UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Applications of Physics To Medicine

2324-1-F1701Q126

Aims

The aim of the course is to deepen the physical foundations on which Diagnostic Imaging and Radiotherapy are based, including the methodologies and technologies used at the state of the art and their application limits. The course is suitable for students who wish to pursue a career in scientific research, undertake studies in medical physics, pursue a path in the biomedical industry, obtain a diploma as a qualified expert in dosimetry, work in the imaging sector.

Contents

Imaging and Radiotherapy: physical principles, instrumental equipment, Image processing and quantitative assessments.

Detailed program

Radiation-matter interaction: electrons, positrons, X-rays and neutrons.
The physics of X-ray radiography.
Computed tomography with X-rays.
Medical imaging with synchrotron radiation: specificity and state of the art.
Functional Imaging: Positron Emission Tomography (PET).
Functional Imaging: Single Photon Emission Computed Tomography (SPECT).
The physics of magnetic resonance imaging.
Image reconstruction techniques, artefacts and their corrections, extraction of quantitative parameters.
X-ray radiotherapy techniques: total body radiation, brachytherapy, radiosurgery.
Radiotherapy with synchrotron radiation: specificity and state of the art.

Introduction to hadron therapy.

Prerequisites

None

Teaching form

Frontal lectures (3 CFU / 21 hours)
Exercises (3 CFU / 24 hours)

Textbook and teaching resource

Notes, data and scientific articles provided to students during the course

Semester

First semester.

Assessment method

The exam consists of two parts, carried out successively during the same exam session:

- In-depth analysis of a scientific article chosen by the student (exposition of topics not directly covered in class) using slides; study sessions aimed at clarifying the contents of the articles and guiding the student to an effective scientific presentation are scheduled in correspondence with the exam sessions.
- A complementary oral interview aimed at verifying the student's level of knowledge of the topics covered during the course.

Office hours

Always, after fixing an email appointment.

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION | INDUSTRY, INNOVATION AND INFRASTRUCTURE