

FACULTY OF COMPUTER APPLICATIONS
Bachelor of Computer Applications

- **Sem.** :5
- **Subject Code** : 05BC1503
- **Subject** : Data Analytics with R
- **Course Objectives** :
 1. To learn about Data analytics and its application areas.
 2. To understand the use of R-software and its fundamental concepts for data analytics.
 3. To be able to understand R Programming Decision making, functions , control statements and data structures.
 4. To be able to understand data visualization using R programming.
 5. To learn statistical methods and models for data analytics.
- **Prerequisites** : Basic knowledge of programming concepts

Unit No	Topics Covered	No of lectures required
1	Introduction to Data Analysis: Overview of Data Analytics, Need of Data Analytics, Nature of Data, Classification of Data: Structured, Semi-Structured, Unstructured, Characteristics of Data, Applications of Data Analytics.	08
2	Introduction to R Programming: Overview of R programming, Features of R, Applications of R, Introduction and Installation of R Studio, Creation and Execution of R File in R Studio, Clear the Console and the Environment in R Studio , Basic Syntax in R Programming , R Commands, Variables and scope of variables, Data Types, Operators,Keywords.	08
3	R Programming Basics: How to take Input from user in R, Output in R using different functions, Decision making statements, Looping statements, Break next, return statements, Switch case,	10

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	Data Structure in R: Vectors , Lists , Data frames , Matrices, Arrays.	
4	Data Visualization using R : Reading and getting data into R (External Data): Using CSV files, XML files, Web Data, JSON files, Databases, Excel files. Working with R Charts and Graphs: Bar Charts, Line Graphs, Scatterplots, Pie Charts, Boxplots, Histograms	12
5	Statistics with R: Mean, Median and Mode, Variance and Standard Deviation, Descriptive Analysis, Normal Distribution, Binomial Distribution, Analysis of Variance (ANOVA) Test : One Way & Two Way ANOVA, Regression: Linear and Multiple Linear Regression, Logistic Regression. Time Series Analysis, Survival Analysis.	12

Course Outcomes:

1. To understand Data analytics, its types and its applications.
2. To get knowledge about R studio installation and R programming fundamental concepts like variable, data types, commands.
3. To apply the basics in R programming in terms of functions, loops, decision making and data structure.
4. To design various experiments based on graphs and charts for data visualization in R programming.
5. To apply of statistical computations for data analytics.

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Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	M	H			H						
CO2	L			L	M			H	H	H	
CO3			M						M	H	H
CO4	L					H	H		H		H
CO5	M	M	M					H			

Text Book :

1. "R for Everyone", Jared P Lander, Pearson Education 2017, Latest Edition.
2. "Beginning R: An Introduction to Statistical Programming"-Larry Pace, Latest Edition.
3. "Big Data Fundamentals" Thomas Erl, Wajid Khattak, and Paul Buhler:: Concepts, Drivers and techniques , Pearson, Latest Edition.

Reference Books :

1. "Introductory Statistics with R", P Dalgaard, Second edition.
2. "Beginning R-The statistical Programming language", Mark Gardner, John wiley & sons 2012, Latest Edition.
3. "An Introduction to R" , Notes on R: A Programming Environment for Data Analysis and Graphics. W. N. Venables, D.M. Smith and the R Development Core Team. Version3.0.1 (2013-05-16).

URL: <https://cran.rproject.org/doc/manuals/r-release/R-intro.pdf>

Web References :

1. <https://www.geeksforgeeks.org/r-programming-language-introduction/>
2. <https://www.datamentor.io/r-programming/examples/>
3. <https://www.tutorialspoint.com/r/index.htm>

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4. <http://tutorials.iq.harvard.edu/R/Rstatistics/datasets>
5. <http://www.r-tutor.com/>

App References :

1. https://play.google.com/store/apps/details?id=com.krazeapps.rprogrammingcompiler&hl=en_IN&gl=US
2. <https://play.google.com/store/apps/details?id=com.superdream.rprogramming&hl=en&gl=US>

Syllabus Coverage from text /reference book & web/app reference:

Unit #	Chapter Numbers
1	Book-3 Chapter 1 : Page no 5-11,Page no 7-20
2	Book-1 Chapter 1 ,2,3 ,4.1 ,4.2& 4.3
3	Book-1: Chapter 4.3-4.7,5,8,9,10
4	Book-1: Chapter 6 Book-2 :Chapter 5
5	Book 2: Chapter 4,7,10,11,13,14

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PRACTICALS

Unit No	List of Practicals
1	<p>(1) Write R script for some inbuilt functions like : help(),c(),ls(),rm(),sqrt(),seq(),min(),max(),assign(),print().</p> <p>(2) Write a R program to take input from the user (name and age) and display the values. Also print the version of R installation.</p> <p>(3) Write a program to use R as a calculator.</p> <p>(4) Write R script to perform arithmetic and logical operations</p> <p>(5) Write a program to assign value to a variable in difference ways.</p> <p>(6) Write a R program to extract first 10 English letter in lower case and last 10 letters in upper case and extract letters between 22nd to 24th letters in upper case.</p>
2	<p>(7) Write R script to create an array, passing in a vector of values and a vector of dimensions. Also provide names for each dimension.</p> <p>(8) Write R script to create a 4 × 4 matrix , 3 × 3 matrix with labels and fill the matrix by rows and 2 × 2 matrix with labels and fill the matrix by columns.</p> <p>(9) Write R script to create 3 x 3 matrix to perform addition, subtraction, multiplication and division operations.</p> <p>(10) Write R script to print even numbers from 10 to 30 using all available loops in R.</p> <p>(11) Write R script to print result as given below using decision making statements:>70 Distinction,>60 First ,>40 pass <40 Fail.</p> <p>(12) Write R script to create data frame "student" with the fields of stud_id, stud_name, email_idandmobile_no. Perform following operations: a. Display data of data frame b. Display summary of data frame c. Display structure of data frame d. Extract and display only stud_name and mobile_no from data frame</p> <p>(13) Write R script to create a Dataframes which contain details of 5</p>

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	employees and display the details. Create another data frame with same columns and merge it with first one.
3	<ul style="list-style-type: none"> (14) Write R script to read and write excel (15) Write R script to read and write csv file. (16) Write R script to read and write XML file. (17) Write R script to read and download Web data file. (18) Write R script to workJSON file. (19) Write R script to work with Database file.
4	<ul style="list-style-type: none"> (20) Write R script to create bar chart(3 different styles preferable). (21) Write R script to create single and multiple Line graph (3 different styles preferable). (22) Write R script to create scatter plot.(3 different styles preferable). (23) Write R script to create pie chart(5 different styles preferable). (24) Write R script to create boxplot (2 different styles preferable). (25) Write R script to create Histogram.
5	<ul style="list-style-type: none"> (26) Write R script to calculate mean , median and mode of given data. (27) Write R script for finding probability by using Normal distribution. (28) Write R script for finding probability by using Binomial distribution. (29) Write R script for Analysis of Variance (ANOVA) Test :One Way & Two Way ANOVA. (30) Write R script for Linear and Multiple Regression. (31) Write R script for Logistic Regression (32) Write R script for Time Series Analysis. (33) Write R script for Survival Analysis.