UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Applications of Physics To Medicine

2425-1-F1701Q126

Aims

The course aims to deepen the physical foundations of Diagnostic Imaging and Radiotherapy, by studying the methodologies and technologies 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 (image analysis, development of detectors etc), undertake studies in medical physics, pursue a path in the biomedical industry, obtain a diploma as a qualified expert in dosimetry, work in the field of imaging.

Contents

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

Detailed program

Radiation-matter interaction: electrons, positrons, X-rays, neutrons and protons
The physics of X-ray radiography
Computed tomography with X-rays
Medical imaging with synchrotron radiation and compact sources like Inverse Compton scattering: specificity and state of the art
Functional Imaging: Positron Emission Tomography (PET)
Functional Imaging: Single Photon Emission Computed Tomography (SPECT)
Image reconstruction techniques, artifacts and their corrections, extraction of quantitative parameters
X-ray radiotherapy techniques: introduction to radiobiology, dosimetry, the 4Rs, 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)
Lectures will be in English.
The slides of the Lectures will be made available to the students.

Textbook and teaching resource

Lecture notes, data and scientific articles provided to students during the course

Semester

First semester.

Assessment method

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

- In-depth analysis of a scientific article chosen by the student (exposition of topics not directly covered in classes) using slides. In correspondence with the exam sessions, open study sessions are organized aimed at clarifying the articles' contents and at guiding the students to an effective scientific presentation.
- A complimentary oral interview aimed at verifying the student's attainment level of the topics covered by the lectures.
  The course doesn't foresee intermediate evaluations.
- Erasmus students, upon request, can held the exam in English.

Office hours

Always, after fixing an email appointment.

Sustainable Development Goals

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