



## DEPARTMENT OF WOMEN'S AND CHILDREN'S HEALTH

### **K6F6043, Applications of Ionizing Radiation in Therapy and Biomedical Research , 1.5 credits (hec)**

Joniserande strålning i behandling och biomedicinsk forskning, 1,5 högskolepoäng

*Third-cycle level / Forskarnivå*

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#### **Approval**

This syllabus was approved by the The Committee for Doctoral Education on 2024-09-20, and is valid from spring semester 2025.

#### ***Responsible department***

Department of Women's and Children's Health, Faculty of Medicine

#### **Prerequisite courses, or equivalent**

The students are expected to have a basic knowledge of cancer and/or radiation biology.

#### **Purpose & Intended learning outcomes**

The course aims to provide a platform for obtaining advanced, cutting-edge pre-clinical and clinical knowledge in radiation therapy.

#### **Intended learning outcomes**

At the end of the course, the participants should be able to:

- recapitulate the principles of radiation and its biological effects on cells and tissues
- summarise radiation protection strategies
- describe the clinical applications of radiation and its side effects
- elaborate on strategies for how to alleviate the side effects of radiation therapy
- reflect upon radiation therapy from the patient's perspective
- connect their research with topics covered in the course

## Course content

- Basic physics and the biological effects of radiation
- A brief history of radiation therapy
- Radiation safety and protection
- Clinical applications of ionising radiation
- Radiation therapy-associated complications and their potential treatments
- The future of radiation therapy
- Practical sessions (Cellular effects of radiation from the lab perspective, visit to the Radiotherapy department at Karolinska University Hospital)
- Meet a patient who has undergone radiation therapy

## Forms of teaching and learning

The course will mainly consist of lectures by experts in the field. In addition, we will have two practical sessions and group exercises.

### *Language of instruction*

The course is given in English

## Grading scale

Pass (G) /Fail (U)

## Compulsory components & forms of assessment

### Mandatory elements

Attendance is compulsory. Absence must be compensated by a written report in the form of a literature review covering the missed topic.

### Examination

An oral exam consisting of a PowerPoint presentation in which each student connects their own research to the course's ILOs. The presentation will be delivered to a panel of fellow students and teachers. After each presentation, a discussion will follow, during which students are expected to offer constructive feedback to their peers. An individual assessment will be conducted for each student.

## Course literature

### **Recommended literature**

Recent Developments in Radiotherapy. Deborah E. Citrin, M.D. Editor Dan L. Longo, M.D. N Engl J Med 2017; 377:1065-1075. doi: 10.1056/NEJMra1608986.

Review: Neurological Complications From Therapies for Pediatric Brain Tumors. Thien Nguyen, Sabine Mueller, Fatema Malbari. Front Oncol. 2022; 12:853034. doi: 10.3389/fonc.2022.853034.

Review: Cross-translational models of late-onset cognitive sequelae and their treatment in pediatric brain tumor survivors. Noor Z Al Dahhan, Elizabeth Cox, Brian J Nieman, Donald J Mabbott. Neuron 2022; 110(14):2215-2241. doi: 10.1016/j.neuron.2022.04.009.

Immune response following FLASH and conventional radiation in diffuse midline glioma. Oscar Padilla, Hanna E. Minns, Hong-Jian Wei, Weijia Fan, Andrea Webster-Carrion, Masih Tazhibi, Nicholas M. McQuillan, Xu Zhang, Matthew Gallitto, Rebecca Yeh, Zhiguo Zhang, Tom K. Hei, Luca Szalontay, Jovana Pavisic, Yuewen Tan, Naresh Deoli, Guy Garty, James H. Garvin, Peter D. Canoll, Claire Vanpouille-Box, Vilas Menon, Marta Olah, Raul Rabadan, Cheng-Chia Wu, Robyn D. Gartrell. Int J Radiat Oncol. Biol. Phys. 2024 Jul 15;119(4):1248-1260. doi: 10.1016/j.ijrobp.2024.01.219.

Lithium treatment reverses irradiation-induced changes in rodent neural progenitors and rescues cognition. Zanni G, Goto S, Fragopoulou AF, Gaudenzi G, Naidoo V, Di Martino E, Levy G, Dominguez CA, Dethlefsen O, Cedazo-Minguez A, Merino-Serrais P, Stamatakis A, Hermanson O, Blomgren K. Mol Psychiatry. 2021; 26(1):322-340. doi: 10.1038/s41380-019-0584-0.

A systematic review of selected musculoskeletal late effects in survivors of childhood cancer. Prasad L Gawade, Melissa M Hudson, Sue C Kaste, Joseph P Neglia, Karen Wasilewski-Masker, Louis S Constine, Leslie L Robison, Kirsten K Ness. Curr Pediatr Rev 2014;10(4):249-62. doi: 10.2174/1573400510666141114223827.

### **Other information**

The syllabus replaces K6F5625.