

## UNIVERSITY OF DELHI

DEPARTMENT: Statistics

COURSE NAME: Multidisciplinary Program with Statistics

(SEMESTER – 1)

based on  
Undergraduate Curriculum Framework 2022 (UGCF)  
(Effective from Academic Year 2022-23)

University of DelhiList of DSC Papers

Course Title	Nature of the Course	Total Credits	Components			Contents of the course and reference is in
			Lecture	Tutorial	Practical	
Descriptive Statistics and Probability theory	DSC	4	3	0	1	Annexure-I

List of GE Papers

Course Title	Nature of the Course	Total Credits	Components			Contents of the course and reference is in
			Lecture	Tutorial	Practical	
Basic Statistics	GE	4	3	0	1	Annexure-II

### Core 1: Descriptive Statistics and Probability

Credit:4

Course Objectives:

The learning objectives include: • Introduction to Statistics.

- Graphical representation of data.
- Understanding the concept of Probability.

Course Learning Outcomes:

After completing this course, students should have developed a clear understanding of:

- The fundamental concepts of statistics.
- Handling various types of data and their graphical representation.
- Measures of location and dispersion.
- Bivariate data. Significance of various coefficients of correlation.
- Fitting of linear curve.
- Probability theory and its applications.

# Proposed Syllabus for Bachelor in Multidisciplinary (B.Sc Mathematical Sciences) courses of study with 3 Core courses under UGCF – 2022

## ❖ DSC and DSE papers for B.Sc Mathematical Sciences under UGCF - 2022

### Semester I

#### Descriptive Statistics and probability theory

##### **Unit I**

Fundamentals of statistics. Diagrammatic representation of data. Measures of central tendency: location and positional. Partition values, Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation. Moments: raw and central, Measures of skewness and kurtosis.

##### **Unit II**

Bivariate data: definition, scatter diagram. Correlation and regression: Karl Pearsons coefficient of correlation, Spearman's rank correlation coefficient, lines of regression, properties of regression coefficients, angle between two regression lines. Principle of least-square and fitting of linear curve.

##### **Unit III**

Probability: Introduction, Random experiment, sample point and sample space, event, algebra of events, Definition of Probability - classical, relative frequency and axiomatic approaches to probability, merits and demerits of these approaches (only general ideas to be given). Theorems on probability, conditional probability, independent events: pairwise and mutually independent. Bayes theorem and its applications.

##### **References:**

1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2005). Fundamentals of Statistics, Vol. I, 8<sup>th</sup> Ed., World Press, Kolkatta.
2. Gupta, S.C. and Kapoor, V.K. (2014). Fundamentals of Mathematical Statistics, 11<sup>th</sup> Ed., Sultan Chand and Sons.
3. Hogg, R. V., McKean, J., and Craig, A. T. (2005). Introduction to mathematical statistics. Pearson Education.
4. Mood, A.M., Graybill, F.A. and Boes, D.C. (2007). Introduction to the Theory of Statistics, 3<sup>rd</sup> Ed., Tata McGraw Hill Publication.
5. Freund, J.E. (2009). Mathematical Statistics with Applications, 7<sup>th</sup> Ed., Pearson Education.
6. Miller, Irwin and Miller, Marylees(2006): John E Freund's Mathematical Statistics with Applications,(7 th Edn.)Pearson Education, Asia.

##### **List of Practicals:**

1. Problems based on graphical representation of data. Histograms (equal class intervals and unequal class intervals), frequency polygon, ogive curve.
2. Problems based on mean using raw data, grouped data for change of origin and scale.
3. Problems based on arithmetic mean and to find missing frequencies given arithmetic mean.
4. Problems based on median and partition values using formulae and to find them graphically also.
5. Problems based on mode by using formula, graphically, method of grouping.
6. Problems based on mean deviation and standard deviation.
7. Problems based on combined mean and variance.
8. Problems based on coefficient of variation.
9. Comparison of data using consistency approach.
10. Problems on skewness based on mean, median, mode and standard deviation.
11. Problems based on central moments.
12. Relationships between moments about origin and central moments.
13. Problems based on skewness and kurtosis.
14. Problems based on Karl Pearson correlation coefficient.
15. Problems based on Spearman's rank correlation with ties.
16. Problems based on Spearman's rank correlation without ties.
17. Problems based on lines of regression and estimated values of variables.
18. Problems on regression coefficients.

### GE1:Basic Statistics

#### Course Objectives:

The learning objectives include: • Introduction to Basic Statistics.

- Graphical representation of data.

Introduction to the concept of attributes

#### Course Learning Outcomes:

After completing this course, students should have developed a clear understanding of:

- The fundamental concepts of statistical population and sample .
  - Classification of data.
- Different Graphical methods used for representation of data.
- Basic concept of theory of attributes.

## Semester I

### Basic Statistics

#### **Unit I**

Definition and scope of statistics, concept of statistical population and sample data: quantitative and qualitative. Scales of measurement: nominal, ordinal, interval and ratio. Concept of averages: mean, median, mode. Measures of Dispersion: range, quartile deviation, mean deviation, variance, standard deviation. Consistency of data.

#### **Unit II**

Presentation of data by tables and by diagrams, frequency distributions for discrete and continuous data, graphical representation of a frequency distribution by histogram and frequency polygon, cumulative frequency distributions (inclusive and exclusive methods). Box Plot method, Stem and Leaf displays.

#### **Unit III**

Theory of attributes: consistency and independence of data with special reference to attributes. Association of attributes: concept, Yule's coefficient of colligation

#### **References:**

1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2005). Fundamentals of Statistics, Vol. I, 8<sup>th</sup> Ed., World Press, Kolkatta.
2. Gupta, S.C. and Kapoor, V.K. (2014). Fundamentals of Mathematical Statistics, 11<sup>th</sup> Ed., Sultan Chand and Sons.
3. Hogg, R. V., McKean, J., and Craig, A. T. (2005). Introduction to mathematical statistics. Pearson Education.
4. Mood, A.M., Graybill, F.A. and Boes, D.C. (2007). Introduction to the Theory of Statistics, 3<sup>rd</sup> Ed., Tata McGraw Hill Publication.
5. Freund, J.E. (2009). Mathematical Statistics with Applications, 7<sup>th</sup> Ed., Pearson Education.

#### **List of Practicals:**

1. Problems based on graphical representation of data: Histograms (unequal class intervals), box plot, stem and leaf.
2. Problems based on mean using raw data, grouped data for change of origin and scale.
3. Practical based on arithmetic mean and to find missing frequencies given arithmetic mean.
4. Practical based on median and partition values using formulae and to find them graphically also.
5. Problems based on mode for ungrouped and grouped data.
6. Practical based on quartile deviation using formula and graphically.
7. Practical based on mean deviation and standard deviation.
8. Practical based on coefficient of variation.
9. Practical based on association and independence of attributes.
10. Practical based on fundamental set of class frequencies in attributes (find missing frequencies given fundamental set of class frequencies)