



University of Rajasthan Jaipur

SYLLABUS

(Three/Four Year Under Graduate Programme in Science)

I & II Semester

Examination-2023-24

As per NEP – 2020

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Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

DEPARTMENT OF STATISTICS
(FACULTY OF SCIENCE AND SOCIAL SCIENCE)



UNIVERSITY OF RAJASTHAN
JAIPUR

SYLLABUS

(As per the University Guidelines under NEP-2020)

For

UG0803-B.Sc. (Maths Group) / UG9101-B.A.
First Year : Semester I & II
Subject: STATISTICS (Major/Minor)
2023-2024

Course Code	Course Title	Course Type	Semester	Paper Title	Paper Code	Credit			Classes/Wk			Total Credit	Total Teaching Hours		Exam Duration	
						L	T	P	L	T	P		Theory	Practical	Theory	Practical
UG0803/ UG9101	Statistics	Major/ Minor	I	Descriptive Statistics	STA-51T-101	4	0	2	4	0	4	6	60	60	3 Hours	4 hours
			II	Probability Theory	STA-51P-102	4	0	2	4	0	4	6	60	60	3 Hours	4 hours

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2024

Name of University	University of Rajasthan, Jaipur
Name of Faculty	<u>Science</u> : UG0803-B. Sc. (Maths Group) <u>Social Science</u> : UG9101-B.A.
Name of Discipline	Statistics
Combination with Other Disciplines	<u>Science Faculty</u> : Mathematics, Physics, Geography, Economics, Geology, Psychology, Chemistry. <u>Arts Faculty</u> : Mathematics, Geography, Economics, Psychology.

SEMESTER-WISE PAPER TITLES WITH DETAILS

UG0803-B. Sc. (Maths Group)								
Statistics								
#	Level	Semester	Type	Title	Credits			
					L	T	P	Total
1.	5	I	MJR/MNR	STA-51T-101- Descriptive Statistics	4	0	0	4
2.	5	I	MJR/MNR	STA-51P-102- Statistics Lab-1	0	0	2	2
3.	5	II	MJR/MNR	STA-52T-103- Probability Theory	4	0	0	4
4.	5	II	MJR/MNR	STA-52P-104- Statistics Lab-2	0	0	2	2

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Semester - I

Subject: Statistics

Theory Paper: STA-51T-101 (Descriptive Statistics)

Also common with Subject- AST-51T-101 (Applied Statistics)

Objectives:

Overall, the objectives of descriptive statistics are to simplify and summarize complex data, reveal patterns and relationships, and provide a foundation for further analysis and interpretation. Some of the main objectives of descriptive statistics include:

1. To provide a concise summary of data through various statistical measures .
2. To develop the ability for visually presenting data through graphs, charts, and tables.
3. To have an ability of organizing data in a meaningful way.
4. To understand various characteristics within data viz. shape, spread, and central values, make comparisons, draw conclusions and comments on findings.
5. To explore relationships between variables.

Detailed Syllabus

Unit-I

Types and Presentation of Data: Concept of statistical population and data. Qualitative & Quantitative data, Discrete & Continuous Data, Frequency & Non-Frequency data, Geographical & Chronological Data. Primary Data and Secondary data. Tabular presentation of data-Construction of tables, Types of tables. Frequency distribution –Discrete, grouped, continuous and cumulative. Graphical presentation of data- Histogram, frequency polygon, frequency curve, ogives and Box-plot.

Unit-II

Statistical analysis of Quantitative Data: Different types of scales-nominal, ordinal, intervals and ratio, Univariate Data-Measures of central tendency, dispersion, moments and its computation from data. Absolute and relative measures of skewness and kurtosis based on quintiles and moments. Sheppard's Correction for moments (without Proof).

Unit-III

Curve fitting and Theory of Attributes: Principle of least squares, fitting of straight line, parabola and curves reducible to straight line(exponential and power curve). Class frequency, order of a class frequency, ultimate class frequency, consistency of data, independence and association of attributes. Various measures of association.

Unit-IV

Statistical Analysis of Bivariate Data: Correlation analysis-scatter diagram, Karl-Pearson's coefficient of correlation and its properties. Correlation of bivariate frequency distribution, Spearman rank correlation. Regression analysis-Fitting of regression lines, regression coefficients and their properties.

