4K L University
Department of Management
Course Handout for 2016 II Year MBA PROGRAM
A.Y.2017-18, IV Semester

Course Name : Advanced Business Analytics with R

Course Code : 16MB62A1

L-T-P structure : 2-0-2

Course Credits : 3

Course Coordinator : **Dr. Akondi Srikanth**

Course Instructor : **Dr. Akondi Srikanth**

Course Teaching Associates : **NIL**

Course Objective: This course aims at analyzing the Marketing data of an organization with the help of statistical tool R. This course enables the capabilities of students in developing the performance of their organization by handling the marketing problems analytically.

Course Rationale: The course is designed for the second semester students of the second year MBA program. The scope of marketing analytics is to help students in making right marketing decisions.

Course Outcomes (CO):

CO No:	CO	SO	BTL
1	To Understand the basics of Data and R	a	2
2	To Understand the implications of Descriptive Analytics on Data	a	2
3	To Examine the implications of Diagnostic Analytics for Understand the Inferences.	a	4
4	To analyze the data using Predictive Analytics.	a	4

COURSE OUTCOME INDICATORS (COI):

CO No.	COI-1	COI-2	COI-3
1	To understand the data and its types.	To Understand the Questionnaire Design.	To Understand the application of R for Data.
2	To demonstrate the practical implications of Business Analytics.	To explain the techniques involved in Descriptive Analytics.	To show the implications of Descriptive Analytics on Data.
3	To apply the Hypothesis Testing on Data.	To analyze the data using Parametric tests.	To examine the data using non-Parametric tests.
4	To model the data using the techniques involved in Predictive Analytics.	To analyze the variables Using Factor Analysis, Time-series Analysis and Survival Analysis.	To examine the data using simple data visualization tools & to take part in mini-project.

SYLLABUS:

Introduction to Data & R: Data and its Types, Tools for Analyzing data, Data types by levels of measurement, Research design, Questionnaire/Schedule design, Sampling design, R basics and Import Data in R, Compute Data types in R.
Business Analytics-Descriptive Analytics Using R: Business Analytics and its Types, Descriptive Analytics-Measures of Central Tendency, Measures of Dispersion, Measures of Skewness, Measures of Kurtosis. **-Business Analytics- Diagnostic Analytics Using R** Introduction to Hypothesis(es), Hypothesis Testing(HT), Types of HT;Testing Normality and Testing Homogeneity of Variances;
Parametric Tests: T-tests: One Sample t-test, Welch(Unequal Variances), Two-Sample(Equal variances),Paired t-test, ANOVA-One-way & two-way, Repeated Measures ANOVA. **Non-parametric tests: Nominal**-Binomial test, McNemar's test, Cochran's Test(Repeated), Chi-Square test. **Ordinal-**Wilcoxon Signed Rank test(One and Paired),Mann-Whitney U test or Wilcoxon Rank Sum test, Friedman test, Kruskal-Wallis test. **Advanced Business Analytics - Predictive Analytics Using R-PART I-** Parametric Tests: Karl-Pearson Co-efficient of Correlation, Linear Regression, Multiple Regression; Non-parametric Test: Spearman Rank Correlation, Kendal's tau,Phi-Coefficient of Correlation, Biserial Correlation. Others: Discriminant Analysis, Logistic Regression -Binomial & Multinomial. **Advanced Business Analytics - Predictive Analytics Using R- PART II -** Cluster Analysis -Hierarchical and K-Means, Time-series Analysis, Conjoint Analysis, and Survival Analysis; Factor Analysis-EFA, CFA, A Brief understanding of prescriptive Analysis, Introduction to Graphics in R. **Note:** Using R Commander and SPSS for reviewing the results of R. Making a Mini Project

Approved Text books:

James, G., Witten, D., Hastie, T., & Tibshirani, R. (2015). *An Introduction to Statistical Learning with Applications in R.* Springer.

Ohri, A. (2012). *R For Business Analytics.* NewYork: Springer.

