



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Applicazioni della Fisica alla Medicina

2223-1-F1701Q126

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#### Aims

The aim of the course is to present the physical foundations on which Diagnostic Imaging and Radiotherapy are based, including the methodologies and technologies used and their limits of application. The program will focus on the state of the art, with also snapshots on recent developments in the field. The course is suitable for students who wish to start a career in scientific research, continue their studies to become medical physicists, or pursue a path in the biomedical industry.

#### 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  
Molecular 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 hadrontherapy

## **Prerequisites**

None

## **Teaching form**

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

## **Textbook and teaching resource**

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

## **Semester**

First semester

## **Assessment method**

The exam consists of an oral interview aimed at verifying the student's level of knowledge of the topics covered during the course. Monographic homeworks will be proposed on subjects directly related (or not) to the classes, to treat specific aspects of medical physics (scientific papers, book chapters etc). To these monographic works students may adhere on a voluntary basis: if they will choose to do so, then the oral interview will include a discussion on the homework.

## **Office hours**

Always, after fixing an appointment by email.

## **Sustainable Development Goals**

QUALITY EDUCATION | CLEAN WATER AND SANITATION

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