

Discipline Specific Core (DSC) Course 1c: Survey Sampling

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Prerequisite of the course (if any)
		Lecture (45 Hours)	Tutorial (15 Hours)	Practical (00 hours)		
DSC 1c: Survey Sampling	4	3	1	0	NIL	NIL

Course Objectives:

- Learn key tools and techniques for selecting representative samples from a target population.
- Understand how sampling decisions depend on study objectives and the characteristics of the population

Course Learning Outcomes: After successful completion of this course, student will be able to:

- Understand the distinctive features of sampling schemes and its related estimation problems
- Learn about various approaches (design based and model-based) to estimate admissible parameters; with and without replacement sampling scheme, sampling with varying probability of selection.
- Learn about the methods of post-stratification (stratified sampling) and controlled sampling and also double sampling procedure with unequal probability of selection.
- Apply the applications of various sampling methods; systematic, stratified and cluster sampling.
- Apply the various methods and techniques of randomized response techniques

Unit I (12 Hours)

Basic ideas and distinctive features of sampling, Probability sampling designs, sampling schemes, inclusion probabilities and estimation. Review of important results in simple and stratified random sampling, Fixed (Design-based) and Superpopulation (model based) approaches.

Unit II (11 Hours)

Sampling with varying probabilities (unequal probability sampling) with or without replacement: pps, π ps and non- π ps sampling methods and estimation based on them, Nonnegative variance estimation.

Unit III (11 Hours)

Two-way stratification, post-stratification, controlled sampling, Estimation based on auxiliary data (involving one or more auxiliary variables) under design-based and model-based approaches, estimation of domain mean.

Unit IV (11 Hours)

Systematic sampling and its application to structured populations, Cluster sampling (with varying sizes of clusters), Two-stage sampling (with varying sizes of first-stage units), Warner's and Simmons' randomized response techniques for one qualitative sensitive characteristic.

Tutorial:

Tutorial sessions will include at least one activity such as group discussion/presentation/problem solving exercise based on the material covered in the lectures along with scholastic work related to the conceptual understanding of the subject.

Essential Readings:

1. Cochran, W.G. (2011). *Sampling Techniques*, John Wiley & Sons.
2. Murthy M.N. (1977). *Sampling Theory and Statistical Methods*, Statistical Publishing Society.
3. Singh, D. and Chaudhary, F.S. (2015). *Theory and Analysis of Sample Survey Designs*, New Age International Publisher.

Suggested Readings:

1. Kish, L. (1965). *Survey Sampling*, John Wiley & Sons.
2. Latpate, R., Kshirsagar, Gupta, V.K. and Chandra, G. (2020). *Advanced Sampling Methods*, Springer.
3. Mukhopadhyay, P. (2009). *Theory and Methods of Survey Sampling*, Prentice Hall of India.
4. Rao, J.N.K. and Molina, I. (2015). *Small Area Estimation*, John Wiley & Sons.
5. Sukhatme, P.V., Sukhatme, B.V., Sukhatme, S. and Asok, C. (1984). *Sampling Theory of Surveys with Applications*, Iowa State University Press.
6. Wu, C. and Thompson, M.E. (2019). *Sampling Theory and Practice*, Springer.