Reference Books:

Winston, W. L. (2014). *Makketing Analytics :Data -Driven Techniques With Microsoft Excel.* Indiana: John Wiley & Sons.

Chapman, C., & Feit, E. M. (2015). *R for Maketing Research and Analytics.* Switzerland: Springer International Publishing.

COURSE DELIVERY PLAN:

Session No	CO	COI	Topic (s)	Teaching-Learning Methods	Evaluation Components
1	1	1	Data and its Types	Classroom Discussion-Interaction	Test I & End Semester Exam
2	1	1	Tools for Analyzing data - Quantitative	Classroom Discussion-Interaction	Test I & End Semester Exam
3	1	1	Tools for Analyzing data - Qualitative	Classroom Discussion-Interaction	Test I & End Semester Exam
4	1	1	Data types by levels of measurement	Classroom Discussion-Interaction	Test I & End Semester Exam
5	1	1	Research design	Classroom Discussion-Interaction	Test I & End Semester Exam
6	1	2	Questionnaire/Schedule design	Classroom Discussion-Interaction	Test I & End Semester Exam
7	1	2	Exercise on QD	Lab –Simulation	Test I & End Semester Exam
8	1	2	Sampling Design Process	Classroom Discussion-Interaction	Test I & End Semester Exam
9	1	2	Sampling Techniques	Classroom Discussion-Interaction	Test I & End Semester Exam
10	1	2	Exercise on Sampling design	Classroom Interaction and Simulation	Test I & End Semester Exam
11	1	3	R basics and Import Data in R	Classroom Interaction and Simulation	Test I & End Semester Exam
12	1	3	Compute Data types in R	Classroom Interaction and Simulation	Test I & End Semester Exam
13	1	3	Importing Data from Questionnaire to R	Classroom Interaction and Simulation	Test I & End Semester Exam
14	1	1	Business Analytics and its Types	Classroom Discussion-Interaction	Test I & End Semester Exam
15	2	2	Descriptive Analytics-Measures of Central Tendency	Classroom Interaction and Simulation	Test I & End Semester Exam
16	2	3	Exercise on Mean,Median and Mode - mean(),median(),modeOf()	Classroom Interaction and Simulation	Test I & End Semester Exam
17	2	2	Measures of Dispersion-quantile()	Classroom Interaction and Simulation	Test I & End Semester Exam
18	2	3	Exercise on Standard Deviation, Variance and Co-efficient of Variance	Lab Simulation	Test I & End Semester Exam
19	2	3	Measures of Skewness - skewness(), agostino.test()	Classroom Discussion and Lab Simulation	Test I & End Semester Exam
20	2	3	Measures of Kurtosis - kurtosis(), anscombe.test()	Classroom Interaction and Lab Simulation	Test 1 & End Exam
21	3	1	Introduction to	Classroom Interaction	Test II & End

			Hypothesis(es),Hypothesis Testing(HT),Types of HT	and Lab Simulation	Semester Exam
22	3	1	Testing Normality-shaprio.test(),jarque.test()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
23	3	1	Testing Homogeneity of Variances-bartlett.test(),levene.test()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
24	3	2	Parametric Tests:One Sample t-test-t.test()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
25	3	2	Welch(Unequal Variances),Two-Sample(Equal variances),Paired T-test	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
26	3	2	ANOVA-One Way, Two-Way, Post-Hoc Tests-aov()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
27	3	2	Repeated Measures ANOVA and Its Types	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
28	3	3	**Nominal**-Binomial test, McNemar's test, -binom.test(),mcnemar.test()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
29	3	3	Cochran's Test(Repeated)Chi-Square test -mantelhaen.test(),chisq.test()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
30	3	3	**Ordinal**-Wilcoxon Signed Rank test(One Sample Group)-wilcox.test()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
31	3	3	Mann-Whitney U test, Wilcoxon Rank Sum test -wilcox.test()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
32	3	3	Wilcoxon Signed Rank Test(Paired),Friedman test(Repeated)-friedman.test()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
33	3	3	Kruskal Wallis Test -kruskal.test()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
34	4	1	Parametric Tests:Karl-Pearson Co-efficient of Correlation,Linear Regression -cor(),lm()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
35	4	1	Multiple Regression -lm()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
36	4	1	Non-parametric Test: Spearman Rank Correlation,Kendall's Tau -cor(),cor.test()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam

