



# SH2310 Radiation Detectors and Medical Imaging Systems 7.5 credits

Strålningsdetektorer och medicinska bildgivande system

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 SH2310 valid from Autumn 2007

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Physics

## Specific prerequisites

## Language of instruction

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

## Intended learning outcomes

In the medical diagnostics and environmental control the use of techniques and methods developed at in nuclear and particle physics are increasing rapidly. The course gives an overview and an understanding of these methods and applications. It treats the theory of the physical processes and presents detectors and instruments and gives a perspective on the advances in this field.

Detector systems used for medical imaging have their origin in detectors used for registering ionizing radiation. The course describes these diagnostic systems and also present them at study visits at hospitals and industry. The laboratory exercises of the course are devoted to the presentation of medical imaging systems.

## Course contents

Summary of basic nuclear physics. Detectors and detector systems. Detection of radioactivity in the environment: radon, fall-out from nuclear bomb tests and nuclear power-plant accidents. The natural ionizing background in the environment.

X-rays and X-ray imaging. CT and principles for image reconstruction

Isotope production for diagnostics.

Gamma-camera, SPECT and PET (Positron Emission Tomography) and image reconstruction.

MR (Nuclear Magnetic Resonance) imaging physics, detector systems and image reconstruction.

Ultra sound for medical imaging.

## Course literature

S.Webb: The physics of medical imaging

## Examination

- LAB1 - Laboratory Work, 3.0 credits, grading scale: P, F
- TEN1 - Examination, 4.5 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.

## Other requirements for final grade

One written exam (or project work) (TEN1; 4,5 university credits) and laboratory work including compulsory participation in visits (LAB1; 3 university credits).

## 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.