HL1002 Medical Imaging Systems 7.5 credits

Medicinska bilder

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

Establishment

Course syllabus for HL1002 valid from Spring 2008

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Basic knowledge of anatomy, physiology and pathology.

Basic knowledge of electrical prinipals and electronics, project work and presentation techninques (oral and written) as well as data- and telecommunication.

Language of instruction

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

Intended learning outcomes

The course aims to provide basic knowledge in the field of medical imaging, which also includes the processing, reconstruction, analysis and communication of medical images.

After the course, the student will be able to:

• Communicate with the experts and discuss problems in this field.

• Explain and give examples of technology and physics, and clinical use of the four dominant imaging modalities.

• Develop problem solving skills as well as putting these questions into contexts around the different imaging methods.

• Give examples of appropriate imaging techniques to be able to solve different medical problems.

• Describe the market, the costs and other economical aspects of medical imaging.

• Explain the tomography technique and use computer tools to reconstruct cross-sectional images by using this technique.

• Explain and give examples of how the communication of medical images in digital radiology departments works.

Course contents

The learning methods used in this course consist of seminars, presentations, discussions performed by the course participants. Laboratory work and study visits are also offered. The course also includes written assignments where the course participants work in small groups with small parts of the course content. The course participants review their classmates' written works within as well as in-between the groups.

The course content is divided into 11 well separated parts, as follows:

• Ionizing radiation dose and mammography.

• Plain X-ray and angiography.

• Computed Tomography (CT).

• Magnetic Resonance Imaging (MRI).

• Ultrasound imaging and Doppler ultrasound.

• Gamma camera and the relationship between radiation dose and image quality.

• Single Photon Emission Computed Tomography (SPECT).

• Positron Emission Tomography (PET).

• Thermography (IR camera) and Magnetoencephalography (MEG).

• Diaphanography, Laser Doppler Imaging (LDPI) and Electrical Impedance Tomography (EIT).

• Datacommunication systems for digital medical images in modern radiology department.

Course literature

The following literature were used in previous years:

Allisy-Roberts and Williams: Farr's Physics for Medical Imaging, Second Edition, Elsevier 2007

Edwin GA Aird: Basic Physics for Medical Imaging, 1993

Lindén & Öberg: Jacobsons Medicin och Teknik, Studentlitteratur 2006

Bertil Jacobson: Teknik i praktisk sjukvård, Studentlitteratur 2003

Jean Pope: Medical Physics: Imaging. Heinemann 1999

In depth:

Prince & Links: Medical Imaging, Signals and Systems, Pearson Prentice Hall 2005

Guy & ffytche: An Introduction to the Principles of Medical Imaging, Imperial College Press 2005

Examination

• RED1 - Account, 7.5 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.

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

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.