37	4	1	Phi-Coefficient of Correlation, Biserial Correlation-phi(),biserial.cor()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
38	4	1	Exercise on Correlations	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
39	4	1	Discriminant Analysis -Concept Note	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
40	4	1	Exercise on DA	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
41	4	1	Logistic Regression -Binomial & Multinomial-glm()	Classroom Interaction and Lab Simulation	Test II & End Semester Exam
42	4	1	Exercise on Logistic Regression	Classroom Interaction and Lab Simulation	Activity Learning
43	4	2	Cluster Analysis -Hierarchical and K-Means-hclust(),kmeans()	Classroom Interaction and Lab Simulation	Test III & End Semester Exam
44	4	2	Exercise on Cluster Analysis	Classroom Interaction and Lab Simulation	Test III & End Semester Exam
45	4	2	Time-series Analysis -ts()	Classroom Interaction and Lab Simulation	Test III & End Semester Exam
46	4	2	Conjoint Analysis -Conjoint()	Classroom Interaction and Lab Simulation	Test III & End Semester Exam
47	4	2	Exercise on Conjoint Analysis	Classroom Interaction and Lab Simulation	Test III & End Semester Exam
48	4	2	Survival Analysis-Surv(),survfit(),coxph()	Classroom Interaction and Lab Simulation	Test III & End Semester Exam
49	4	2	Exercise on Survival Analysis	Classroom Interaction and Lab Simulation	Test III & End Semester Exam
50	4	2	Factor Analysis-Exploratory FA-factanal()	Classroom Interaction and Lab Simulation	Test III & End Semester Exam
51	4	2	Exercise on EFA	Classroom Interaction and Lab Simulation	Test III & End Semester Exam
52	4	2	Factor Analysis-Confirmatory FA-sem()	Classroom Interaction and Lab Simulation	Test III & End Semester Exam
53	4	2	Exercise on CFA	Classroom Interaction and Lab Simulation	Test III & End Semester Exam
54	4	3	A Brief understanding of prescriptive Analysis	Classroom Interaction and Lab Simulation	Test III & End Semester Exam

55	4	3	Introduction to Graphics in R	Classroom Interaction and Lab Simulation	Internal Lab Test & End Semester Exam
56	4	3	Making a Mini Project	Classroom Interaction and Lab Simulation	Active Learning
57	4	3	Making a Mini Project	Classroom Interaction and Lab Simulation	Active Learning
58	4	3	Making a Mini Project	Classroom Interaction and Lab Simulation	Active Learning
59	4	3	Making a Mini Project	Classroom Interaction and Lab Simulation	Active Learning
60	4	3	Making a Mini Project	Classroom Interaction and Lab Simulation	Active Learning

Session wise Teaching – Learning Plan

Session Number: 1

Session Outcome: At the end of the session, the student will be able to know about

Data and its Types

Time(min)	Topic	BTL	Teaching – Learning Method
10	Definition of Data		Lecture
35	Types of Data –Quantitative Vs Qualitative -Examples	2	lecture
05	Summary		Q & A

Session Number: 2

Session Outcome: At the end of the session, the student will be able to understand

Tools for Analyzing Data -Quantitative

Time(min)	Topic	BTL	Teaching – Learning Method
05	Revision the previous session		Questioning
25	Tools for Analyzing Data – Proprietary, Open Source -Examples	2	Classroom discussion-Interaction
20	Pros and Cons of Quantitative Tools		Classroom Discussion, Interaction
05	Summary		Q & A

