HL2013 Strålterapi 7,5 hp

Radiation Therapy

Fastställande

Betygsskala

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

Utbildningsnivå

Avancerad nivå

Huvudområden

Fysik

Särskild behörighet

Bachelor's degree in Engineering Physics, Electrical Engineering, Computer Science or equivalent. Basic knowledge of anatomy.

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

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

Kursinnehåll

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

Kurslitteratur

Lecture material available at the department

Examination

- ÖVN1 - Övningar, 1,0 hp, betygsskala: P, F
- PRO1 - Projekt, 2,0 hp, betygsskala: P, F
- TEN1 - Tentamen, 4,5 hp, betygsskala: A, B, C, D, E, FX, F

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.