HL2013 Radiation Therapy 7.5 credits

Strålterapi

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

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for HL2013 valid from Autumn 2023

Grading scale

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

Education cycle

Second cycle

Main field of study

Physics

Specific prerequisites

Bachelor's degree in technology or science. 4 credits in physics, 4 credits in anatomy and/or physiology. English 6/B

Language of instruction

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

Intended learning outcomes

The course gives a fundamental knowledge of physical, biological and clinical aspects of radiation therapy. A special focus is given to mathematical methods applied in dose planning systems and to treatment optimisation methods to get the best therapy outcome. The aim of the course is to provide an understanding of the basic physical and biological effects of ionising radiation in order to learn the principles of radiation therapy and to provide an overview of different mathematical tools for dose plan calculations.

After the course you should be able to:

- describe the effects in tissue from different types of ionising radiation such as photons, electrons, neutrons, protons or light ions
- give an overview of different accelerator designs and irradiation techniques to treat tumours
- explain the main differences in radiobiological response of the low- and high let radiation
- describe the mathematical methods used in the dose calculations
- present and compare different radiation treatment strategies to obtain the best cancer cure and to spare healthy surrounding tissues under exposure to radiation
- describe imaging tools used during treatment planning and daily treatment sessions to target the cancer and for better control of the irradiated volume

Course contents

Basic interaction processes of ionising radiation with matter. Basic concepts of dosimetry, dosimetric quantities and units. Accelerators for radiation therapy, principles of linear and circular accelerators. Optimal design of the therapy beam. Introduction to basic biological and chemical reactions in the irradiated cells. Lesions produced by radiation in DNA molecules. Cell survival models. Radiation effects on normal tissues and tumours. The biological basis of radiotherapy, oxygen effect, dose rate dependence, dose fractionation. Dose calculation in electron and photon beams. Algorithms for calculations of dose distribution in the patient. Principles of optimal treatment planning. Dose planning exercises. Special treatment modalities. Intensity Modulated Radiation Therap

Examination

- PRO1 - Project, 2.0 credits, grading scale: P, F
- TEN1 - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- ÖVN1 - Exercises, 1.0 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.

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.