Session Number: 3

Session Outcome: At the end of the session, the student will be able understand

Tools for Analyzing Data - Qualitative

Time(min)	Topic	BTL	Teaching – Learning Method
10	Revision of previous Session		Questioning
35	Examples of Qualitative Analytical tools –Pros and Cons	2	Discussion-Interaction
05	Summary		Recall

Session Number: 4

Session Outcome: At the end of the session, the student will be able to know

Levels of Measurement

Time(min)	Topic	BTL	Teaching – Learning Method
10	Revision		Questioning
35	Understanding the levels of Measurement	2	Lab – Demonstration
05	Summary		Q & A

Session Number: 5

Session Outcome: At the end of the session, the student will be able to

Research Design

Time(min)	Topic	BTL	Teaching – Learning Method
10	What is Research Design?, Significance of Research Design	2	Eliciting Information
35	Types of Research Design	3	Discussion and Interaction
05	Summary		JAM

Session Number: 6

Session Outcome: At the end of the session, the student will be able to know how to

Questionnaire /Schedule Design

Time(min)	Topic	BTL	Teaching – Learning Method
10	Difference between Questionnaire and Schedule		Interaction
35	Questionnaire/ Schedule Design	2	Discussion and Interaction
05	Summary		Q & A

Session Number: 7

Session Outcome: At the end of the session, the student will be able to

Exercise on Questionnaire Design

Time(min)	Topic	BTL	Teaching – Learning Method
10	Criterion for Designing a Questionnaire		Quiz
35	Designing a Questionnaire –Partially	2	Activity
05	Summary		Recall

Session Number: 8

Session Outcome: At the end of the session, the student will be able to

Sampling Design Process

Time(min)	Topic	BTL	Teaching – Learning Method
10	Definition and Significance of Sampling Design		Discussion and Eliciting
25	Steps in Sampling Design	2	Lecture
10	Determination of Sample Size		Activity
05	Summary		Recall

Session Number: 9

Session Outcome: At the end of the session, the student will be able to

Sampling Techniques

Time(min)	Topic	BTL	Teaching – Learning Method
05	Types of Sampling techniques		Lecture
30	Understanding the usage of Sampling techniques	2	demonstration
05	Summary		recall

Session Number: 10

Session Outcome: At the end of the session, the student will be able to

Exercise on Sampling Design

Time(min)	Topic	BTL	Teaching – Learning Method
45	Exercise on Sampling Design	2	Activity
05	Summary		Recall

Session Number: 11

Session Outcome: At the end of the session, the student will be able to

R Basics and Importing Data in R

Time(min)	Topic	BTL	Teaching – Learning Method
20	Basics of R – vector, list, dataframe, function, matrix	2	Lecture cum Practice

20	Import of Data from Excel and Notepad.	2	Demonstration
05	Summary		Recall

Session Number: 12

Session Outcome: At the end of the session, the student will be

Compute Data types in R

Time(min)	Topic	BTL	Teaching – Learning Method
45	Exercises on Data types in R	2	Evaluation & Support
05	Summary		Recall

Session Number: 13

Session Outcome: At the end of the session, the student will be

Importing Data from Questionnaire to R

Time(min)	Topic	BTL	Teaching – Learning Method
45	Exercise on Importing Data from Questionnaire	2	Evaluation & Support
05	Summary		Recall

Session Number: 14

Session Outcome: At the end of the session, the student will be able to

Business Analytics and Its Types

Time(min)	Topic	BTL	Teaching – Learning Method
10	Definition and Significance of Business Analytics		Activity
30	Types of Business Analytics	2	Lecture cum Discussion
05	Summary		Recall

Session Number: 15

Session Outcome: At the end of the session, the student will be able to

Descriptive Analytics -Measures of Central Tendency

Time(min)	Topic	BTL	Teaching – Learning Method
10	Understanding the Descriptive Statistics		Lecture
10	mean(), median(), mode()	2	Demonstration
25	Hands on Expertise		Activity
05	Summary		Recall

