Optional Course

LS 503— RADIATION BIOLOGY [2 credits]

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S No	Topic	Contact Hours
1.	Interaction of radiation with matter: Different types of radiation. Ionization and excitation. Linear energy transfer, Direct and indirect effects of radiation Radiation chemistry of water	
2.	Biological effects of radiations: Whole body irradiation and sensitivity of tissue Units of radiation measurement Radiation levels and limits	
3.	Cell Survival curves: reproductive integrity mechanism of cell killing ,survival curves in mammalian cells	
4.	Radiosensitivity and cell cycle: Variation of sensitivity with cell age, effect of X rays and high let radiations, possible implications in radiotherapy	
5.	Heritable effects of radiations: Chromosomal and chromatid aberrations, point mutations Mendelian, chromosomal and multi-factorial diseases, genetic risk assessment, doubling dose, mutation component	
6.	Modification of radiation induced damage Radiosensitizers, Radio protectors, Normal tissue radioprotection Mechanisms of action, sulfhydryl compounds, WR series, dose reduction factor (DRF)	
7.	Non targeted effects of radiations: Bystanders effects, chromosomal instability, adaptive response	
8.	Mechanisms for the repair of DNA. Repair of DNA breaks. Repair of base damage: photoreactivation, excision repair, postreplication recovery. Base excision repair, nucleotide excision repair (NER), transcription coupled repair (TCR) and bulk DNA repair	
9.	Radiation induced signaling pathways: Radiationinduced gene expression Signaling abnormalities in cancer Effects of signaling abnormalities on radiation responses	
10.	Radiation cacinogenesis: Initiation, promotion, progression Dose response for radiationinduced cancers Importance of age at exposure and time since exposure, Second tumors in radiation therapy patients	

Suggested reading:

1. Prasad, K.N., CRC Handbook of Radiobiology, CRC Press, Florida
2. Eric J Hall, Amato J Giaccia Radiobiology for the Radiologist Lippincott : Williams & Wilkins (Sixth Edition)
3. A.H.W. Nias An Introduction to Radiobiology John Wiley and sons
4. Alison P Casarette Radiation Biology Prentice Hall Inc