



(Master of Science in Statistics) (Master of Science)
(M. Sc.) (Statistics) Semester (I)

Course Code	PS01ESTA52	Title of the Course	INTRODUCTION TO R PROGRAMMING
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	<ol style="list-style-type: none">1. To develop logic for programming2. Understand the usage of various operators and syntax rules3. To learn import-export facilities, data frame structure4. To learn data visualization5. To write arrays and conditional and control statements6. To create understanding of writing simple to complex programme7. To develop user defined functions
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Course Content		
Unit	Description	Weightage* (%)
1.	<p>Introduction to R - A programming language and environment for data analysis and graphics.</p> <p>Syntax of R expressions: Vectors and assignment, vector arithmetic, generating regular sequence, logical vector, character vectors, Index vectors; selecting and modifying subsets of data set</p> <p>Data objects: Basic data objects, matrices, partition of matrices, arrays, lists, factors and ordered factors, creating and using these objects; Functions- Elementary functions and summary functions, applying functions to subsets of data.</p> <p>Data frames: The benefits of data frames, creating data frames, combining data frames, Adding new classes of variables to data frames; Data frame attributes.</p>	25
2.	<p>Importing/exporting data files: text file and binary file, Outputting results – source and sink function, formatting output - options, and format functions.</p> <p>Graphics in R: creating graphs using plot function, box plot, histogram, line plot, steam and leaf plot, pie chart, bar chart multiple plot layout, plot titles, formatting plot axes.</p>	25





	Interactively adding information of plot - Identifying the plotted points, adding trend lines to current scatter plot, adding new data to current plot, adding text and legend. Exporting graphs to popular image format.	
3.	Loops and conditional statements: Control Statements; if statement, if else statement. Looping statements - for loop, repeat, while loop. Developing simple programs in R for data analysis tasks, saving programs, executing stored programs, defining a new binary operator, assignment within function, more advanced examples, Creating function libraries- library function, attaching and detaching the libraries. Random numbers from various distributions like uniform, Normal, gamma, exponential, beta, F, Poisson, binomial, Weibull etc.	25
4.	Performing data analysis tasks: Reading data with scan function, Exploring data using graphical tools, computing descriptive statistics, one sample tests, two sample tests, Goodness of fit tests, Defining Statistical Models: Introduction for defining models, Generic functions for extracting model information.	25

Teaching-Learning Methodology	Learning through example using inbuilt data Discussion and question answers based learning for logic of programming Use of ICT Tools and R language for demonstration Assignments and seminars are given for development of confidence among students
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%





Course Outcomes: Having completed this course, the learner will be able to

1.	get procedure and experience to write systematic algorithm, usage of operators, loops in programme
2.	do import-export of data
3.	create data visualisation and incorporate them in report.
4.	do statistical analysis using inbuilt packages and functions for data
5.	to perform simulation by developing R programme.

Suggested References:

Sr. No.	References
1.	Chambers J. M. (1998). Programming with Data: A guide to S language, Springer.
2.	Venables W N and Ripley B D (2000). S Programming, Springer
3.	Everitt B. S. (1994): A handbook of Statistical Analysis using S-Plus, Chapman & Hall.
4.	Peter Dalgaard (2002). Statistics and computing: Introductory Statistics with R Springer
5.	Purohit, G.S., Gore, S.D. and Deshmikh, S.R. (2008). Statistics Using R. Narosa Publishing House
6.	Maindonald J. and Braum, J. (2007) Data Analysis and Graphics Using R: An example-based approach Second Edition, Cambridge Series in Statistical and Probabilistic Mathematics
7.	Hey-Jahans, C.(2012) .An R Companion to Linear Statistical Models ,CRC Press

On-line resources to be used if available as reference material





On-line Resources

1. <https://www.r-bloggers.com/>
2. <https://www.analyticsvidhya.com/>

