Progressive Education Society's

Modern College of Arts, Science and Commerce,

Shivajinagar, Pune - 5

FirstYear of B.Sc.

Course under NEP 2020 (OE)

Course Code : 24ScStaU1401

Course Name : Fundamentals of Statistics-I

Teaching Scheme: 2 Hours/Week **Credit: 2**

Examination Scheme: CIA: 20 Marks **End-Sem : 30 Marks**

Prerequisite Courses:

- Basic Mathematics.

Course Objectives:

- To study different types of the data, different methods of sampling.
- To learn graphical representation, summary statistics of the data.

Course Outcomes:

On completion of the course, student will be able to–

- Represent the data in tabular and different types of the graphs as well as to interpret it.
- Compute the appropriate measures of central tendency and dispersion applicable to the data set.

Course Contents

Unit 1	**Introduction to Statistics**	**02**
	1.1 Meaning of Statistics as a science. 1.2 Importance of Statistics. 1.3 Scope of Statistics: In the field of Industry, Biological sciences, Medical sciences, Economics, Social sciences, Management sciences, Agriculture, Insurance, Information Technology, Education and Psychology. 1.4 Statistical organizations in India and their functions: CSO, ISI, NSSO, IIPS, Bureau of Economics and Statistics. Introduction to contributions by Indian Statisticians :P C Mahalnobis P V Sukhatme, C R Rao , V. S. Huzurbazar.	
Unit 2	**Population and Sample**	05
	2.1 Types of characteristics: Attributes: Nominal scale, ordinal scale, Likert scale. Variables: Interval scale, ratio scale. Discrete and continuous variables. 2.2 Types of data: (a) Primary data, Secondary data. (b) Cross-sectional data, Time series data, Directional data. 2.3 Notion of a statistical population and sample: Finite population, infinite population, homogeneous population and heterogeneous population. Methods of sampling (description only): Simple random sampling with and without replacement (SRSWR and SRSWOR),	

	Stratified Random Sampling, Systematic Sampling.	
Unit 3	**Graphical Representation**	**03**
	3.1 Classification: Raw data and its classification, ungrouped frequency distribution, grouped frequency distribution, cumulative frequency distribution, inclusive and exclusive methods of classification, open end classes, relative frequency distribution. 3.2 Data visualization technique : Bar Diagram, Histogram, frequency polygon, frequency curve, pie diagram.	
Unit 4	**Measures of Central Tendency**	**12**
	4.1 Concept of central tendency of statistical data, Statistical averages, characteristics of a good statistical average. 4.2 Arithmetic Mean (A.M.): Definition, effect of change of origin and scale, combined mean of a number of groups, merits and demerits, trimmed arithmetic mean. 4.3 Mode and Median: Definition, merits and demerits. Empirical relation between mean, median and mode. 4.4 Partition values: Quartiles, Deciles and Percentiles. Geometric Mean (G.M.): Definition, merits and demerits. Harmonic Mean (H.M.): Definition, merits and demerits. Order relation between arithmetic mean, geometric mean, harmonic mean. 4.5 Situations where one kind of average is preferable to other.	
Unit 5	**Measures of Dispersion**	**08**
	5.1 Concept of dispersion, characteristics of good measure of dispersion. 5.2 Range, Semi-interquartile range (Quartile deviation): Definition, merits and demerits. 5.3 Variance and standard deviation: Definition, merits and demerits, effect of change of origin and scale, 5.4 combined variance for 2 groups 5.5 Measures of dispersion for comparison: Coefficient of range, coefficient of quartile deviation and Coefficient of variation (C.V.).	

References:

1. Goon, A. M., Gupta, M. K. and Dasgupta, B. (2016). Fundamentals of Statistics, Vol. 1, 6th Revised Edition, The World Press Pvt. Ltd., Calcutta
2. Gupta, S. C. and Kapoor, V. K. (2000). Fundamentals of Mathematical Statistics, 10th Edition, Sultan Chand and Sons Publishers, New Delhi.
3. Mohanty (2016). Basic Statistics, Scientific Publisher
4. Mukhopadhyay P. (2015). Applied Statistics ,*Publisher*: Books & Allied (*P*) Ltd.

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FirstYear of B.Sc.

Course under NEP 2020 (OE)

Course Code: 24ScStaU2401

Course Name: Fundamentals of Statistics-II

Teaching Scheme: 2 Hours/Week **Credit 02**

Examination Scheme: CIA: 20 Marks **End-Sem: 30 Marks**

Prerequisite Courses:

- Basic Mathematics.
- Graphical representation and Measures of Central tendency and dispersion.

Course Objectives:

- To Study the concept of Skweness, Kurtosis and correlation.
- To learn attributes and its measure of association.

Course Outcomes:

On completion of the course, student will be able to–

- Interpret the data in terms of skweness and kurtosis while analyzing the real data set.
- Find the kind of relation and extent of relation between two variables.

Course Contents

Unit 1	**Moments, Skewness and Kurtosis**	**10**
	1.1 Moments: Raw moments (m'_r) for ungrouped and grouped data. Central moments (m_r) for ungrouped and grouped data, Relations between central moments and raw moments upto 4^{th} order (without proof). 1.2 Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution and its relation with central tendency. Bowley's coefficient of skewness : Bowley's coefficient of skewness lies between -1 to 1, Karl Pearson's coefficient of skewness. Measures of Skewness based on moments (β_1,γ_1). 1.3 Concepts of kurtosis, Types of kurtosis: Leptokurtic, Mesokurtic and Platykurtic frequency distributions and its relation with dispersion. Measures of kurtosis based on moments (β_2,γ_2).	

Unit 2	**Correlation**	**10**
	2.1 Bivariate data, Scatter diagram and interpretation. 2.2 Concept of correlation between two variables, positive correlation, negative correlation, no correlation. 2.3 Covariance between two variables (m11) : Definition, computation, effect of change of origin and scale. 2.4 Karl Pearson's coefficient of correlation (r) : Definition, Properties: (i) $-1 \leq r \leq 1$ (ii) Effect of change of origin and scale Computation for ungrouped data and grouped frequency distributed data with interpretation. 2.5 Spearman's rank correlation coefficient: Definition, derivation of formula, computation and interpretation (without ties).	
Unit 3	**Line/Curve Fitting**	**10**
	3.1 Simple linear regression, principle of least squares 3.2 Fitting of polynomials and exponential curves.	

References:

1. Goon, A. M., Gupta, M. K. and Dasgupta, B. (2016). Fundamentals of Statistics, Vol. 1, 6th Revised Edition, The World Press Pvt. Ltd., Calcutta
2. Gupta, S. C. and Kapoor, V. K. (2000). Fundamentals of Mathematical Statistics, 10th Edition, Sultan Chand and Sons Publishers, New Delhi.
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