References:

1. Bhatt B.R., Srivenkatramanna T. and Rao Madhava K.S. (1997): Statistics- A Beginner's Text, Vol-II, New Age Intl.(P) Ltd.
2. Croxton F.E., Cowden D.J. and Kelin S (1973) : Applied General Statistics ,PHI
3. Goon A.M.,Gupta M.K.,Das Gupta B. (1991) : Fundamentals of Statistics , Vol-I, World Press, Kolkata.
4. Kapoor V.K. & Gupta S.C.: Fundamentals of Mathematical Statistics, Sultan Chand and Sons, N. Delhi
5. Gupta S.P. : Statistical Methods , Sultan Chand and Sons, New Delhi
6. Elhance D.N. : Fundamentals of Statistics
7. Nagar K.N. : Sankhyaki Ke Mool Tatva (Hindi), Minaakshi Prakashan Mandir , Meerut.

Programme Specific Outcome (PSOs') of the Paper: Descriptive Statistics (STA-51T-101):

Completing a course in descriptive statistics can provide several outcomes and benefits. Here are some common outcomes that you can expect:

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1. Student will gain a comprehensive knowledge and understanding of different types of data, data collection methods, and data measurement scales.
 2. Student will acquire skills in analyzing and interpreting data using various descriptive statistical techniques.
 3. Student will learn how to present data visually through graphs, charts, and tables.
 4. Solving the complex problem of the level of Descriptive statistics, will provide the ability to interpret and draw meaningful conclusions from data.
 5. Descriptive statistics can enhance students' analytical reasoning with decision-making skills after analyzing and evaluating statistical data.
 6. Completing a course in descriptive statistics, student will be equipped with the skills necessary to conduct data analysis for research projects, reports, and academic studies during practical hours.
 7. Descriptive statistics serves as the foundation for more advanced statistical techniques and analysis. Once the student has a solid understanding of descriptive statistics, he/she can build upon this knowledge to explore inferential statistics, hypothesis testing, regression analysis, and other advanced statistical methods.
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**Practical Paper: STA-51P-102
(Statistics Lab-1)**

Objectives:

Overall, the objectives of laboratory work in descriptive statistics, are to simplify and summarize complex data, reveal patterns and relationships, and provide a foundation for further analysis and interpretation on various types of data sets. Some of the main objectives of descriptive statistics include:

1. To prepare and provide a concise summary of data through various statistical measures.
 2. To prepare presenting data through graphs, charts, and tables for various types of data sets.
 3. To have an ability of organizing data in a meaningful way for various types of data sets.
 4. To predict various characteristics within data viz. shape, spread, and central values, make comparisons, draw conclusions and comments on findings.
 5. To find and provide a mathematical relationship (Basic Mathematical modeling) for bivariate data sets.
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Detailed Syllabus

1. Presentation of data through Frequency Table and Graphs.
 2. Calculation of Measures of Central tendency, Dispersion, Moments, Skewness and Kurtosis.
 3. Computation of Correlation Coefficient of bivariate data and bivariate frequency distribution table
 4. Regression Analysis for Bivariate data.
 5. Fitting of curves by least square method.
 6. Computation of Spearman's Rank Correlation .
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Programme Specific Outcome (PSOs) of the Paper: Statistics Lab-1(STA-51P-102)

Completing a course in descriptive statistics can provide several outcomes and benefits. Here are some common outcomes that you can expect:

1. Student will be able to gain a comprehensive knowledge and understanding of different types of data, data collection methods, and data measurement scales.
 2. Student will be able to acquire skills in analyzing and interpreting data using various descriptive statistical techniques.
 3. Student will be able to learn how to present data visually through graphs, charts, and tables.
 4. Solving the complex problem of the level of Descriptive statistics will provide the ability to interpret and draw meaningful conclusions from data.
 5. Student will be able to gain the analytical reasoning with decision-making skills after analyzing and evaluating statistical data.
 6. Students will gain the solid understanding of descriptive statistics. As a result they will be able to explore inferential statistics, hypothesis testing, regression analysis, and other advanced statistical methods in future.
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-Statistics-

Semester - II

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Semester - II Subject: Statistics

Theory Paper: STA-52T-103 (Probability Theory)

Objectives:

The objectives of probability theory are to provide a fundamental understanding of probability concepts and principles to develop a solid understanding of basic probability concepts, provide tools for analyzing uncertain events, and lay the groundwork for further study in probability and statistics. Some of the main objectives of elementary probability theory include:

1. Probability theory aims to provide a clear definition of probability and its basic properties. It introduces the concept of probability as a measure of the likelihood of events occurring.
2. The primary objective is to develop the skills to calculate probabilities for various types of events.
3. To develop combinatorial skills for counting and arranging objects, which are essential in calculating probabilities of events.
4. Probability theory covers fundamental probability laws including Bayes' theorem.
5. The course aims to introduce basic probability distributions, including the discrete probability distributions and continuous probability distributions.
6. To develop problem-solving skills in probability. By working on a variety of probability problems and exercises.

