Advanced Magnetic Resonance: Practical Use and Safety, 3.0 credits

Avancerad magnetresonans: praktisk användning och säkerhet, 3.0 hp

Third-cycle education course

8FO0143

Department of Health, Medicine and Caring Sciences

Valid from: First half-year 2024

Approved by
The Research and PhD studies Committee

Approved
2023-05-02

Registration number
LiU-2023-00969

Entry requirements

Entry requirement for studies on third-cycle education courses

- second-cycle degree,
- 240 credits in required courses, including at least 60 second-cycle credits, or
- acquisition of equivalent knowledge in some other manner

Specific information

The course is primarily intended for PhD-students planning to use magnetic resonance imaging scanners at CMIV (Center for Medical Imaging and Visualization) in their research projects.

Learning outcomes

Knowledge and understanding
By the end of the course the students will be able to:
– Explain the importance of safety, risks, potential consequences and how accidents can be avoided when examining using MR
– Describe the IT infrastructure that exists within CMIV
– Describe the importance of and the connection between ethics, GDPR and medical imaging
– Explain the basic physical principles of magnetic resonance and image generation
– Explain the difference between the basic pulse sequences and how they relate to the contrast in MR images
Competence and skills
By the end of the course the students will be able to:
– Independently and safely use the magnetic scanners used at CMIV
– Optimize basic pulse sequence parameters (eg TR, TE, rBW, NSA) to obtain desired contrast characteristics
Judgement and approach
By the end of the course the students will be able to:
– Comply with the safety requirements that apply when using and researching on advanced magnetic scanners
– Comply with the ethics and laws that apply when using and researching on advanced magnetic scanners.

Contents

The aim of this course is that PhD-students acquire the practical skills and judgment required to safely operate and run a magnetic resonance imaging scanner in advanced imaging research projects.
Lectures will provide basic theory on the structure and function of a magnetic resonance imaging scanner, MR-safety, use of the magnetic resonance imaging scanner, ethics, GDPR, MDR and the specific IT-infrastructure at CMIV, as well as basic theoretical knowledge of how MR-images are generated.
The course also includes practical sessions at magnetic scanners to give students the opportunity to independently use a magnetic scanner for research in advanced imaging research projects. An in-depth hands-on session on one of the magnetic scanners is also included.

Educational methods

The pedagogical approach applied at the Faculty of Medicine and Health Sciences is student centered, problem-based learning (PBL). The student takes responsibility for his/her own learning and seeks and evaluates information and knowledge based on own queries and formulated problems. The role of the teacher is to guide and support the students.
Educational methods applied in this course are practical sessions, lectures and seminars.

Examination

The course is examined through an oral group examination with individual assessment, and an individual practical examination.
In addition, active participation in mandatory elements is required for passing the course. Active participation means that the student contributes with work, input and/or own reflections with relevance to the task. The mandatory elements are practical sessions and group discussions.
Students who fail are offered one re-examination occasion in close connection to the course. After that participation in a coming course examination is offered. The re-examination should be equally comprehensive as the ordinary examination.
Change of examiner
Students who have failed the course or part of the course twice are entitled to request another examiner for the following examination occasion.

Grading

Two-grade scale

Course literature

A list of recommended literature will be provided by the course coordinator before the start of the course.

General information

The course is planned and carried out according to what is stated in this syllabus. Course evaluation, analysis and suggestions for improvement should be fed back to the Research and PhD studies Committee (FUN) by the course coordinator.
If the course is withdrawn or is subject to major changes, examination according to this syllabus is normally offered at three occasions within/in close connection to the two following semesters.
On the student's request, course certificate is issued by the course examiner.