

**DEPARTMENT OF STATISTICS
UNIVERSITY OF KASHMIR, SRINAGAR**

**SEMESTER 1st
MAJOR COURSE**

STS123J: DESCRIPTIVE STATISTICS

Credits: 4+2

Course Objectives:

The learning objectives include:

- To understand the Statistics, its scope and importance in various fields .
- To understand the Knowledge of methods for summarizing data sets, including common graphical tools (such as boxplots, histograms and stem plots). Interpret histograms and boxplots.

Course Outcomes:

After completing this course, a student will have:

- Knowledge of Statistics, its scope and importance in various fields
- Ability to understand concepts of sample vs. population and difference between different types of data.
- Knowledge of methods for summarizing data sets, including common graphical tools (such as boxplots, histograms and stem plots). Interpret histograms and boxplots.
- Ability to describe data with measures of central tendency and measures of dispersion

THEORY: 04 CREDITS

UNIT I

Introduction to Statistics: Meaning, origin, definition, limitations and applications of Statistics. Primary and secondary data, different methods of collection of primary data with merits and demerits. Sources of secondary data. Classification: meaning, objectives, types of classifications, Formation of discrete and continuous frequency distributions.

UNIT II

Diagrammatic and Graphical representation of Data: Diagrams: Meaning, importance of diagrams and general rules of construction. Types of Diagrams - simple, multiple, component, percentage bar diagrams and pie diagrams with simple illustrations.

Graphs: Types of Graphs - Histogram, frequency Polygon, frequency curve and Ogives, simple problems, location of mode, median and partition values from the graphs. Difference between diagrams and graphs.

UNIT III

Central Tendency: Meaning of central tendency and essentials of a good measure of central tendency: Arithmetic mean, Median, Mode, Geometric mean and Harmonic mean - definition, merits and demerits and their important Properties. Empirical relation between mean median and mode. Problems on both grouped and ungrouped data of all the measures.

UNIT IV

Dispersion: Meaning of measures of dispersion. Essentials of a good measure of dispersion, absolute and relative measures of dispersion. Range, Quartile deviation, Mean deviation and standard deviation with relative measures - definition, merits and demerits and their important properties. Properties of Standard deviation, simple problems on ungrouped and grouped data.

**DEPARTMENT OF STATISTICS
UNIVERSITY OF KASHMIR, SRINAGAR**

PRACTICAL: 02 CREDITS

Preferably Computers Using Excel

- I. Problems based on graphical representation of data by Histogram, Frequency polygons,
- II. Problems based on graphical representation of data by Ogives, Stem and Leaf Plot, Box Plot.
- III. Problems based on calculation of Measures of Central Tendency.
- IV. Problems based on calculation of Measures of Dispersion.

BOOKS RECOMMENDED:

1. Gupta S. C. Fundamentals of Statistics, Himalaya Publishing House, Bombay
2. Mukhopadhyaya, P. Applied Statistics, New Central Book Agency (P) Ltd., Calcutta
3. Gupta S P. and V K Kapoor Fundamentals of Mathematical Statistics, Sultan Chand, New Delhi
4. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2013). Fundamental of Statistics, Vol I, World Press, Kolkata.
5. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamental of Statistics, Vol II, World Press, Kolkata.
6. Gupta, S.C. and Kapoor, V.K. (2000). Fundamentals of Mathematical Statistics (10th ed.), Sultan Chand and Sons.
7. Hanagal, D. D. (2009). Introduction to Applied Statistics: A Non-Calculus Based Approach. Narosa Publishing Comp. New Delhi.
8. Miller, I. and Miller, M. (2006). John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
9. Mood, A.M. Graybill, F.A. and Boes, D.C. (2011). Introduction to the Theory of Statistics, 3rd Edn., Tata McGraw-Hill Pub. Co. Ltd.
10. Weatherburn, C.E. (1961). A First Course in Mathematical Statistics, The English Lang. Book Society and Cambridge Univ. Press.
11. Paratha Sarathi Bishnu and Vandana Bhattacharjee (2019): Data Analysis: Using Statistics and Probability with R Language, PHI Learning Pvt. Ltd. New Delhi.

**DEPARTMENT OF STATISTICS
UNIVERSITY OF KASHMIR, SRINAGAR**

**SEMESTER 1st
MINOR COURSE**

STS123N: DESCRIPTIVE STATISTICS

Credits: 4+2

Course Objectives:

The learning objectives include:

- To understand the Statistics, its scope and importance in various fields .
- To understand the Knowledge of methods for summarizing data sets, including common graphical tools (such as boxplots, histograms and stem plots). Interpret histograms and boxplots.

Course Outcomes:

After completing this course, a student will have:

- Knowledge of Statistics, its scope and importance in various fields
- Ability to understand concepts of sample vs. population and difference between different types of data.
- Knowledge of methods for summarizing data sets, including common graphical tools (such as boxplots, histograms and stem plots). Interpret histograms and boxplots.
- Ability to describe data with measures of central tendency and measures of dispersion

THEORY: 04 CREDITS

UNIT I

Introduction to Statistics: Meaning, origin, definition, limitations and applications of Statistics. Primary and secondary data, different methods of collection of primary data with merits and demerits. Sources of secondary data. Classification: meaning, objectives, types of classifications, Formation of discrete and continuous frequency distributions.

UNIT II

Diagrammatic and Graphical representation of Data: Diagrams: Meaning, importance of diagrams and general rules of construction. Types of Diagrams - simple, multiple, component, percentage bar diagrams and pie diagrams with simple illustrations.

Graphs: Types of Graphs - Histogram, frequency Polygon, frequency curve and Ogives, simple problems, location of mode, median and partition values from the graphs. Difference between diagrams and graphs.

UNIT III

Central Tendency: Meaning of central tendency and essentials of a good measure of central tendency: Arithmetic mean, Median, Mode, Geometric mean and Harmonic mean - definition, merits and demerits and their important Properties. Empirical relation between mean median and mode. Problems on both grouped and ungrouped data of all the measures.

UNIT IV

Dispersion: Meaning of measures of dispersion. Essentials of a good measure of dispersion, absolute and relative measures of dispersion. Range, Quartile deviation, Mean deviation and standard deviation with relative measures - definition, merits and demerits and their important properties. Properties of Standard deviation, simple problems on ungrouped and grouped data.

**DEPARTMENT OF STATISTICS
UNIVERSITY OF KASHMIR, SRINAGAR**

PRACTICAL: 02 CREDITS

Preferably Computers Using Excel

- I. Problems based on graphical representation of data by Histogram, Frequency polygons,
- II. Problems based on graphical representation of data by Ogives, Stem and Leaf Plot, Box Plot.
- III. Problems based on calculation of Measures of Central Tendency.
- IV. Problems based on calculation of Measures of Dispersion.

BOOKS RECOMMENDED:

1. Gupta S. C. Fundamentals of Statistics, Himalaya Publishing House, Bombay
2. Mukhopadhyaya, P. Applied Statistics, New Central Book Agency (P) Ltd., Calcutta
3. Gupta S P. and V K Kapoor Fundamentals of Mathematical Statistics, Sultan Chand, New Delhi
4. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2013). Fundamental of Statistics, Vol I, World Press, Kolkata.
5. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamental of Statistics, Vol II, World Press, Kolkata.
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8. Miller, I. and Miller, M. (2006). John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
9. Mood, A.M., Graybill, F.A. and Boes, D.C. (2011). Introduction to the Theory of Statistics, 3rd Edn., Tata McGraw-Hill Pub. Co. Ltd.
10. Weatherburn, C.E. (1961). A First Course in Mathematical Statistics, The English Lang. Book Society and Cambridge Univ. Press.
11. Paratha Sarathi Bishnu and Vandana Bhattacharjee (2019): Data Analysis: Using Statistics and Probability with R Language, PHI Learning Pvt. Ltd. New Delhi.

DEPARTMENT OF STATISTICS
UNIVERSITY OF KASHMIR, SRINAGAR
SEMESTER 1st to 2nd
MULTIDISCIPLINARY COURSE

STS023I: STATISTICS (INTRODUCTORY STATISTICS)

Credits: 3+0

Course Objectives:

The learning objectives include:

- To understand the Statistics, its scope and importance in various fields .
- To understand the Knowledge of methods for summarizing data sets, including common graphical tools (such as boxplots, histograms and stem plots).
- To understand the concept of moments with their inter-relations with properties.
- To have a clear understanding of when to apply various descriptive statistics and correlation and Regression Analysis for the real life data sets and draw appropriate conclusions from the analysis.

