

## Core Course

### Research Methodology I (LS 601A)

D Kaur\* (DK), N Ramchiary (NR), and K Kar (KK)

SL. No	Topics	No of Lectures	Faculty
1	Biostatistics and its application in research	1	DK
2	Concept of distribution and data types: Sample and sampling distributions, Normal Distribution, Central Limit Theorem, discrete and continuous data, variables: univariate, bivariate, and multi-variate data	2	DK
3	Understanding descriptive Statistics: Central tendency (Mean, Median, and Mode), variability and spread of data (Population variance, Sample variance, standard deviation, and standard error of mean(SEM))	2	DK
4	Hypothesis testing and statistical significance: Null and alternative hypotheses, Type 1 and Type 2 errors, Z statistic, Chi-square analyses	2	DK
5	Understanding Inferential Statistics: t-test, ANOVA, Mann-Whitney test, Correlation analysis	2	DK
6	Predicting outcome from dataset: Regression analysis	1	DK
7	Machine Learning and Applications in Biological Research	2	DK
8	Application of Bioinformatics and Computational Biology, Biological Databases, Types, and extractions and use of data from databases	3	NR
9	Sequence analysis and gene prediction tools, applications in analysing experimental data	2	NR
10	Genome/Transcriptome sequencing, assembly, annotation, differential expression, and gene network analysis.	6	NR 3 DK 3
11	Proteomics, protein structure prediction, molecular docking, and simulation analysis.	4	KK
12	Sequence alignment, Comparative genomics, and Molecular Phylogenetic analysis using genes/whole genome data	4	NR 2 DK 2
14	Research Ethics in Quantitative analysis	1	NR

### References:

1. Biostatistics: A Foundation for Analysis in the Health Sciences. Wayne W. Daniel and Chad L. Cross. ISBN: 978-1-119-49657-1
2. Biostatistics for the Biological and Health Sciences. Marc M. Triola, Mario F. Triola and Jason Roy. ISBN-13: 9780137401512
3. Principles of Biostatistics. Marcello Pagano, Kimberlee Gauvreau and Heather Mattie. ISBN-10: 1138593141
4. Bioinformatics and Functional Genomics. Jonathan Pevsner. ISBN-13: 978-1118581780