

LS 504A Radiation Biology 2 Credits Name of the Faculty : Prof. R.P. Singh, Dr. A.B. Tiku*		
Sr.No.	Topic	Faculty Name/ 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	ABT/4
2.	Biological effects of radiations: Whole body irradiation and sensitivity of tissue Units of radiation measurement Radiation levels and limits	ABT/4
3.	Cell Survival curves: reproductive integrity mechanism of cell killing, survival curves in mammalian cells	ABT/2
4.	Radiosensitivity and cell cycle: Variation of sensitivity with cell age, effect of X rays and high let radiations, possible implications in radiotherapy	ABT/4
5.	Heritable effects of radiations: Chromosomal and chromatid aberrations, point mutations Mendelian, chromosomal and multi-factorial diseases, genetic risk assessment, doubling dose, mutation component	ABT/4
6.	Modification of radiation induced damage Radiosensitizers, Radio protectors, Normal tissue radioprotection Mechanisms of action, sulfhydryl compounds, WR series, dose reduction factor (DRF)	ABT, RPS/4
7.	Non targeted effects of radiations: Bystanders effects, chromosomal instability, adaptive response	ABT/4
8.	Mechanisms for the repair of DNA. Repair of DNA breaks. Repair of base damage: photoreactivation, excision repair, post-replication recovery. Base excision repair, nucleotide excision repair (NER), transcription coupled repair (TCR) and bulk DNA repair	ABT,RPS/4
9.	Radiation induced signaling pathways: Radiation-induced gene expression Signaling abnormalities in cancer Effects of signaling abnormalities on radiation responses	RPS/4
10.	Radiation carcinogenesis: Initiation, promotion, progression Dose response for radiation-induced cancers Importance of age at exposure and time since exposure, Second tumors in radiation therapy patients	RPS/2
11.	Radiotherapy of cancer: Background and latest advances, Mechanisms of radiation resistance in cancer treatment, Secondary tumor formation in radiation therapy, Radiation in combination therapy	RPS/2
12.	Model systems in radiation biology: In vitro and in vivo assays, Xenograft of human tumors, Spleen colony assay, Spheroids, Spheroids of human tumor cells	RPS, ABT/2

Further 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