UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

## Image Diagnostics

**2122-2-H4102D014**

### Aims

Acquisition of knowledge related to:

- X-ray based, US-based, Magnetic Resonance, Nuclear Medicine and hybrid diagnostic imaging instrumentation
- Radiotherapy instrumentation
- Pharmacological aspects of diagnostics medicinal products, including fundamental of pharmacokinetics, pharmacodynamics and regulatory aspects related to their use in Diagnostic imaging.

Basic comprehension of the key anatomic reference structures, as an introduction to clinical interpretation of radiological images.

### Contents

- Diagnostic imaging modalities and radiotherapy systems
- Pharmacology of Diagnostic Medicinal Products
- Normal anatomy as documented by means of conventional radiology, CT, ultrasound, and Magnetic Resonance Imaging.

## Detailed program

Instrumentation for diagnostic imaging and radiotherapy

Diagnostic imaging instrumentation:

- X-ray imaging: revision of physical principles and image formation; multislice CT, cone beam CT, mammography, angiography
- Magnetic Resonance Imaging: revision of physical principles and T1/T2 image formation; diffusion weighted and perfusion weighted MRI, fMRI, spectroscopy
- Echography: physical principles and image formation; echographic probes
- Nuclear Medicine Imaging: revision of physical principles and image formation; PET/CT and PET/RM hybrid instrumentation

Radiotherapy instrumentation:

- Linear accelerator and components
- Intensity Modulated Radiotherapy (IMRT), Image Guided Radiotherapy (IGRT), tomotherapy
- Cyber knife, gamma knife

Pharmacology of Diagnostic Medicinal Products

- Radiological contrast media: mechanism of action, pharmacokinetics and safety

- Radiopharmaceuticals: mechanism of action, kinetics of biodistribution and safety
- Optical imaging probes: mechanism of action, kinetics behavior and safety
- Regulatory affairs relative to their classification and reimbursement

Radiological anatomy

- Normal anatomy on the basis of the following scheme:
- Thorax: lung, and mediastinum; vascular structures, along with the heart.
- Abdomen: upper abdomen: liver, pancreas, kidney, and adrenal glands.
- Lower abdomen: pelvic organs. Male and female genital tract.

## Prerequisites

Basic knowledge on chemistry, physics, human anatomy, physiology and pharmacology.

## Teaching form

Lectures.

As to radiological anatomy, students will participate to conventional lessons; ample interactive discussion on radiological findings, as particularly shown in CT and MR images; practical demonstrations on clinical reporting workstations.

## Textbook and teaching resource

Slides illustrated and commented on during lessons. General reviews from international literature.

## Semester

Second semester of second year

## Assessment method

Instrumentation for diagnostic imaging and radiotherapy

Written exam: multiple choice quiz for the extensive evaluation of learning.

Pharmacology of Diagnostic Medicinal Products

Written exam: multiple choice quiz for the extensive evaluation of learning. Oral exam: interview on topics covered in class aimed at verifying autonomous reflection capacity on critical points of the program.

Radiological anatomy

Oral exam consisting of ample discussion on the basis of radiological images digitally provided with the aim of recognizing the key anatomical features.

## Office hours

By appointment required by e-mail