



# FSH3214 Computer Simulation Methods for Physics of Medical Imaging 15.0 credits

Dator-och Simuleringsmetoder för medicinsk bildfysik

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

## Establishment

Course syllabus for FSH3214 valid from Spring 2019

## Grading scale

P, F

## Education cycle

Third cycle

## Specific prerequisites

Corresponding to MSc in Engineering Physics.

## 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 students with good knowledge of simulation methods used in research and development within medical imaging. After completing the course, students should

- be able to explain which simulation methods are used within a selected field of specialty, including their strengths and weaknesses.
- be able to choose, based on a specific research problem, an appropriate simulation method or combination of simulation methods to qualitatively and quantitatively be able to predict and explain experimental data.
- be able to perform a preferred simulation by selecting the appropriate tools, implement, execute and analyze the simulation.

## Course contents

The course content is chosen from the literature, in consultation with the examiner, but should include:

- Light-Matter Interaction
- Raytracing
- Methods for simulating wave propagation
  - Fresnel-Kirchhoff diffraction
  - Fourier optics
  - Finite difference method
- Monte Carlo methods.

## Course literature

Selected parts from:

"Principles of Optics", Born and Wolf, Cambridge University Press

"Introduction to Fourier Optics", J. W. Goodman, 2005, Roberts & Company Publishers

"A Primer for the Monte Carlo Method", Ilya M. Sobol, 1994, CRC Press

and selected journal articles.

## Examination

- SEM1 - Seminars, 3.0 credits, grading scale: P, F
- INL1 - Assignment, 6.0 credits, grading scale: P, F
- PRO1 - Project, 6.0 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.

Written examination combined with oral presentation.

## **Other requirements for final grade**

Grading scale: 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.