LS 503— RADIATION BIOLOGY [2 credits]

(Prof. RP Singh*, Dr. AB Tiku,)

S No	Course Content	Faculty	Lectures
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.	Radio-sensitivity 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 multifactorial 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 of cancer by UV radiation, Dose-response for radiation-induced cancers, Importance of age at exposure and time since exposure	RPS	4
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

Books :

Eric J Hall, Amato J Giaccia *Radiobiology for the Radiologist* Lippincott Williams & Wilkins .

Prasad, K.N., CRC *Handbook of Radiobiology*, CRC Press, Florida

A.H.W. Nias An Introduction to Radiobiology John Wiley and sons