IV Year B.Tech. Bioinformatics I - Semester	L	T	P	To	C
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BI 403 R - STATISTICS

Course Description and Objectives :

This course deals with the basic concepts of R-statistics. The main objective of this course is to provide students the skills to utilize R for basic statistics.

Course Outcomes :

1. Acquire basic concepts of R-Statistics
2. Be able to perform basic statistics using R
3. Gain adequate insights to the graphics in R
4. Be able to perform various models of simulations using R.

Unit I: Overview :

R help; help.search( ), R mailing list, contributed documentation on CRAN. Data types in R : numeric/character/logical; real/integer/ complex, strings and the paste command, matrices, dataframes, lists, Creation of new variables, Creation of patterned variables, Saving workspace/history.

Unit II: Graphics in R

The plot command, histogram, barplot, boxplot, points, lines, segments, arrows, inserting mathematical symbols in a plot, pie diagram, Customisation of plotsetting graphical parameters, adding text, saving to a file; Adding a legend.

Unit III: Basic statistics using R

One and two sample t tests, Bartletts test for variance,F test for equality of variances, multi sample means, Nonparametric tests, Chi squared tests, Exact tests and confidence intervals, Checking assumptions, distribution fitting.

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Unit IV: Vector matrix operations :

Matrix operations such as addition, subtraction, multiplication,; Linear equations and eigenvalues, matrix decomposition – LU, QR and SVD; matrix inverse, G inverse : finding a basis, orthonormalisation, finding rank.

Unit V: Linear models :

The lm function; ANOVA/ANCOVA/regression, models, the summary function, goodness of fit measures, predicted values and residuals; the ANOVA table, confidence intervals and confidence ellipsoids; Multiple testing. Random no. generation & Simulations :rnorm, rchisq,rt, rbinometc; sample; set.seed, Monte Carlo techniques. Programming in R.

Text Book :

1. P.Dalgaard : Introductory Statistics with R, Springer, 2nd,2008.

Reference Books :

1. J.Maindonald&J.Braun : Data Analysis and Graphics Using R , Cambridge University Press, Cambridge, 2nd edition, 2007.
2. J.J.Faraway : Linear Models with R ,Chapman& Hall/CRC Texts in Statistical Science.

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