

TRIBHUVAN UNIVERSITY
INSTITUTE OF SCIENCE AND TECHNOLOGY
SCHOOL OF MATHEMATICAL SCIENCES
Bachelor in Mathematical Sciences (B.Math.Sc.)

Course of Study

Code No.: MSST 101

Paper: **Statistics & Data Analysis I**

Nature: Theory and Lab work

Full Mark: 75

Pass Mark: 30

Credit: 3

Course Description:

This course introduces statistics and contains a comprehensive treatment of Descriptive measures Moments, Skewness and Kurtosis

Course Objective:

The main objective of the course is to acquaint students with basic Statistics and elementary methods of data analysis techniques.

Contents:

Unit 1 Introduction to Statistics

2hrs

Meaning of Statistics as a Science: Definitions, subdivisions of statistics: descriptive and inferential statistics, applied statistics; Importance of Statistics: In data analysis and decision making; Scope of Statistics: In physical, biological, actuarial, social, management and other sciences

Unit 2 Variable and Data

4 hrs

Types of variables: Qualitative (attributes), quantitative, discrete and continuous variables, entities; Scales of measurement: Nominal scale, ordinal scale, interval scale, ratio scale; Types of data: Primary data, secondary data and their sources, cross-sectional data, time series data and panel data; Methods and problems of collecting primary and secondary data, advantages and disadvantages of primary and secondary data; population and sample data

Unit 3 Presentation of Data

12 hrs

Organization of Data: Raw and processed data, data editing, coding and data management, data consistency and assessing quality of the data; Classification and tabulation : Raw data and its classification, discrete frequency distribution, construction of class interval (Sturge's rule), continuous frequency distribution, inclusive and exclusive methods of classification, open end classes, cumulative frequency distribution and relative frequency distribution, tabulation, construction of bivariate frequency distribution; Diagrammatic presentation: Simple bar diagram, multiple bar diagram, sub-divided bar diagram, pie-chart; Graphical presentation: Histogram, frequency curve, frequency polygon and ogive

Unit 4 Descriptive measures

18 hrs

Concepts of central tendency, dispersion and nature of frequency curve, characteristics of a good statistical average

Measures of central tendency: Arithmetic mean, geometric mean and harmonic mean and their uses in descriptive analysis, computational methods for ungrouped and grouped data, their merits and demerits; Median and mode: Computations for ungrouped and grouped data, graphical methods, uses, merits and demerits; Empirical relation between mean, median and mode; relationships between arithmetic mean, geometric mean and harmonic mean, choice of an appropriate average; Partition values: Quartiles, deciles and percentiles; weighted and un-weighted averages

Measures of Dispersion: Concept of dispersion, characteristics of good measure of dispersion; absolute and relative measures of dispersion; Range, semi-interquartile range (quartile deviation), mean deviation, mean square deviation, variance and standard deviation (SD), their definitions, merits and demerits, properties, and uses, combined variance and standard deviation, computations for ungrouped and grouped data; Relative measures of dispersion: Coefficient of range, coefficient of quartile deviation, coefficient of mean deviation and coefficient of variation (C.V.); Choice of an appropriate measure of dispersion

Unit 5 Moments, Skewness and Kurtosis

12 hrs

Moments: Raw moments for grouped and ungrouped data, moments about an arbitrary constant for grouped and ungrouped data, central moments for grouped and ungrouped data, effect of change of origin and scale, relations between central moments and raw moments

Skewness and Kurtosis: Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution, absolute and relative measures, Bowley's coefficient of skewness, Karl Pearson's coefficient of skewness, measures of skewness based on moments, Choice of an appropriate measure of skewness; Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions, measures of kurtosis using partition values, measures of kurtosis based on moments

References

1. Miller and Freund (2007): *Modern Elementary Statistics*, Pearson Publishers.
2. Neil Weiss (2010): *Introductory Statistics, 5th edition* : Pearson Publishers
3. Snedecor and Cochran (1980): *Statistical Methods*, Oxford and IBH Publishers.
4. Gupta S.C. and Kapoor V.K.(2012): *Fundamentals of Mathematical Statistics*, Sultan Chand and Sons, New Delhi.
5. Mukhopadhyay, P. (1996): *Mathematical Statistics* , New Central Book Agency, Calcutta, Introduction to Mathematical Statistics, Ed. 4 (1989), MacMillan Publishing Co. New York.
6. Shrestha H.B., *Statistics and Probability: Concepts and Techniques*, EKTA Books.
7. Sthapit Azaya, Yadav Rashinder, Khanal Shankar. (2012): *Fundamentals of Statistics*, Asmita Publication, Kathmandu, Nepal

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