Course Code	Course Name	Theory	Practical	Tutorial	Theory	Practical & Oral	Tutorial	Total
ITL804	R Programming Lab	--	02	--	--	01	--	01

Course Code	Course Name	Examination Scheme							
		Theory Marks				Term Work	Practical & oral	Oral	Total
		Internal assessment			End Sem. Exam				
		Test1	Test 2	Avg. of two Tests					
ITL804	R Programming Lab	--	--	--	--	25	25	--	50

Lab Objectives: Students will try:

1. To provide an overview of a new language R used for data science.
2. To introduce students to the R programming environment and related eco-system and thus provide them with an in-demand skill-set, in both the research and business environments
3. To introduce the extended R ecosystem of libraries and packages
4. To demonstrate usage of as standard Programming Language.
5. To familiarize students with how various statistics like mean median etc. can be collected for data exploration in R
6. To enable students to use R to conduct analytics on large real life datasets.

Lab Outcomes: students will be able to:

1. Install and use R for simple programming tasks.
2. Extend the functionality of R by using add-on packages
3. Extract data from files and other sources and perform various data manipulation tasks on them.
4. Code statistical functions in R.
5. Use R Graphics and Tables to visualize results of various statistical operations on data .
6. Apply the knowledge of R gained to data Analytics for real life applications.

SOFTWARE requirements:

1. The R statistical software program. Available from: https://www.r-project.org/

2. RStudio an Integrated Development Environment (IDE) for R. Available from: https://www.rstudio.com/

Detailed syllabus:

Module	Detailed Content	Hours	LO Mapping
0	**Prerequisites -** Any programming Language like Java Python. Basic statistics. Data Mining Algorithms	--	--
I	**Introduction:** Installing R on personal machines. installing R and RStudio. • The basic functionality of R will be demonstrated, Variable types in R. Numeric variables, strings and factors. • Accessing the help system. Retrieving R packages. • Basic data types and operations: numbers, characters and composites. • Data entry and exporting data	02	**LO 1, LO 2, LO 3**
II	**Data structures**: vectors, matrices, lists and data frames.	04	**LO1, LO 3**
III	**R as a programming language**: • Grouping, loops and conditional execution, Functions **Exploratory data analysis** • Range, summary, mean, variance, median, standard deviation, histogram, box plot, scatterplot	04	**LO 1, LO 4**
IV	**Graphics in R** • Graphics and tables • Working with larger datasets • Building tables with aggregate • Introduction to ggplot2 graphics	06	**LO 3**
V	**Regression and correlation** • Simple regression and correlation, Multiple regression • Tabular data and analysis of Categorical data	02	**LO 4**
VI	**R for Data Science (Mini Project)** Implementing a mini project using any data mining or big data analytics algorithm in R • Extracting data from a large Dataset • Exploratory analysis • Using Mining algorithm • Visualizations and interpretation of results	06	**LO 5, LO 6**

Text Books:

1. URL: https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf (Online Resources)
2. R Cookbook Paperback – 2011 by Teetor Paul O Reilly Publications
3. Beginning R: The Statistical Programming Language by Dr. Mark Gardener, Wiley Publications
4. R Programming For Dummies by Joris Meys Andrie de Vries, Wiley Publications

References:

1. Hands-On Programming with R by Grolemund, O Reilly Publications
2. R for Everyone: Advanced Analytics and Graphics, 1e by Lander, Pearson Ltd.
3. R for Data Science Learning Dan Toomey December 2014 Packt Publishing Limited

Term Work:
Term Work shall consist of experiment on above guidelines/syllabus. Also Term work Journal must include at least 2 assignments.
Term Work Marks: 25 Marks (Total marks) = 15 Marks (Experiment) + 5 Marks (Assignments) + 5 Marks (Attendance)

Practical & Oral Exam: An Oral exam will be held based on the above syllabus.