



CM2020 Ionising Radiation Imaging 7.5 credits

Medicinsk avbildning med joniserande strålning

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for CM2020 valid from Autumn 2024

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Medical Engineering

Specific prerequisites

Completed degree project 15 credits, 15 credits in mathematics, 15 credits in physics, 6 credits in programming, and 5 credits in electronics. English B/6

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

Efter godkänd kurs ska studenten kunna:

1. Describe and apply relevant physical processes to the detection of ionising radiation, the estimation of radiation dose and the design of imaging devices for x-ray Computed tomography (CT), Single Photon Emission (SPE) imaging and Positron Emission Tomography (PET).
2. Describe the rationale of detector and scanner design as well as of data acquisition protocols in CT, SPE and PET and relate those to the outcome of the imaging procedure (i.e. dose and image quality).
3. Describe, quantify and discuss common trade offs among image quality measures, dose, and various detector performances in medical imaging with ionising radiation.

Course contents

- Basic nuclear physics and detection principles (only refresh)
- Radiation detectors for monitoring and imaging
- Detection and surveillance of radiation levels
- X-ray physics
- 2D x-ray radiography
- 3D x-ray CT imaging
- Gamma camera / SPECT - Single Photon Emission Computed Tomography (physics, detector systems and imaging)
- PET - Positron Emission Tomography (physics, detector systems and imaging)

Examination

- LAB1 - Laboratory exercise, 2.0 credits, grading scale: P, F
- PRO1 - Project, 2.0 credits, grading scale: P, F
- TEN1 - Written exam, 3.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Ethical approach

- All members of a group are responsible for the group's work.

- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.