



ARSD College, University of Delhi

Model Course Handout/Lesson Plan

Course Name : B.Sc.(Honours) Mathematics						
Semester	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
IV	32353401	Computer Algebra System and Related Software (Theory)	2	0	0	2
Teacher/Instructor(s)		Raj Kumar Bhagat				
Session		2020-21				

Course Objective: This course aims at familiarizing students with the usage of computer algebra systems (Mathematica/MATLAB/Maxima/Maple) and the statistical software R. The basic emphasis is on plotting and working with matrices using CAS. Data entry and summary commands will be studied in R. Graphical representation of data shall also be explored.

Teaching Plan:

S.No.	Topic to be covered	Teaching Hours
1	Computer Algebra System (CAS), Use of a CAS as a calculator, Computing and plotting functions in 2D, Producing tables of values, Working with piecewise defined functions, Combining graphics. Simple programming in a CAS.	6
2	Plotting functions of two variables using Plot3D and contour plot, Plotting parametric curves surfaces, Customizing plots, Animating plots.	4
3	Working with matrices, Performing Gauss elimination, Operations (Transpose, Determinant, Inverse), Minors and cofactors, Working with large matrices, Solving system of linear equations, Rank and nullity of a matrix, Eigenvalue, Eigenvector and diagonalization.	6
4	R as a calculator, Explore data and relationships in R. Reading and getting data into R: Combine and scan commands, Types and structure of data items with their properties. Manipulating vectors, Data frames, Matrices and lists. Viewing objects within objects. Constructing data objects and conversions.	6
5	Summary commands: Summary statistics for vectors, Data frames, Matrices and lists. Summary tables. Stem and leaf plot, histograms. Plotting in R: Box-whisker plots, Scatter plots, Pairs plots, Line charts, Pie charts, Cleveland dot charts and Bar charts. Copy and save graphics to other applications.	6
Total		28

Suggested Books

S. No.	Title/Author	Publisher/Edition/Year
1	A Student's Guide to the Study, Practice, and Tools of Modern Mathematics by Bindner, Donald & Erickson, Martin.	CRC Press/ 2011
2	The Student's Introduction to Mathematica®: A Handbook for Precalculus, Calculus, and Linear Algebra by Torrence, Bruce F., & Torrence, Eve A.	Cambridge University Press./ Second Edition / 2009
3	Beginning R: The Statistical Programming Language by M Gardener	Wiley/ Second Edition / 2012

Evaluation Scheme:

No.	Component	Duration	Marks	Total Marks
1.	Internal Assessment			12
	• Class Test		5	
	• Attendance		2	
	• Assignment		5	