

Course on therapeutic and diagnostic medical physics

02-05 May 2022

Herlev Hospital, Store Auditorium,
Borgmester Ib Juuls vej 1, 2. floor, 2300 Herlev, Denmark

Monday May 02, 2022

Time	Session	Title	Content
08:00-08:30	-	Registration	Registration and coffee (JE)
08:30-10:00	1.1	Radiation dosimetry	Interactions and cross sections, Absorbed dose, Kerma, exposure, charged particle equilibrium. (CA)
10:00-10:20	-	break	pause and coffee
10:20-11:40	1.1e	Exercises	Hand calculations and computer exercises on the topics covered in session 1.1 (CA+JE)
11:40-12:30	-	Lunch	
12:30-14:00	1.2	Dose measurements	Ionization chamber and solid state detectors, Depth dose curves, beam qualifiers. (CA)
14:00-14:20	-	break	pause and coffee
14:20-16:00	1.2e	Exercises	Hand calculations and computer exercises on the topics covered in session 1.2 (CA+JE)

Tuesday May 03, 2022

Time	Session	Title	Content
08:30-10:00	2.1	Basic radiobiology	Radiation interaction with living tissue, cell survival curves, early/late effects, 5 Rs, RBE/OER. (PR)
10:00-10:20	-	break	pause and coffee
10:20-11:40	2.2	Fractionation and iso-effects	Dose-response, volume effect and dose-volume-histogram, Linear-quadratic model, EQD2, time-dose-fractionation. (PR)
11:40-12:30	-	Lunch	
12:30-14:00	2.2e	Exercises	Hand calculations and computer exercises on the topics covered in sessions 2.1 and 2.2 (PR+JE)

14:00-14:20	-	break	pause and coffee
14:20-16:00	2.2e	Exercises	Hand calculations and computer exercises on the topics covered in sessions 2.1 and 2.2 (PR+JE)
16:15-17:00	-	Quiz	Smartphone based multiple choice quiz on dosimetry and radiobiology (JE)

Wednesday May 04, 2022

Time	Session	Title	Content
08:30-10:00	3.1	CT basics and geometry	Description on CT scanner geometry including fan/cone angle, slice thickness, intensity and noise considerations and attenuation. (JE)
10:00-10:20	-	break	pause and coffee
10:20-11:40	3.1e	Exercises	Hand calculations and computer exercises on the topics covered in session 3.1 (JE+TA)
11:40-12:30	-	Lunch	
12:30-14:00	3.2	CT reconstruction	The physics behind CT image contrast, sinograms, forward and simple backward projection, filtered backprojection. (JE)
14:00-14:20	-	break	pause and coffee
14:20-16:00	3.2e	Exercises	Hand calculations and computer exercises on the topics covered in session 3.2 (JE+TA)

Thursday May 05, 2022

Time	Session	Title	Content
08:30-10:00	4.1	MR basics and tissue contrast	Nuclear magnetic resonance, spin and precession, magnetic field interaction, T1 and T2 weighted tissue relaxation, Bloch equation. (FM)
10:00-10:20	-	break	pause and coffee
10:20-11:40	4.1e	Exercises	Hand calculations and computer exercises on the topics covered in session 4.1 (FM+JE)
11:40-12:30	-	Lunch	
12:30-14:00	4.2	MR pulse sequences and imaging	Spin echo pulse sequence, contrast weighting, inversion recovery, gradient-phase-frequency encoding, k- and image space transformation. (FM)
14:00-14:20	-	break	pause and coffee

14:20-16:00	4.2e	Exercises	Hand calculations and computer exercises on the topics covered in session 4.2 (FM+JE)
16:15-17:00	-	Quiz	Smartphone based multiple choice quiz on CT and MRI (JE)

Faculty.

JE: Jens Edmund (PhD, MPE, DABR). Medical physicist at Herlev Hospital and affiliate associated professor at the Niels Bohr Institute, University of Copenhagen. Course director.

CA: Claus Erik Andersen (PhD). Associate professor (head of section), Technical University of Denmark, Department of health technology.

FM: Faisal Mahmood (PhD, MPE). Medical physicist at Odense University Hospital and associate professor at the University of Southern Denmark.

PR: Per Rugaard Poulsen (PhD) is professor in medical physics at Aarhus University and Aarhus University hospital, the Danish Center of Proton Therapy.

TA: Teaching Assistant, to be determined. Usually a PhD student in medical physics at one of the departments of the lectures.