Session Number: 16

Session Outcome: At the end of the session, the student will be able to1

Exercise of Mean, Median and Mode

Time(min)	Topic	BTL	Teaching – Learning Method
15	Understanding of mean, median and mode		Interaction
25	Exercises on mean(), median() and mode()	2	Lab
05	Summary		Q&A

Session Number: 17

Session Outcome: At the end of the session, the student will be able to

Measures of Dispersion

Time(min)	Topic	BTL	Teaching – Learning Method
20	Measures of Dispersion –Introduction		Interaction
25	Std deviation, variance, range, Coefficient of variation	2	Demonstration
05	Summary		Q&A

Session Number: 18

Session Outcome: At the end of the session, the student will be able to

Exercise on Standard Deviation, variance and Co-efficient of variance

Time(min)	Topic	BTL	Teaching – Learning Method
10	Revision of Previous concepts		Interaction

35	Hands on Practice of Std dev, variance, co-efficient of variation.	3	lab
05	Summary		Q & A

Session Number: 19

Session Outcome: At the end of the session, the student will be able to

Measures of Skewness - skewness(), agostino.test()

Time(min)	Topic	BTL	Teaching – Learning Method
10	Conceptual discussion on Skewness		Skewness
35	Exercise for testing skewness in data –skewness, agostino test	3	Lab
05	Summary		Q & A

Session Number: 20

Session Outcome: At the end of the session, the student will be able

Measures of Kurtosis – kurtosis, anscombe test

Time(min)	Topic	BTL	Teaching – Learning Method
25	Concept discussion on Kurtosis		Lecture
20	Exercise for testing kurtosis in data –kurtosis, anscombe test	3	Lab
05	Summary		Recall

Session Number: 21

Session Outcome: At the end of the session, the student will be able to

Introduction to Hypothesis (es), Hypothesis Testing(HT), Tests of Hypothesis

Time(min)	Topic	BTL	Teaching – Learning Method
15	Hypothesis and its Types ,Errors		Lecture
15	Hypothesis Testing with Example	3	lab
15	Tests of Hypothesis		Lecture
05	Summary		Q&A

Session Number: 22

Session Outcome: At the end of the session, the student will be able to

Testing Normality

Time(min)	Topic	BTL	Teaching – Learning Method
20	Understanding the concept of Normality		Interaction
15	Shapiro test, Kolmogorov-Smirnov test, Jarque-bera test, Lillifores test	3	Demonstration
15	Exercise on Normality tests		Lab
05	Summary		Q & A

Session Number: 23

Testing Homogeneity of Variances

Time(min)	Topic	BTL	Teaching – Learning Method
15	Understand the concept of Homogeneity or Equality of Variances		Interaction
15	Demo on Bartlett, Levene & Brown – Forsythe test	3	Demonstration
15	Exercise on Equality of Variances		Lab
05	Summary		Q & A

Session Number: 24

Session Outcome: At the end of the session, the student will be able to

Parametric Tests – on sample t-test

Time(min)	Topic	BTL	Teaching – Learning Method
15	Understand t.tests		Interaction
30	Excursive for one sample test	4	lab
05	Summary		Recall

Session Number: 25

Session Outcome: At the end of the session, the student will be able to

Welch (Unequal Variances),Two-Sample(Equal variances),Paired T-test

Time(min)	Topic	BTL	Teaching – Learning Method
15	Understanding Two-sample and Paired t-test with example		Interaction
30	Exercise Two-sample and Paired T-test	4	lab
05	Summary		Interaction

Session Number: 26

Session Outcome: At the end of the session, the student will be able to

Anova –One-way, Two-way, Post-hoc tests

Time(min)	Topic	BTL	Teaching – Learning Method
05	**Revision**		Interaction
20	ANOVA and ist Types with Exercise	4	Lab & interaction
20	Students Exercise on Sample problems of ANOVA		Lab
05	Summary		Q&A

