

Hard Core	STH403: THEORY OF SAMPLING	No. of Credits:4
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Course Outcomes:

CO1: Understand the principles underlying sampling as a means of making inferences about a population

CO2: Learn the different sampling techniques and able to apply the same in different area and able to analyze data from multi-stage surveys

CO3: Apply the statistical method to get response in case sensitive matter and able to analyse the data to get accurate results

CO4: Learn the concepts of ratio and regression method of estimation, estimate the bias and sampling variability and straggles for reducing these

CO5: Compute the HDI from data ,interpretation of results and understand need, importance of measuring inequality in income and concept of NSS and CSO

CO6: Understand and solve the practical issues arising in sampling studies

Unit I

Basic Concepts: Sampling design, sampling scheme, sampling strategy, interpenetrating subsampling.

Probability Proportion to Size with Replacement (PPSWR) Sampling: Selection of PPSWR sample. Estimation of population mean, total and their sampling variances – Hansen-Hurwitz strategy. Estimation of sampling variance. Comparison with SRSWR, Estimation of Gain due to PPSWR sampling. (12 hrs)

Unit II

Varying Probability Without Replacement (PPSWOR) Sampling: Some properties of sampling design, Horwitz-Thompson estimator, sampling variance of population total and its unbiased estimator. Sen-Midzuno Sampling Scheme, Des-Raj's Ordered estimator (general case), Murthy's unordering principle (sample of size two), Rao-Hartley-Cochran sampling strategy. (12 hrs)

Unit III

Single stage cluster sampling: Concepts, estimation of efficiency of cluster sampling, clusters of varying sizes.

Two stage sampling: Notions, estimation of population total and its variance, when SRSWR is used at first stage and SRSWOR at the second stage, SRSWOR at both stages and

PPSWR at the first stage and SRSWOR at the second stage. Efficiency of two-stage sampling relative to cluster and SRS sampling. (12 hrs)

Unit IV

Ratio and regression estimators based on SRSWOR, method of sampling, bias and mean square errors, comparison with mean per unit estimator.

Two phase sampling: notion, double sampling for ratio estimation, double sampling for regression estimation. (10 hrs)

Unit V

Randomized response techniques: Warner's model, related and unrelated questionnaire methods, Non sampling errors.

Statistics for National Development: NSO, CSO, Human Development Index, measuring inequality in income: Lorenz Curve, Gini coefficient. (10 hrs)

References:

1. Cochran W.G. (1977): Sampling Techniques, 3rd Ed., Wiley.
2. Des Raj and Chandok (1998): Sampling Theory, Narosa Publication.
3. Mukhopadhyay P. (1998): Theory and Methods of Survey Sampling, Prentice-Hall of India.
4. Murthy M.N. (1977): Sampling Theory and Methods, Statistical Publishing Society, Calcutta.
5. S. Sampath (2001): Sampling Theory and Methods, Narosa Publishers.
6. Sen A. (1997): Poverty and Inequality.
7. Singh D. and Chaudhary F.S. (1986): Theory and Analysis of Sample Survey Designs, New Age International Publishers.
8. Sukhatme P.V., Sukhatme B.V, Sukhatme S. and Ashok(1984): Sampling Theory of Surveys with Applications, ICAR publication.
9. Vic Barnett (2002): Sample Survey – Methods and Principles, Arnold Publishers.


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