INSTITUTE	**FACULTY OF COMPUTER APPLICATIONS**
PROGRAM	**MASTER OF SCIENCE (DATA SCIENCE)**
SEMESTER	**1**
COURSE TITLE	**STATISTICAL METHODS**
COURSE CODE	**05MD0101**
COURSE CREDITS	**5**

Objective:

1. To understand a standard set of statistical and graphical techniques which are useful in analyzing business-related data.
2. To apply appropriate measure of central values and variability to analyze data.
3. To understand the basic concepts of probability and its applications in data science.
4. To apply various Probability Distributions in analyzing Data and solving Decision-Making Problems.
5. To apply the appropriate Sampling Technique in Choosing a Representative Sample from a Population and Examine the Population Parameters using Estimation Techniques.

Course Outcomes: After completion of this course, student will be able to:

1. Develop expertise in a standard set of statistical and graphical techniques useful in analyzing business-related data.
2. Apply appropriate measure of central values and variability to analyze data.
3. Understand the mathematical basis of probability and its applications in various fields of real life.
4. Apply various Probability Distributions in analyzing Data and solving Decision-Making Problems.
5. Apply the appropriate Sampling Technique in Choosing a Representative Sample from a Population and Examine the Population Parameters using Estimation Techniques.

Pre-requisite of course:NONE

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	2	50	30	20	25	25

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Contents : Unit	Topics	Contact Hours
1	**Descriptive Statistics** Definition, Functions, and Applications of Statistics, Types of Data and Scale of Measurement, Descriptive Statistics and Inferential Statistics , Population and Sample, Graphical Presentation of Numerical and Categorical Data (bar graph, pie charts, histogram, ogive), Arithmetic Mean, Mode, Median and Percentiles, Variance and Standard Deviation and Coefficient of Variation (CV) of Ungrouped Data and Frequency Distribution, Exploratory Data Analysis using Five Number, Summary and Box-plot, Examples, Revision, Test-1	12
2	**Theory of Probability** Counting rules, Permutations and Combinations, Basic Terminology like Random Experiment, Sample Space, Events and Their Probabilities, Some basic examples, Addition Rule and Multiplication Rule of Probability, Examples based on Addition Multiplication rule of probability, Bayes Rule, Examples based on Bayes rule, Naïve Bayes Classification for Three events with Categorical Values, Applications, Mixed examples, Activity: MCQ Quiz	12
3	**Discrete Probability Distribution** Random Variables and Mathematical Expectation (Mean and Variance) of Discrete and Continuous Variables, Binomial Distribution, Poisson Distribution, Hypergeometric Distribution, Applications, Mixed examples, Revision, Activity: Lecture by Students	8
4	**Continuous Probability Distributions** Uniform Distribution - 1, Uniform Distribution – 2, Normal Distribution -1, Normal Distribution -2, Exponential Distribution -1, Exponential Distribution -2, Practice Examples, Applications, Revision, Class Test 2	10
5	**Sampling Distributions** Population, Parameter, Sample, Statistic, Types of Sampling Methods – Simple Random Sampling (SRS), Stratified Sampling and Cluster Sampling, Point Estimation, Sampling Distribution of Sample Mean, Relationship between Sample Size and Sampling Distribution, Revision, Class Test 3	8
Total Hours		**50**

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**1. PRACTICAL LIST** PRACTICAL NO 1 FROM PRACTICAL LIST., PRACTICAL NO 2 FROM PRACTICAL LIST., PRACTICAL NO 3 FROM PRACTICAL LIST., PRACTICAL NO 4 FROM PRACTICAL LIST., PRACTICAL NO 5 FROM PRACTICAL LIST., PRACTICAL NO 6 FROM PRACTICAL LIST., PRACTICAL NO 7 FROM PRACTICAL LIST., PRACTICAL NO 8 FROM PRACTICAL LIST., PRACTICAL NO 9 FROM PRACTICAL LIST., PRACTICAL NO 10 FROM PRACTICAL LIST., PRACTICAL NO 11 FROM PRACTICAL LIST., PRACTICAL NO 12 FROM PRACTICAL LIST., PRACTICAL NO 13 FROM PRACTICAL LIST., PRACTICAL NO 14 FROM PRACTICAL LIST., PRACTICAL NO 15 FROM PRACTICAL LIST., PRACTICAL NO 16 FROM PRACTICAL LIST.	16
Total Hours		**16**

Textbook :

1 Statistics for Business and Economics , Anderson et al, Cengage, 10Ed

2 Statistical Methods, S P Gupta, Sultan Chand and Sons, LaEd

References:

1 Practical Statistics for Data Scientist , Practical Statistics for Data Scientist , Peter Bruce and Andrew Bruce, O'RELLY, 2017

2 Introduction to Statistics and Data Analysis, Introduction to Statistics and Data Analysis, Christian Heumann, Shalabh Sinha et al, Springer, 2017

3 Fundamentals of Mathematical Statistics, Fundamentals of Mathematical Statistics, S C Gupta and V K Kapoor, Sultan Chand and Sons, 2020

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
10.00	10.00	25.00	25.00	10.00	10.00

Instructional Method:

1 Board Work

2 PPT

3 Videos

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Supplementary Resources:

1 https://www.coursera.org/courses?query=statistical%20analysis

2 https://www.edx.org/learn/statistics

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