UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Conventional Instruments and Analogical Systems

2627-1-I0304D005-I0304D00501

Aims

The module aims to provide the student with knowledge relating to the main conventional radiological equipment, their operation and their physical and structural characteristics, including knowledge relating to some important dedicated radiological systems.

Contents

The student will learn the physical laws underlying the production, propagation and interaction with matter of X-rays, and will be able to describe the mechanisms that regulate these phenomena; he/she will be able to illustrate the characteristics of conventional radiological equipment, dedicated systems and the various analogue radiological devices analyzed during the lessons and must be able to indicate and comment on the main qualitative parameters that define a radiographic image.

Detailed program

Production of X-rays and x-ray tube. Characterization of an X beam: quality and quantity of a beam (kVp and mAs). Interaction of X-rays with matter and formation of radiological images; physical and technological bases of diagnostic radiology.
Essential components of a conventional radiological device. Main types of conventional radiological equipment. Diffuse radiation; beam limiting devices: collimation; anti-diffusion grilles.
X-ray film: optical density, characteristic curve, contrast index and sensitivity index; sensitometer and photodensitometer; calculation of the physical parameters relating to the sensitometric curve. Treatment of sensitive products; developers. Reinforcement screens: physical principles of fluorescence, characteristics of fluorescent materials, speed classes, screen-film coupling.

Image quality: spatial resolution and MTF, MTF measurement mode; noise, variance and Wiener spectrum. Penumbra, blur and distortion. Synthetic quality indices.
Digital image, size of the image matrix, gray levels, windowing and level, image format, comparison with analogue image, dynamic range, compression.
Operating principles of Computed Radiography, Direct Radiography systems with indirect conversion and direct conversion.
Technological aspects of the following equipment: column stand, wall unit, folding X-ray table, teleradiograph, stratigraph, seriegraph, craniostat, mobile
Fluoroscopic systems. Image intensifier. Dedicated radiological equipment: the mammograph and mammographic devices.

Prerequisites

Organs and Functions

Teaching form

8 frontal lessons of 2 hours carried out in attendance

Textbook and teaching resource

F.MAZZUCATO: “Anatomia Radiologica. Tecniche e Metodologie in Radiodiagnostica” Ed.Piccin

R.PASSARIELLO "Radiologia, Elementi di Tecnologia". Idelson Gnocchi

Teachers will provide other educational material.

Semester

Second semester

Assessment method

Written exam with open questions, multiple choice questions and exercises to evaluate preparation on the exam program

Office hours

By appointment required by mail

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION