

As Per NEP 2020

University of Mumbai



Syllabus for Basket of Minor	
Board of Studies in Data Science	
UG First Year Programme	
Semester	II
Title of Paper	Credits 2/ 4
I. DS_R Programming (Minor)	2
From the Academic Year	2024-2025

Name of the Course: DS_R Programming

Sr.No.	Heading	Particulars
1	Description the course : Including but Not limited to:	R-Programming is a course that provides a comprehensive introduction to the R programming language, widely used in data analysis, statistics, and machine learning. The course covers the basics of R programming, including its user interface, objects, functions, writing own functions, and scripts. Students will learn how to use packages and help pages in R programming and work with R objects such as atomic vectors, matrices, arrays, lists, and data frames. They will also learn about different data subsetting and manipulation techniques and get familiar with working with different environments and scoping rules. The course includes working with programs, strategies, if statements, else statements, lookup tables, code comments, and S3 systems. Students will gain an understanding of loops, expected values, expand.grid, repeat loops, and how to write fast, vectorized code. The course will also cover the basic applications of R programming for data science, and machine learning
2	Vertical :	Minor
3	Type :	Theory
4	Credits :	2 credits (1 credit = 15 Hours for Theory)
5	Hours Allotted :	30 Hours
6	Marks Allotted:	50 Marks
7	Course Objectives: CO 1. To provide students with a strong foundation in R programming basics, including its user interface, objects, functions, and scripts. CO 2. To help students master the use of R packages and help pages to carry out data analysis tasks more efficiently. CO 3. To enable students to work with R objects such as atomic vectors, matrices, arrays, lists, data frames, and understand loading and saving data for effective analysis. CO 4. To teach students how to use R notation techniques such as selecting values, shuffling a deck, and modulating values and different data subsetting techniques. CO 5. To enable students to work with R programming environments, including their introduction, different kinds of scoping rules, assignment,	

	evaluation, closures, and how to debug them more effectively.
8	<p>Course Outcomes:</p> <p>OC 1. Students will have the ability to write their own functions, manage arguments and understand scripts in the R programming language.</p> <p>OC 2. Students will proficiently use packages and help pages in R programming for the better resolution of the challenges of data analysis.</p> <p>OC 3. Students will gain a strong foundation in R objects, different data frames, working with loading data, saving data, and data coercions.</p> <p>OC 4. Students will have a comprehensive understanding of R notation techniques such as selecting values, shuffling a deck, and modulating values and different data subsetting techniques.</p> <p>OC 5. Students will be able to work effectively in R programming environments, including their introduction, different kinds of scoping rules, assignment, evaluation, closures, and debugging.</p> <p>OC 6. Students will understand programs in R programming that includes strategies for different tasks while working with if statements, else statements lookup tables, and code comments.</p> <p>OC 7. Students will have the ability to understand S3 systems, attributes, generic functions, methods, classes, and S3 and R5 debugging implications.</p> <p>OC 8. Students will have the ability to use different loops and functions like expand.grid and able to write fast loops, understand how vectorized code works, and will apply it in practice while working with large datasets.</p>
9	<p>Modules:-</p> <p>Module 1: (15 hours)</p> <ol style="list-style-type: none"> R Basics: The R User interface, objects, functions, sample with replacement, writing own functions, arguments, scripts Packages and Help pages: Packages, Help packages R Objects: Atomic Vectors, Attributes, Matrices, Arrays, Class, Coercion, Lists, data frames, loading data, saving data R Notation: Selecting values, deal a card, shuffling a deck, dollar signs and double brackets Modifying Values: Changing values in place, logical subsetting, missing information Environments: Introduction, working with environments, scoping rules, assignment, evaluation, closures <p>Module 2: (15 hours)</p> <ol style="list-style-type: none"> Programs: Strategy, if statements, else statements, lookup tables, code comments S3: The S3 system, attributes, generic functions, methods, classes, S3 and debugging, S4 and R5 Loops: Expected values, expand.grid, for loops, while loops, repeat loops, Speed: Vectorized code, how to vectorize? writing fast loops, vectorized code in practice R for data science R for machine learning

10	Text and References: 1. Hands-On Programming with R, Garrett Grolemond, O' Reilly, 2014 2. R Programming: A Step-by-Step Guide for Absolute Beginners. Daniel Bell, Guzzler Media, 2020	
11	In 10 above	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: Class test of 1 of 15 marks Class test of 2 of 15 marks Average of the two: 15 marks Quizzes/ Presentations/ Assignments: 5 marks Total: 20 marks	Format of Question Paper: External Examination (30 Marks)– 1 hr duration
14	Format of Question Paper: (Semester End Examination : 30 Marks. Duration:1 hour) Q1: Attempt any two (out of four) from Module 1 (15 marks) Q2: Attempt any two (out of four) from Module 2 (15 marks)	

Sign of Chairperson
Dr. Mrs. R. Srivaramangai
Ad-hoc BoS (Data Science)

Sign of the
Offg. Associate Dean
Dr. Madhav R. Rajwade
Faculty of Science & Technology

Sign of Offg. Dean,
Prof. Shivram S. Garje
Faculty of Science & Technology