

SYLLABUS

Radiography - Digital image handling 7.5 credits E0014E

Radiografi - Digital bildhantering

Course syllabus admitted: Spring 2014 Sp 4 - Present

**DECISION DATE
2014-01-17**

Radiography - Digital image handling 7.5 credits E0014E

Radiografi - Digital bildhantering

First cycle, E0014E

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	U G VG	Medicinsk teknik	Other Subjects within Technology

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language +

Swedish upper secondary school courses Mathematics 2a/2b/2c , General Science 2, Social Studies 1b/1a1 +1a2 (specifik entry A14).

Or:

Swedish upper secondary school courses Mathematics B, General Science B, Social Studies A (specifik entry 16)

Alternative:

or professional experience in x-ray or imaging modalities

Selection

The selection is based on final school grades or Swedish Scholastic Aptitude Test.

Examiner

Niklas Lehto

Course Aim

The course objective is that the students can explain how a digital image is produced and stored, and be able to describe simple imaging operations. The goal is that the student should have good knowledge of digital imaging. This means that the student should be able to:

- describe how a digital image is stored in the computer memory
- explain the concept of pixel value
- interpret the histogram of an image
- describe how the resolution of an image affects the ability to see details
- describe how the color depth of an image affects the ability to see details
- describe how filters are used to reduce noise in the image
- describe the difference between various file formats used for storage of images
- give examples of how three-dimensional images can be displayed on a two-dimensional computer screen
- know how distortion can be corrected digitally
- mention how images are archived in hospital settings
- know different concepts and their synonyms in digital imaging.

The course also aims to develop the ability of the students to interact with colleagues and to carry out supervised tasks. This means that the student should be able to:

- formulate subject-related questions and answers orally and in writing
- present new knowledge orally and in writing
- provide feedback on the work of others

Contents

The focus lies on basic introduction to digital imaging, relevant to the radiology nursing profession. The following topics are included:

- general Introduction, what is a picture, how can you portray something you do not see?
- how a digital image is constructed (spatial resolution)
- how the image is stored in the computer (quantization)
- how to represent a digital image (histogram)
- what is contrast (thresholding)
- dynamic, fast and slow processes
- interference and noise
- edge Information, the definition of edges and sharp edges
- introduction to color images
- introduction to image formats
- image processing - compression
- 3D images
- distortion
- DICOM and PACS

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

The course is offered as a distance course and the literature should be read independently. Lessons will be given through web-based tools. Laboratory work is carried out from the home computer remotely and guidance is provided by web-based tools. Campus days occur during the course, where either seminars or study visits occur. The course concludes with a joint oral and written presentation and opposition to a project where digital imaging within a given modality should be covered by either a literature study or by a description of their own practical work.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.

Examination consists of completed and reported laboratory, visited workshops and a final presentation with the opposition of a project (in groups or individually) (project 4.5 points, laboratory 3 points). These parts are mandatory. The connection to the hospital environment and the ability to formulate concepts are evaluated in the project report. Other goals are examined in written answers to the laboratory questions. Alternative forms of examination may occur.

Overlap

The course E0014E is equal to E0010E, M0076H

The course E0014E corresponds to the course E0010E

Literature. Valid from Spring 2014 Sp 4

- hand outs written by the responsible teacher

Radiologi , Peter Aspelin och Holger Pettersson, Studentlitteratur AB, ISBN: 9789144038872

Recommended alternatives in english:

- Principles of Radiographic Imaging – An Art and Science (4th edition Thomson Delmar Learning) Richard R. Carlton, Arlene M. Adler

ISBN: 9781439058725

Recommended Swedish literature:

- Jacobssons Medicin och Teknik (5:th edition). Studentlitteratur. Editors: Maria Lindén & P. Åke Öberg ISBN: 9144047606

ISBN10: 9144047606

Course offered by

Department of Health Sciences

Items/credits

Number	Type	Credits	Grade
0003	Laboratory work	3	U G VG
0004	Project	4.5	U G VG

Last revised

by 2014-01-17

Syllabus established

by the Department of Computer Science and Electrical Engineering 2008-12-15