Course Outcomes:

After completing this course, a student will have:

To understand the Statistics, its scope and importance in various fields.

- To understand the Knowledge of methods for summarizing data sets, including common graphical tools (such as boxplots, histograms and stem plots).
- Ability to understand the concept of moments with their inter-relations with properties.
- Ability to understand the concept of Measures of skewness and kurtosis.
- Ability to understand the correlation and its methods.

THEORY (3 CREDITS)

UNIT-I

Introduction to Statistics and Basic Concepts: Meaning, origin, definition, functions, limitations and applications of Statistics. Primary and secondary data, different methods of collection of primary data with merits and demerits. Sources of secondary data. Classification: meaning, objectives, types of classifications- Chronological, Geographical, Qualitative and Quantitative classifications with illustrations. Formation of discrete and continuous frequency distributions. Tabulation: meaning, rules of tabulation, format of a statistical table and its parts. Diagrammatic and Graphical representation of Data: Diagrams, general rules of construction of diagrams. Types of Diagrams with simple illustrations. Graphs: Types of Graphs - Histogram, frequency Polygon, frequency curve and Ogives, simple problems, location of mode, median and partition values from the graphs. Difference between diagrams and graphs.

UNIT-II: Measures of Central Tendency:

Meaning of central tendency and essentials of a good measure of central tendency. Types of measures of central tendency: Arithmetic mean, Median, Mode, Geometric mean and Harmonic mean - definition, merits and demerits. Properties of arithmetic mean. Problems on both grouped and ungrouped data for all the measures.

UNIT-III: Measures of Dispersion: Meaning and objectives of measures of dispersion. Essentials of a good measure of dispersion, absolute and relative measures of dispersion. Types of measures of dispersion- Range, Quartile deviation, Mean deviation and standard deviation with relative measures - definition, merits and demerits. Simple problems on ungrouped and grouped data.

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UNIVERSITY OF KASHMIR, SRINAGAR**

BOOKS RECOMMENDED:

1. Gupta S. C. Fundamentals of Statistics, Himalaya Publishing House, Bombay
2. Mukhopadhyaya, P. Applied Statistics, New Central Book Agency (P) Ltd., Calcutta
3. Gupta S P. and V K Kapoor Fundamentals of Mathematical Statistics, Sultan Chand, New Delhi
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7. Hanagal, D. D. (2009). Introduction to Applied Statistics: A Non-Calculus Based Approach. Narosa Publishing Comp. New Delhi.
8. Miller, I. and Miller, M. (2006). John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.

**DEPARTMENT OF STATISTICS
UNIVERSITY OF KASHMIR, SRINAGAR**

**SEMESTER 1ST
SKILL COURSE (NON-NSQF)**

STS123S: Visualization of Data

Credits: 2+2

Course Objectives:

The objective of the course is to express the students to the real-life skill for statistical computing analysis and graphical interpretation using software skill. Hands on training on the following problem can be done on any one of the statistical software/excel to enhance data analysis skill.

Course Outcomes:

After completing this course, a student will have:

- Knowledge of Statistics, its scope and importance in various fields
- Ability to understand concepts of sample vs. population and difference between different types of data.
- Knowledge of methods for summarizing data sets, including common graphical tools (such as boxplots, histograms and stem plots). Interpret histograms and boxplots.
- Ability to describe data with measures of central tendency and measures of dispersion

THEORY (2 CREDITS)

UNIT-I

Introduction to Computers: Historical evolution of Computers. Generations of Computers. Classification of Computers, Applications of Computers, Computer Memory: Primary and Secondary Memory, Hardware: CPU, I/O Devices.

Primary and secondary data, different methods of collection of primary data with merits and demerits. Sources of secondary data. Classification: meaning, objectives, types of classifications. Formation of discrete and continuous frequency distributions.

UNIT II:

Diagrammatic and Graphical representation of Data: Diagrams: Meaning, importance of diagrams and general rules of construction of diagrams. Types of Diagrams - simple, multiple, component, percentage bar diagrams and pie diagrams with simple illustrations.

Graphs: Types of Graphs - Histogram, frequency Polygon, frequency curve and Ogives, simple problems, location of mode, median and partition values from the graphs. Difference between diagrams and graphs.

