Value Added Add-On Course
DETAILED SYLLABUS

Title of the Course	**:**	**R Programming**
Course Code	**:**	
Nature of the Course	**:**	**Value Added**
Total Credits	**:**	**02**
Distribution of Marks	**:**	**60 TH + 20 PR (End Sem) + 20 (In-Sem)**

COURSE SUMMARY:

This course is designed to guide the learners through the fundamentals of R programming to advanced analytics techniques. Designed to cater to both beginners and those with some programming experience, the course offers a deep dive into R's powerful capabilities for statistical analysis, data visualization, and predictive modeling. Through a blend of theoretical concepts, hands-on exercises, and real-world case studies, learners will emerge with a robust understanding of R programming and its applications in data analysis and beyond.

COURSE OBJECTIVES:

- To introduce participants to the R programming language and its environment.
- To equip learners with the skills to manipulate data, perform statistical analyses, and create visualizations using R.
- To provide insights into advanced data analysis techniques, including machine learning algorithms within the R ecosystem.
- To foster the ability to tackle real-world data problems and derive actionable insights using R.
- To cultivate best practices in coding and data analysis workflows, ensuring reproducibility and efficiency.

UNITS	CONTENTS	L	T	P	Total Hours
1 (Marks) 12 TH + 4 PR	**Introduction to R Programming** Overview of R and its IDEs (RStudio), Basics of R syntax and programming concepts,Data types, variables, and operations in R.	02	01	03	6
2 (Marks) 12 TH + 4 PR	**Data Manipulation and Preparation** Importing and exporting data in R, Data cleaning and preparation with dplyr, Data transformation using tidyr.	02	01	03	6
3 (Marks) 12 TH + 4 PR	**Data Analysis and Statistics** Descriptive statistics and exploratory data analysis, Hypothesis testing and inferential statistics, Regression analysis and ANOVA.	02	01	03	6
4 (Marks) 12 TH + 4 PR	**Data Visualization with R** Principles of effective data visualization, Introduction to ggplot2 and advanced visualization techniques, Creating interactive visualizations with packages like plotly.	02	01	03	6
5 (Marks) 12 TH + 4 PR	**Advanced Analytics and Machine Learning** Overview of machine learning in R, Classification, regression, and clustering techniques, Model evaluation and tuning.	02	01	03	6
	Total (in Hrs)	**10**	**05**	**15**	**30**

Where, L: Lectures T: Tutorials P: Practicals (1P = 2 Hours)

MODES OF IN-SEMESTER ASSESSMENT: **(20 Marks)**

- One Internal Examination - **10 Marks**
- Others (Any one) - **10 Marks**
  - Quiz
  - Seminar presentation
  - Assignment

LEARNING OUTCOMES:

After the completion of this course, the learner will be able to:

- Demonstrate proficiency in R programming basics, including data types, functions, and control structures.
- Effectively manipulate and prepare data for analysis using packages like dplyr and tidyr.
- Conduct comprehensive data analysis, including descriptive statistics, hypothesis testing, and regression analysis, using R.
- Create impactful visualizations with ggplot2 to communicate data insights clearly and effectively.
- Apply machine learning techniques to solve predictive modeling problems, using R packages like caret and randomForest.
- Develop and implement R scripts and functions to automate data analysis tasks, enhancing productivity and ensuring reproducibility.
- Navigate and contribute to the vibrant R community, leveraging resources and sharing knowledge for continuous learning.

SUGGESTED READINGS:

1. N. Metzler, " R Programming for Beginners: An Introduction to Learn R Programming with Tutorials and Hands-On Examples," Independently Published, 2019.
2. Fischetti, Tony, " R: Data Analysis and Visualization," Packt Publishing, 2016.
3. Lander, Jared. "R for Everyone: Advanced Analytics and Graphics," Pearson Education, 2017.
4. Singh, Ajit. "R Programming: Simply In Depth," Amazon Digital Services LLC - Kdp, 2020.
5. G. Grolemund, " R Programming An Approach to Data Analytics," Mjp Publisher, 2021.

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