LS 501A Molecular Genetics and Genetic Engineering 2 Credits

Name of the Faculty: Prof. P.K. Verma *, Prof. Shilpee Dutt, Dr. Pankaj Kr.Giri

S.No.	Topic	Faculty Name/ Contact Hours
1	From classical genetics to molecular genetics and genetic engineering: The Rise of Genomics	PKV/1
2	DNA Modifying Enzymes in recombinant DNA technology, DNA cloning and manipulating cloned DNA	PKG/2
3	RNA isolation, cDNA Synthesis, cDNA Library Construction and its Applications	PKG/2
4	Polymerase Chain Reaction, and its Applications Real-Time PCR and analysis	PKG/1 PKV/1
5	Protein Expression Systems: From prokaryotes to mammalian Hosts	PKG/2
6	DNA labelling chemistry (radioactive and non-radioactive), Southern, northern, western, south-western blotting/hybridization, Identification and analysis of recombinant DNA clones.	PKG/2
7	Genomic DNA library construction for general and genome analysis, screening and its applications	PKV/2
8	Milestones in genome sequencing; Sanger sequencing, importance, and applications of genome sequencing	PKV/1
9	Genome sequencing techniques- classical, next-generation sequencing, third and fourth generation sequencing	PKV/4
10	Methods to study gene expression and its applications	SD/2
11	RNA-Seq chemistry and applications for transcriptomics	PKV/1
12	DNA-protein interactions, CHIP-PCR, CHIP-Seq, Protein-Protein Interactions and its applications	SD/1 PKV1
13	Fundamentals of Mass Spectrometry for proteomics	PKG/2
14	RNA interference and gene silencing	SD/1
15	Site-directed Mutagenesis, Genome editing (CRISPR-Cas, ZFN, TALEN etc.) and their applications	SD/3
16	Gene knock-out and knock-down methods and their applications	SD/1
17	Transgenic systems and their applications	SD/2

Further Reading:

1. Gene Cloning and DNA Analysis: An Introduction –T.A.Brown (2020) 8th Edn.
2. Principles of gene manipulation and Genomics. 7th Edn. Primrose and Twyman (2006)
3. Molecular Biology of the Gene. Watson et al. 6th Edn (2009)
4. Genes IX. Lewin (2008)
5. Molecular Cloning- A laboratory Manual. Sambrook and Russell (2001)