Session Number: 27

Session Outcome: At the end of the session, the student will be able to

Repeated Measures Anova and its types

Time(min)	Topic	BTL	Teaching – Learning Method
5	Revision		Interaction
20	Repeated Measures Anova and its Types With example	4	Lab & interaction
20	Students Exercise with an Example		Lab
05	Summary		Q&A

Session Number: 28

Session Outcome: At the end of the session, the student will be able to

Nominal-Binomial test, McNemar's test, -binom.test(),mcnemar.test()

Time(min)	Topic	BTL	Teaching – Learning Method
5	Revision of levels of Measurement		Interaction
20	Demo for Nominal-Binomial test, McNemar's test, -binom.test(),mcnemar.test()	4	Lab & interaction
20	Students Exercise on Nominal Tests	4	Lab
5	Summary		Q&A

Session Number: 29

Session Outcome: At the end of the session, the student will be able to

Cochran's Test(Repeated)Chi-Square test -mantelhaen.test(),chisq.test()

Time(min)	Topic	BTL	Teaching – Learning Method
5	Revision of Concepts		Interaction
20	Cochran's Test(Repeated)Chi-Square test -mantelhaen.test(),chisq.test()	**4**	Lab & interaction
20	Students' Exercise		Lab
5	Summary		Q&A

Session Number: 30

Session Outcome: At the end of the session, the student will be able

Ordinal-Wilcoxon Signed Rank test(One Sample Group)-wilcox.test()

Time(min)	Topic	BTL	Teaching – Learning Method
5	**Recap**		Interaction
20	Ordinal-Wilcoxon Signed Rank test(One Sample Group)-wilcox.test()	**4**	Lab & interaction
20	Students Exercise on ordinal tests		Lab
5	Summary		Q&A

Session Number: 31

Session Outcome: At the end of the session, the student will be able

Mann-Whitney U test or Wilcoxon Rank Sum test

Time(min)	Topic	BTL	Teaching – Learning Method
5	Recap		Interaction
20	Mann-Whitney U test, Wilcoxon Rank Sum test -wilcox.test()	**4**	Lab & interaction
20	Students' Exercise on above tests.		Lab
5	Summary		Q&A

Session Number: 32

Session Outcome: At the end of the session, the student will be able

Wilcoxon Signed Rank Test(Paired),Friedman test(Repeated)-friedman.test()

Time(min)	Topic	BTL	Teaching – Learning Method
5	**Recap**		Interaction
20	Wilcoxon Signed Rank Test(Paired),Friedman test(Repeated)- friedman.test()	**4**	Lab & interaction
20	Students' Practice with an example.		Lab
5			Q&A

Session Number: 33

Session Outcome: At the end of the session, the student will be able to

Kruskal Wallis Test -kruskal.test()

Time(min)	Topic	BTL	Teaching – Learning Method
05	Revision		Interaction
20	Kruskal Wallis Test -kruskal.test()	4	Lab & interaction
20	Students' Exercise		Lab
05	Summary		Q&A

Session Number: 34

Session Outcome: At the end of the session, the student will be able to

Parametric Tests:Karl-Pearson Co-efficient of Correlation,Linear Regression -cor(),lm()

Time(min)	Topic	BTL	Teaching – Learning Method
5	Recap		Interaction
20	Parametric Tests:Karl-Pearson Co-efficient of Correlation,Linear Regression -cor(),lm()	3	Lab & interaction
20	Students' Exercise		Lab
05	Summary		Q&A

Session Number: 35

Session Outcome: At the end of the session, the student will be able to

Multiple Regression

Time(min)	Topic	BTL	Teaching – Learning Method
5	Revision		Interaction
20	Multiple Regression	3	Lab & interaction
20	Students' Exercise		Lab
5	Summary		Q&A

Session Number: 36

Session Outcome: At the end of the session, the student will be able to

Non-parametric Test: Spearman Rank Correlation,Kendall's Tau -cor(),cor.test()

