DPG Institute of Technology and Management

Sector 34, Gurugram HR 122004

Lesson Plan

Course Name: R Programming

Faculty Name: Ms. Arpita Mendiratta

No. of Lecture Hours/Week	**3**	**Exam Hours**	**3**
Total No. of Lecture Hours		**Exam Marks**	**75**
Course Code:	**OEC-AI-434G**	**Semester**	**7**

COURSE OBJECTIVES:

1. Understand what R is and what it can be used for.
2. Why would you choose R over another tool
3. Troubleshoot software installs (keep your fingers crossed)
4. Gain familiarity with using R from within the RStudio IDE
5. Get to know the basic syntax of R functions
6. Be able to install and load a package into your R library

S.No	Topics to be covered	Teaching Methodology	Remark/CO	Activity
SECTION A	**Unit 1**			
1	Introduction to R	Chalk &Talk	CO1	Group discussion on usage of R programming
2	R Version, 32-bit versus 64-bit	PPT	CO1	Brainstorming challenges with different versions.
3	The R Environment, Command Line Interface	PPT	CO1	Analyse R environment
4	RStudio, Revolution Analytics RPE	Chalk &Talk	CO1	Practical on R Studio

5	**R** Packages: Installing Packages	Chalk &Talk	CO1	Analysis of various packages
6	Loading Packages, Building a	Chalk &Talk	CO1	Understanding loading of packages
7	R Basics: Basic Math, Variables, Data Types	PPT	CO1	Working on various operators
8	Vectors, Calling Functions	PPT	CO1	Practical Application of vectors
9	Function Documentati on	Chalk &Talk	CO1	Practical on functions
10	Missing Data, Introduction to Advanced Data Structures	Chalk &Talk	CO1	Case study discussion.
11	Data frames, Lists, Matrices, Arrays	Chalk &Talk	CO1	Quiz and collaborative Q&A.
12	Revision	Chalk &Talk	CO1	Case-based exercises.
SECTION B	**Unit 2**			
13	Reading Data into **R:** Reading CSVs	Chalk &Talk	CO2	Debate activity.
14	Excel Data, Reading from Databases	PPT	CO2	Analysing uses of various types of files
15	Data from Other Statistical Tools, R Binary Files	PPT	CO2	Practical on statistical tools
16	Data Included with R, Extract	Chalk &Talk	CO2	Discussion on importing data

	Data from Web Sites			
18	Statistical Graphics: Base Graphics, ggplot2	Chalk &Talk	CO2	Perform various operations on statistical functions.
18	Writing **R** Functions: Hello, World, Function	Chalk &Talk	CO2	Purpose of R functions
19	Control Statements: if	Chalk &Talk	CO2	Activity on control statements
20	Compound Tests, Loops, for Loops, while Loops	Chalk &Talk	CO2	Compare different types of looping statements
21	Revision	Chalk &Talk	CO2	Quiz
Section C	**Unit 3**			
22	Group Manipulation : Apply	Chalk &Talk	CO3	Practical
24	aggregate, plyr, data.table,	Chalk &Talk	CO3	Quiz
25	Joins, reshape2, Manipulating Strings:	Chalk &Talk	CO3	Practical on pasting data
26	Extracting Text, Regular R	Chalk &Talk	CO3	Numerical on various statistics measures
27	Probability Distributions: Normal Distribution,	PPT	CO3	Lab activity.
28	Basic Statistics: Summary Statistics,	PPT	CO3	Conduct quiz and review answers collaboratively.
29	T-Tests 200, ANOVA, Linear Models: Simple	Chalk &Talk	CO3	Practical
30	Generalized Linear Models: Logistic	Chalk &Talk	CO3	Understanding differences
31	.Model Diagnostics: Residuals, Comparing	Chalk &Talk	CO3	Group discussion

Section D	**Unit 4**			
32	Nonlinear Models: Nonlinear Least Squares	PPT	CO4	Revision
33	Splines, Generalized Additive Models	PPT	CO4	Understanding various models
34	Decision Trees, Random Forests	Chalk &Talk	CO4	Analysing differences
35	Clustering: K-means	Chalk &Talk	CO4	Quiz and review
36	PAM, Hierarchical Clustering,	Chalk &Talk	CO4	Practice problems.
37	Revision	PPT		Quiz

Assessment Methods: -

S.No.	Evaluation Component	Assessment Method	Marks
1	**Internal Marks**		**25**
		Attendance	**5**
2		**Quiz/Presentation**	**5**
3		**Assignment**	**5**
4		**Avg of Sessional 1&2**	**10**
5	**External Marks**	**Final University Exam**	**75**

Suggested Textbook:

- Jared P. Lander, R for Everyone: Advanced Analytics and Graphics, Pearson Edu. Inc.

Suggested reference books:

- Christian Heumann, Michael Schomaker and Shalabh, Introduction to Statistics and Data Analysis - With Exercises, Solutions and Applications in R , Springer, 2016
- Pierre Lafaye de Micheaux, Rémy Drouilhet, Benoit Liquet, The R Software Fundamentals of Programming and Statistical Analysis, Springer 2013
- Alain F. Zuur, Elena N. Ieno, Erik H.W.G. Meesters, A Beginner's Guide to R (Use R) Springer 2009

Course Outcome:

At the end of this course, students will demonstrate the ability to:

CO.1 Familiarize themselves with R and the RStudio IDE

CO.2 Understand and use R functions

CO.3 Install and load a package into your R library

CO.4 Get insight into the capabilities of the language as a productivity tool for data manipulation and statistical analyses.

Signature of Staff In-charge Signature of HOD