

NERS 555 Schedule (Final)

Fall 2018

Radiological Physics and Dosimetry

09/04	First lecture
11/22.....	No lecture (Thanksgiving Break)
12/11.....	Last lecture

Key	Description of required reading	Click on the blue-colored links in the table below for access
N#.#	On-line notes lecture #:Slide(s)	Always read these first
B#	Course textbook Chapter #.sections	Fundamentals of Ionizing Radiation Dosimetry by Andreo <i>et al</i>
O	On-line supplemental book Chapter #	The other book (a work-in-progress)

Radiation Physics, Fluence, Equilibrium, Dose Estimation, Interfaces

Date started	Material Started/Covered	N1 N2 N3 N4 N5 N6	B (link)	O (link)
	Use links ==>			
09/04	Introduction to the course Radiation "quality" Solid angle, polar coordinates	N1: 1-24 N1:27-28 N1:29	B1.1	
09/06	Overview of calibration methods	N1:30-38		
09/11	Sources of radiation	N1:39-56	B1.2	
09/18	Macroscopic radiation physics, Fluence	N2:1-24	B4.1-4.5	O:4.1
09/20	Integrated fluence Planar fluence	N2:25-43 N2:44-47	B4.3.5	O:4.2.1
09/25	Radiation equilibrium Fano's Theorem	N2:48-52 N2:53-56	B4.8-4.10 B4.8,9.6	O:4.2 O:4.5
10/02	Fluence-related radiometric quantities	N3:2	B:4.5	O:4.3
10/04	Photon attenuation Radiological pathlength	N3:3-19 N3:7	B:5.1-5.5	O:3.1 O:4.4
10/09	Microscopic radiation physics Photon interaction processes "Catastrophic" electron interaction processes The Compton interaction	N3:23 N3:24-42 N3:43-55 N3:56-65	B:3.1-3 B:2.2,2.4,2.5	O:1.1 O:2.1
10/11	"Soft" electron interaction processes	N3:72-84	B:2.4-2.10	O:2.2
10/18	Stopping power, electron range	N3:85-103	B:2.4-2.7	O:6.2
10/25	Kerma dose from photons Collision/Electronic kerma dose, from photons	N4:1-7 N4:8-12	B4.6 B4.6	O:5.1 O:5.2
10/30	Photon dose deposition	N4:13-15	B4.6	O:5.3
11/01	Comparison of photon dose deposition models	N4:16-29		O:5.4
11/06	Transient/partial charged particle equilibrium Dose due to scattered photons Dose due to primary electrons	N4:25-29 N4:30-37 N4:38-50	B4.10 B6.1-6.4 "	O:5.5 O:5.6 O:6.4

Dose Calculation, Dose calculation models, Cavity theories, Recombination, Ion chambers

11/08	Photon dose models	N5:1-22	B6.1-6.4	O:7.4
11/15	Photon dose ω -models	N5:1-22	B6.1-6.4	O:7.4
11/27	The convolution method	N5:23-33		O:6.5
11/29	Bragg-Gray cavity theory	N6:1-18	B9.1-9.2.2	O:7.1
12/04	Exposure Spencer-Attix cavity theory Modern cavity theory	N6:19-23 N6:24-25 N6:26-33	B4.6 B9.2.3-9.2.4	O:7.1.1 O:7.2 O:7.3
12/06	Recombination corrections in ion chambers Interface effects Burlin cavity theory The dosimetry chain	N6:34-40 N6:42 N6:43-45		O:7.5 O:7.4 O:7.6 O:7.7
12/11	History of Monte Carlo methods See also ... Monte Carlo methods- How to model geometry		Monte Carlo book Chapter 1 A book chapter from the book "Monte Carlo Techniques in Radiation Therapy" Monte Carlo book Chapter 10	