

SYLLABUS

Radiography, Digital image handling 7.5 credits M0076H

Radiografi, Digital bildhantering

Course syllabus admitted: Autumn 2016 Sp 1 - Spring 2017 Sp 4

**DECISION DATE
2016-02-15**

Radiography, Digital image handling 7.5 credits M0076H

Radiografi, Digital bildhantering

First cycle, M0076H

Education level

First cycle

Grade scale

U G VG

Subject

Medicinsk teknik

Subject group (SCB)

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 and The course furthermore assumes the following completed courses:

O0055H Fundamental Principles in Nursing

O0047H Nursing: Health

M0026H Medical Science: Anatomy and Physiology in position to Radiology

M0050H Radiation Science and Radiological Modalities

M0067H/M0050H Radiography Nursing Interventions in position radiography with Clinical Practice

M0066HM0051H Radiography Nursing techniques in position radiography with Clinical Practice

M0029H Medical Science: Microbiology, Infection Control and Infection Disease)

M0070H/M0052H General Pharmacology, Contrast Agents and Pharmaceutical Calculation

M0069H Radiography in-depth studies in anatomy, projectional radiography with applications

M0028H Medical Science: Patophysiology in position to Radiology

Selection

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

Examiner

Niklas Lehto

Course Aim

The aim of the course is for the student to be able to explain how a digital image is produced and stored and be able to describe simple image analysis operations. The aim of the course is to let the student achieve good knowledge in digital image processing. This means that the student should be able to:

- describe how a digital image is represented in computer memory.
- explain the concept pixel value
- interpret the histogram of an image
- describe how the resolution of an image affects the ability to distinguish details in the image
- explain how colour depth of an image affects the ability to see details in the image
- describe how filters are used to reduce noise in the image
- describe the difference between different file formats used to store images
- give examples of how three-dimensional images can be shown on a two-dimensional computer screen
- know how image distortion can be corrected digitally
- explain how images are archived in hospital environment
- be familiar with different concepts and their synonyms in digital image processing.

Furthermore, the aim of the course is to let the student develop his/her ability to interact with others and to carry out supervising assignments. This means that the student should be able to:

- formulate subject-related issues and responses in writing
- present recently acquired knowledge orally and in writing
- give feedback on the work of others

Contents

Focus in the course lies on basic introduction of digital image processing, of significance for the exercise of the profession of the radiographer. The following parts are included:

- General introduction, what is an image, how can one reproduce something that cannot be seen?
- How is a digital image built-up (spatial resolution)?
- How is it stored in the computer (quantisation levels)?
- How is an image represented digitally (histogram)?
- What is contrast (thresholding)?
- Dynamics, fast and slow processes
- Disturbances and noise
- Edge information, definition of edges and sharp edges
- Introduction to colour images
- Introduction to image formats
- Introduction to 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 given by distance learning and the literature should be read individually. Introductory lectures will be given via web-based tools. Each course module is completed with home assignments. Sessions on campus takes place during the course. On these occasions, either compulsory seminars or study visits are included. The course is completed with session on campus including critical review of the projects where different aspects of digital image processing should be reviewed either through a literature study or through the description of a practical individual work.

The content of course elements and its teaching methods specifically geared towards radiology nursing profession.

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. The course is examined through assignments, seminar / laboratory and a final presentation with critical review of a project (in groups or individually). These sections are compulsory. Alternative examination formats may be used.

Overlap

The course M0076H is equal to E0014E

Literature. Valid from Autumn 2015 Sp 1

- Documents compiled by responsible teachers.

Aspelin, P. & Pettersson, H. (ed.) (2008). Radiologi. (1st ed.) Lund: Studentlitteratur.

Recommended alternatives for those that want to obtain more breadth:

Carlton, R.R. & Adler, A.M. (2013). Principles of radiographic imaging: an art and a science. (5th ed.) Clifton Park, NY: Delmar, Cengage Learning. Svensk förening för medicinsk teknik och fysik (2006). Jacobsons Medicin och teknik. (5th [rev.] ed.) Lund: Studentlitteratur.

Course offered by

Department of Health Sciences

Items/credits

Number	Type	Credits	Grade
0004	Assignment report	4	U G VG
0005	Project work with seminar	2.5	U G VG
0006	Laboration	1	U G#

Last revised

by 2016-02-15

Syllabus established

by Prefekt vid Inst för hälsovetenskap 2014-02-13