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction

20	Non-parametric Test: Spearman Rank Correlation,Kendall's Tau –cor(),cor.test()	3	Lab & interaction
20	Students' Exercise		Lab
05	Summary		Q&A

Session Number: 37

Session Outcome: At the end of the session, the student will be able to

Phi-Coefficient of Correlation, Biserial Correlation-phi(),biserial.cor()

Time(min)	Topic	BTL	Teaching – Learning Method
5	Recap		Interaction
20	Phi-Coefficient of Correlation, Biserial Correlation-phi(),biserial.cor()	3	Lab & interaction
20	Students' Exercise		Lab
5	Summary		Q&A

Session Number: 38

Session Outcome: At the end of the session, the student will be able to

Exercise on Correlation

Time(min)	Topic	BTL	Teaching – Learning Method
5	Recap		Interaction
40	Exercise on Correlation	3	Lab
5	Summary		Q& A

Session Number: 39

Session Outcome: At the end of the session, the student will be able to

Discriminant Analysis -Concept Note

Time(min)	Topic	BTL	Teaching – Learning Method
5	Recap		Interaction
20	Discriminant or Discriminate Analysis –A Concept Note	3	Lab & interaction
20	Exercise By Students		Lab
5	Summary		Q&A

Session Number: 40

Session Outcome: At the end of the session, the student will be able to

Exercise on Discriminant Analysis

Time(min)	Topic	BTL	Teaching – Learning Method
5	Recap		Interaction
25	Performing exercise on DA	3	Lab & interaction
15	Understanding MDA		Lecture
5	Summary		Q&A

Session Number: 41

Session Outcome: At the end of the session, the student will be able to

Logistic Regression -Binomial & Multinomial-glm()

Time(min)	Topic	BTL	Teaching – Learning Method
5	Recap		Interaction
40	Logistic Regression -Binomial & Multinomial-glm()	3	Lab
5	Summary		Q & A

Session Number: 42

Session Outcome: At the end of the session, the student will be able to

Exercise on Logistic Regression

Time(min)	Topic	BTL	Teaching – Learning Method
5	Recap		Interaction
40	Exercise on Logistic Regression	3	Lab
5	Summary		Q & A

Session Number: 43

Session Outcome: At the end of the session, the student will be able to

Cluster Analysis -Hierarchical and K-Means-hclust(),kmeans()

Time(min)	Topic	BTL	Teaching – Learning Method
5	Recap		Interaction
40	Cluster Analysis -Hierarchial and K-Means-hclust(),kmeans()	3	Lab
5	Summary		Q & A

Session Number: 44

Session Outcome: At the end of the session, the student will be able to

Exercise on Cluster Analysis

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Students' Exercise on Cluster Analysis	3	Lab
05	Summary		Q & A

Session Number: 45

Session Outcome: At the end of the session, the student will be able to

Time-Series Analysis

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Time-Series Analysis –ts() with Example	4	Lab
05	Summary		Q & A

Session Number: 46

Session Outcome: At the end of the session, the student will be able to

Conjoint Analysis

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Concept of Conjoint Analysis Using an Example –Conjoint()	4	Lab
05	Summary		Q & A

Session Number: 47

Session Outcome: At the end of the session, the student will be able

Exercise on Conjoint Analysis

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Students' Exercise on Conjoint Analysis Using survey method	**4**	Lab
05	Summary		Q & A

Session Number: 48

Session Outcome: At the end of the session, the student will be able

Survival Analysis

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Survival Analysis using an example	4	Lab
05	Summary		Q & A

Session Number: 49

Session Outcome: At the end of the session, the student will be able

Exercise on Survival Analysis

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Understanding Survival Analysis with an Example –Students Exercise	4	Lab
05	Summary		Q & A

Session Number: 50
Session Outcome: At the end of the session, the student will be able to
Factor Analysis – Exploratory Factor Analysis (EFA)

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Demonstrating Exploratory Factor Analysis with an Example	4	Lab
05	Summary		Q & A

Session Number: 51
Session Outcome: At the end of the session, the student will be able to
Exercise on EFA

