



HL2009 Medicinsk utbildning med joniserande strålning 6,0 hp

Ionising Radiation Imaging

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

Fastställande

Kursplan för HL2009 gäller från och med HT07

Betygsskala

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

Utbildningsnivå

Avancerad nivå

Huvudområden

Elektroteknik

Särskild behörighet

Bachelor's degree in Engineering Physics, Electrical Engineering, Computer Science or equivalent. Basic knowledge of anatomy.

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

The two major medical imaging modalities, transmission and emission, are both based on ionising electromagnetic radiation as information carrier from the organ to be depicted to the imaging detector system. The course treats the theory of the physical processes and presents detectors and instruments and gives a perspective on the advances in this field. Consequences of ionising radiation on living tissues are presented.

Transmission imaging where the anatomy of the organ is shown is the most widely used technique and is performed both in 2D (i.e. radiography, fluoroscopy) and in 3D mode (Computed Tomography). In emission imaging the physiology of the organ is studied in vivo with high sensitivity in systems that can produce images in 2D (Gamma Camera) or in 3D (SPECT and PET). All these imaging systems will be discussed thoroughly. The laboratory exercises of the course are devoted to the presentation of medical imaging systems with working demonstrators.

Following this course, you will gain knowledge and understanding:

- About nuclear structure, natural and artificial radioactivity, and nuclear reactions
- How ionising radiation like X-ray or radioactive substances for medical imaging are produced
- How the ionising radiation interact with matter
- How dose is measured and calculated
- How detectors for ionising radiation are constructed and their signals are treated
- How imaging systems for ionising radiation are functioning, data collected, and images are reconstructed

Kursinnehåll

You will explicitly learn about the different imaging systems, their function and application. These systems are:

- 2D X-ray radiography with different imaging techniques
- Fluoroscopy and image intensifiers
- 3D Computer Tomography
- Gamma Camera and scintigraphy
- Single Photon Computed Tomography
- Positron Emission Tomography

You will also get an insight to the development of new detection and imaging techniques and organ dedicated imaging systems.

Kurslitteratur

To be decided.

Examination

- LAB1 - Laborationer, 1,5 hp, betygsskala: P, F
- PRO1 - Projekt, 1,5 hp, betygsskala: P, F
- TEN1 - Tentamen, 3,0 hp, betygsskala: A, B, C, D, E, FX, F

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

Passed written exam (TEN1; 3 cr.) grading A-F.

Passed lab work (LAB1; 1.5 cr.) grading P/F.

Passed project (PRO1; 1.5 cr.) grading P/F.

Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.