Detailed Syllabus

Unit -I

Important Concepts of Probability: Random Experiment, Trial, Events and their types. Definitions of Probability . Sample point and Sample Space . Axiomatic Approach of Probability and its properties. Addition and Multiplication theorems of probability. Conditional Probability. Bayes Theorem and its Applications. Random Variable: Definition with illustrations, Types of Random Variables. Probability Mass Function, Probability Density Function. Distribution Function and its properties

Unit-II

Joint Probability Distribution, Marginal and Conditional Probability Distributions and density functions (Continuous and Discrete Cases). Chebychev's Inequality and its applications. Mathematical Expectation: Expectation of a random Variable and its simple properties. Addition and Multiplication Theorems of Expectation . Conditional Expectation. Definition of Variance and Covariance and properties. Raw and Central Moments, Moment Generating Function and their properties,

Unit-III

Univariate Discrete Distributions and their properties: Bernoulli Distribution, Binomial Distribution , Poisson Distribution , Geometric Distribution . Idea of Hyper-geometric and Negative Binomial Distribution.

Unit-IV

Univariate Continuous Distributions and their properties - Rectangular Distribution , Normal Distribution Idea of exponential Distribution, Cauchy Distribution, Gamma Distribution, Beta Distribution.

References:

1. Bhatt B.R., Srivenkatramanna T. and Rao Madhava K.S. (1997): Statistics- A Beginner's Text, Vol-II, New Age Intl.(P) Ltd.
2. Goon A.M.,Gupta M.K.,Das Gupta B. (1991) : Fundamentals of Statistics , Vol-II, World Press, Kolkata.
3. Kapoor V.K. & Gupta S.C. : Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi
4. Mood A.M. Graybill F.A. Bose D.C. (1974) : Introduction to the theory of statistics, McGraw Hill

Additional References:

1. Hoel P.G. (1971) : An introduction of Mathematical Statistics , Asia Publishing House..
2. David S. (1996): Elementary Probability., Oxford Press.
3. Cooke, Cramer and Clarke : Basic Statistical Computing , Chapman and Hall.
4. Meyer P.L.(1970):Introductory Probability and statistical Applications. Addison Wesley.

Programme Specific Outcome (PSOs) of the Paper: Probability Theory (STA-52T-103)

Completing a course in elementary probability theory can provide several outcomes and benefits. Here are some common outcomes that you can expect:

1. Student will develop comprehensive knowledge of fundamental probability concepts .
 2. It involves combinatorics, which develops skills in counting and arranging objects.
 3. This includes identifying sample spaces, defining events, and using probability distributions to model random phenomena.
 4. Student will acquire skills in solving the analytical probability problems for different types of events.
 5. It will enhance analytical thinking skills by training to analyze problems, identify relevant information, and apply appropriate probability concepts and techniques to arrive at solutions.
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**Practical Paper : STA-52P-104
(Statistics Lab-2)**

Objectives:

1. It introduces the applications of basic concept of probability outcomes, sample space, various form of events and their characteristics.
 2. To develop combinatorial skills for counting and arranging objects, which are essential in calculating probabilities of events.
 3. To provide the practical training of application of fundamental probability laws including Bayes' theorem.
 4. The course aims to introduce basic probability distributions, including the discrete probability distributions and continuous probability distributions.
 5. To develop problem-solving skills in probability. By working on a variety of probability problems and exercises.
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Detailed Syllabus

1. Experiments based on Coin Toss
 2. Experiments based on Deck of Cards
 3. Experiments based on Dice Rolling
 4. Exercise of mathematical expectation and Finding Mean, Variance, Skewness, Kurtosis of Univariate probability distributions.
 5. Fitting standard univariate discrete and continuous probability distributions.
 6. Various computations based on Binomial, Poisson and Normal Distribution
 7. Computation for Marginal and Conditional Distributions.
 8. Generation of Random Numbers and computations based on Binomial, Poisson and Normal Distribution
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Programme Specific Outcome (PSOs) of the Paper : Statistics Lab-2 (STA-52P-104)

Completing a course in elementary probability laboratory work, can provide several outcomes and benefits. Here are some common outcomes that you can expect:

1. The Laboratory exercise will provide a the practical knowledge of probability and its basic properties.
 2. The students will gain the skills to calculate probabilities for various types of events.
 3. Practical training of data will provide the combinatorial skills for counting and arranging objects, which are essential in calculating probabilities of events.
 4. The Lab exercise will covers the applications of fundamental probability laws including Bayes' theorem.
 5. Student will understand the appropriate application of probability distributions.
 6. Students will gain the knowledge to develop problem-solving skills in probability while working on a variety of probability problems and exercises.
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