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Students' Exercise on EFA	4	Lab
05	Summary		Q & A

Session Number: 52
Session Outcome: At the end of the session, the student will be able to
Factor Analysis – Confirmatory Factor Analysis (CFA)

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Demonstration of CFA with an Example	4	Lab
05	Summary		Q & A

Session Number: 53
Session Outcome: At the end of the session, the student will be able to
Exercise on CFA

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Students' Exercise on CFA	4	Lab
05	Summary		Q & A

Session Number: 54
Session Outcome: At the end of the session, the student will be able to
A brief Understanding of Prescriptive Analysis

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	A brief understanding of Prescriptive Analysis	4	Lab
05	Summary		Q & A

Session Number: 55
Session Outcome: At the end of the session, the student will be able to
Introduction to Graphics in R

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Exercises on Graphics in R	4	Lab
05	Summary		Q & A

Session Number: 56
Session Outcome: At the end of the session, the student will be able to
Making a Mini-Project

Time(min)	Topic	BTL	Teaching – Learning Method
05	Introduction		Interaction
40	Making a Mini-Project	4	Lab
05	Review		Q & A

Session Number: 57

Session Outcome: At the end of the session, the student will be able to

Making a Mini-Project

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Making a Mini-Project	4	Lab
05	Review		Q & A

Session Number: 58

Session Outcome: At the end of the session, the student will be able to

Making a Mini-Project

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Making a Mini-Project –Presentations	4	Lab
05	Review		Q & A

Session Number: 59

Session Outcome: At the end of the session, the student will be able to

Making a Mini-Project

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Making a Mini-Project – Presentations	4	Lab
05	Review		Q & A

Session Number: 60

Session Outcome: At the end of the session, the student will be able to

Making a Mini-Project

Time(min)	Topic	BTL	Teaching – Learning Method
05	Recap		Interaction
40	Making a Mini-Project – Presentations	4	Lab
05	Review		Q & A

EVALUATION PLAN

Evaluation Component	Weightage / Marks	Date	Duration (Hours)	CO 1			CO 2			CO 3			CO 4		
COI Number				1	2	3	1	2	3	1	2	3	1	2	3
BTL				2	2	2	2	4	4	2	4	4	2	4	4
Test 1 Theory	Weightage 11%	30th Jan to 2nd Feb 2018	90 min	1	1	2	2	2	3						
	Max Marks 20			2	2	3	4	4	5						
Test 2 Theory	Weightage 11%	5th to 8th March 2018	90 min							3	3	5			
	Max Marks 20									6	6	8			
Test 3 Theory	Weightage 11%	3rd to 6th April 2018	90 min										3	3	5
	Max Marks 20												6	6	8
Internal Lab (Record)	Weightage 7%	7th April 2018	30 min	1			2			2			2		
	Max Marks 10			2			2			2			4		
Active Learning (Mini-Project)	Weightage (5%)	Continuous Evaluation		5			5			5			5		
	Max Marks 20			----------> 5 marks <----------											
Attendance	Weight age (5%)	Equal weight age for all the lecture sessions (5%)													
	Max Marks 5														
Lab External	Weightage 16%	13th April 2017	60 min	1	1	1	1	1	1	1	2	2	2	2	1
	Max Marks 25			1	1	1	2	2	2	3	3	3	3	3	1
Semester End Exam	Weightage 34%	25th April 2017	180 min	2	2	2	3	3	3	3	3	3	3	4	3
	Max Marks 50			2	5	5	3	5	3	2	5	5	3	10	2
	Question Number			1(a)	2(a)	3	1(b)	2(b)	5	1(c)	4	5	1(d,e)	6,7	8

Signature of Course Coordinator

Signature of Research Group Head

Hari Kiran Vege,
Assoc.Dean-TLP

Recommended by HEAD OF DEPARTMENT:
(Dr.M Kishore Babu)

for **Approved By: DEAN-ACADEMICS**
(Sign with Office Seal)