PRACTICALS (02 CREDITS)

Preferably Computers Using Excel/Software

- I. Problems based on graphical representation of data by bar diagrams and pie diagrams
- II. Problems based on graphical representation of data by Histogram
- III. Problems based on graphical representation of data by Frequency polygons,
- IV. Problems based on graphical representation of data by frequency curves
- V. Problems based on graphical representation of data by Ogives,

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BOOKS RECOMMENDED:

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3. Gupta S P. and V K Kapoor Fundamentals of Mathematical Statistics, Sultan Chand, New Delhi
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**DEPARTMENT OF STATISTICS
UNIVERSITY OF KASHMIR, SRINAGAR**

**SEMESTER 2nd
MAJOR COURSE**

STS223J: CORRELATION AND REGRESSION ANALYSIS

Credits: 4+2

Course Objectives:

The learning objectives include:

- To understand the concept of moments with their inter-relations with properties.
- To have a clear understanding of when to apply various descriptive statistics and correlation and Regression Analysis for the real life data sets and draw appropriate conclusions from the analysis.

Course Outcomes:

After completing this course, a student will have:

- Ability to understand the concept of moments with their inter-relations with properties.
- Ability to understand the concept of Measures of skewness and kurtosis.
- Ability to understand the correlation and its methods.

THEORY: 04 CREDITS

UNIT I

Partition Values, Moments-Meaning and their inter-relations with properties- problems on ungrouped and grouped data, factorial moments, Shephard's correction for moments (without Proof). Relationship between raw and central moments.

UNIT II

Skewness and Kurtosis: Definition, objectives and types of skewness, explanation of positive and negative skewness. Measure of skewness based on moment.

Skewness- Measures of skewness- Karl Pearson's coefficient of skewness and Bowley's coefficient of skewness. Simple problems. Kurtosis: Definition and types of kurtosis. Explanation of types of kurtosis. Difference between skewness and kurtosis.

UNIT III

Bivariate Data: Concept of correlation and its types. Scatter diagram method and product moment method of studying correlation. Properties of a correlation coefficient (limits of the correlation coefficient, effect of change of origin and scale). Concept of rank correlation, derivation of Spearman's rank correlation coefficient and its limits.

UNIT IV

Regression: Regression curve and regression equation, linear & nonlinear regression, lines of regression, regression coefficients and properties, angle between two lines of regression. Mean value, regression coefficients, correlation coefficient from two lines of regression, correlation vs regression. Principle of least squares and fitting of polynomials and exponential curves.

**DEPARTMENT OF STATISTICS
UNIVERSITY OF KASHMIR, SRINAGAR**

PRACTICAL: 02 CREDITS Preferably Computers Using Excel

- I. Practicals based on calculation of Moments.
- II. Practicals based on Measures of Skewness .
- III. Practicals based on Kurtosis.
- IV. Practicals based Correlation on bivariate data.
- V. Practicals based on Regression on bivariate data.

BOOKS RECOMMENDED:

1. Gupta S. C. Fundamentals of Statistics, Himalaya Publishing House, Bombay
2. Mukhopadhyaya, P. Applied Statistics, New Central Book Agency (P) Ltd., Calcutta
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**DEPARTMENT OF STATISTICS
UNIVERSITY OF KASHMIR, SRINAGAR
SEMESTER 2nd
MINOR COURSE**

STS223N: CORRELATION AND REGRESSION ANALYSIS

Credits: 4+2

Course Objectives:

The learning objectives include:

- To understand the concept of moments with their inter-relations with properties.
- To have a clear understanding of when to apply various descriptive statistics and correlation and Regression Analysis for the real life data sets and draw appropriate conclusions from the analysis.

Course Outcomes:

After completing this course, a student will have:

- Ability to understand the concept of moments with their inter-relations with properties.
- Ability to understand the concept of Measures of skewness and kurtosis.
- Ability to understand the correlation and its methods.

THEORY: 04 CREDITS

UNIT I

Partition Values, Moments-Meaning and their inter-relations with properties- problems on ungrouped and grouped data, factorial moments, Shephard's correction for moments (without Proof). Relationship between raw and central moments.

UNIT II

Skewness and Kurtosis: Definition, objectives and types of skewness, explanation of positive and negative skewness. Measure of skewness based on moment.

Skewness- Measures of skewness- Karl Pearson's coefficient of skewness and Bowley's coefficient of skewness. Simple problems. Kurtosis: Definition and types of kurtosis. Explanation of types of kurtosis. Difference between skewness and kurtosis.

