical problems including the integrated Medical Physics module, each problem with one and only one correct answer).
No midterm exams are scheduled.

Office hours

By telephone appointment (02 6448 8209) or by email (francesco.mantegazza@unimib.it).

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION | GENDER EQUALITY | REDUCED INEQUALITIES