# HL2010 Ultrasound 6.0 credits

## Ultraljud

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

## Establishment

Course syllabus for HL2010 valid from Autumn 2007

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Electrical Engineering

## Specific prerequisites

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

## Language of instruction

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

## Intended learning outcomes

The course will give knowledge about ultrasound as a medical diagnostic modality and also future terapeutic possibilities with ultrasound. Basic physics about ultrasound transmission and reflection will be described. The gain and filtering theories for the equipment. Calibration routines and errors in the ultrasound equipments. Ultrasound interaction with tissue and contrast substancies. Quantitative imaging, including Doppler, specle scattering and measurements on the returning radiofreqency signal. Basic anatomical und functional findings with ultrasound, including velocity and pressure calculations from ultrasound images. Storage and communication of the images. Parametric imaging. How does ultrasound gives diagnostic information in comparision with other imaging modalities.

**Following this course, you will gain knowledge and understanding**

- **about the construction of an ultrasoundequipment**
- **regulations concerning ultrasound**
- **how the equipment is tested and common errors.**
- **how the equipment is used in a clinical panoroma, including image and data storage.**
- **3-d and 4-d image reconstruction.**
- **on line and off line image reconstruction.**
- **different ways to present quntitative information.**
- **how equipments are used in radiological, cardiological, vascular and gynecological depertments.**
- **how cardiological information are calculated from the images.**
- **how to make a specification for purchase of a system.**

## Course contents

- You will explicitly learn about the different diagnostic procedures, their clinical application and how they are performed.
- Diagnostic procedures for detection of myocardial ischemia, like stress testing and use of perfusion markers
- Quantification of different valvular diseasies
- Quantification of vascular diseasies.
- Sceletal muscle disturbencies
- Measurement of distancies areas and volumes in the body.
- Quantification of tissue deformation.
- Automatic or semiautomatic image processing procedures for ultrasound images.
- Difficult to image views with invasive transducers.
- Standard imaging routines. What to look fore and what calculations should be performed.
- You will also get an insight to the development of nex diagnostic ultrasound based imaging procedures.

# Course literature

To be decided.

# Examination

- TEN1 - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, 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.

# Other requirements for final grade

Passed written exam (TEN1; 4.5 cr.) grading A-F.
Passed lab work (LAB1; 1.5 cr.) grading P/F.

# 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.