UNIT III

Bivariate Data: Concept of correlation and its types. Scatter diagram method and product moment method of studying correlation. Properties of a correlation coefficient (limits of the correlation coefficient, effect of change of origin and scale). Concept of rank correlation, derivation of Spearman's rank correlation coefficient and its limits.

UNIT IV

Regression: Regression curve and regression equation, linear & nonlinear regression, lines of regression, regression coefficients and properties, angle between two lines of regression. Mean value, regression coefficients, correlation coefficient from two lines of regression, correlation vs regression. Principle of least squares and fitting of polynomials and exponential curves.

**DEPARTMENT OF STATISTICS
UNIVERSITY OF KASHMIR, SRINAGAR**

PRACTICAL: 02 CREDITS Preferably Computers Using Excel

- I. Practicals based on calculation of Moments.
- II. Practicals based on Measures of Skewness .
- III. Practicals based on Kurtosis.
- IV. Practicals based Correlation on bivariate data.
- V. Practicals based on Regression on bivariate data.

BOOKS RECOMMENDED:

1. Gupta S. C. Fundamentals of Statistics, Himalaya Publishing House, Bombay
2. Mukhopadhaya, P. Applied Statistics, New Central Book Agency (P) Ltd., Calcutta
3. Gupta S P. and V K Kapoor Fundamentals of Mathematical Statistics, Sultan Chand, New Delhi
4. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2013). Fundamental of Statistics, Vol I, World Press, Kolkata.
5. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamental of Statistics, Vol II, World Press, Kolkata.
6. Gupta, S.C. and Kapoor, V.K. (2000). Fundamentals of Mathematical Statistics (10th ed.), Sultan Chand and Sons.
7. Hanagal, D. D. (2009). Introduction to Applied Statistics: A Non-Calculus Based Approach. Narosa Publishing Comp. New Delhi.
8. Miller, I. and Miller, M. (2006). John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
9. Mood, A.M. Graybill, F.A. and Boes, D.C. (2011). Introduction to the Theory of Statistics, 3rd Edn., Tata McGraw-Hill Pub. Co. Ltd.
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**DEPARTMENT OF STATISTICS
UNIVERSITY OF KASHMIR, SRINAGAR**

**SEMESTER 2nd
SKILL COURSE (NON-NSQF)**

STS223S: ANALYSIS OF DATA

Credits: 2+2

Course Objectives:

The objective of the course is to express the students to the real-life skill for statistical computing analysis and graphical interpretation using software skill. Hands on training on the following problem can be done on any one of the statistical software/excel to enhance data analysis skill.

Course Outcomes:

After completing this course, a student will have:

- Ability to understand the concept of moments with their inter-relations with properties.
- Ability to understand the concept of Measures of skewness and kurtosis.
- Ability to understand the correlation and its methods.

THEORY (2 CREDITS)

UNIT-I

Central Tendency: Meaning of central tendency and essentials of a good measure of central tendency. Arithmetic mean, Median, Mode, Geometric mean and Harmonic mean - definition, merits and demerits. Properties of arithmetic mean. Empirical relation between mean median and mode. Problems on both grouped and ungrouped data for all the measures.

UNIT II:

Dispersion: Meaning and objectives of measures of dispersion. Essentials of a good measure of dispersion, absolute and relative measures of dispersion. Range, Quartile deviation, Mean deviation and standard deviation with relative measures - definition, merits and demerits. Properties of Standard deviation, simple problems on ungrouped and grouped data.

PRACTICALS (02 CREDITS) Preferably Computers Using Excel/Software

- I. Problems based on calculation of Measures of Central Tendency: Arithmetic mean, Median, Mode, Geometric mean and Harmonic mean.
- II. Problems based on calculation of Measures of Dispersion: Quartile deviation, Mean deviation and standard deviation

BOOKS RECOMMENDED:

1. Gupta S. C. Fundamentals of Statistics, Himalaya Publishing House, Bombay
2. Mukhopadhaya, P. Applied Statistics, New Central Book Agency (P) Ltd., Calcutta
3. Gupta S P. and V K Kapoor Fundamentals of Mathematical Statistics, Sultan Chand, New Delhi
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5. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamental of Statistics, Vol II, World Press, Kolkata.
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