

Course Title:	Sampling Techniques - II
Course Code:	STAT-304
Semester:	VI
Credit Hours:	3 Credit Hours
Pre-requisites:	Sampling Techniques - I

### **Learning Outcomes**

By the end of this course, students will be able to:

1. Obtain Ratio and Regression estimates under various sampling designs.
2. Learn the estimation under Cluster sampling along with Cost and Variance Function.
3. Know the dimensions of Two-stage sampling and its applications in the real world.

### **Course Contents**

#### **Unit 1**

##### **1.1 Ratio and Regression estimation**

Estimation of total, mean square error and bias using design based approach and model based approach in simple random sampling. Unbiased ratio-type estimators. Ratio estimation in stratified sampling, Estimation of mean and variance in linear regression estimates. Best linear unbiased estimator (BLUE). Bias of the linear regression estimates. Regression estimation in stratified sampling. The Linear regression estimator under the general linear model

#### **Unit 2**

##### **2.1 Cluster sampling**

Estimation of mean, total and variance for single-stage cluster sampling, Cost function, Variance function. Cluster sampling for proportions, Sampling with unequal probability with replacement.

##### **2.2 Two-stage sampling**

Estimation of mean, total, proportion and variance. Both stages with equal probability. Two-stage sampling with units of unequal sizes, first stage PPS (with replacement) and second stage with equal probability. Both stages with probability proportional to size and with replacement. Sampling methods when a single primary unit is selected for the sample. Basic concept of double sampling.

- **Teaching-learning Strategies:**

Class Lecture method, which includes seminars, discussions, assignments and projects. (Audio-visual tools are used where necessary)

- **Assignments-Types and Number with calendar:**

According to the choice of respective teacher.

- **Assessment and Examinations:**

According to the University's Semester Rules.

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2	Formative Assessment	25%	It is continuous assessment. It includes: Classroom participation, attendance, assignments, and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

### **Text Books**

1. Cochran, W.G. (1977). *Sampling Techniques* (3<sup>rd</sup> ed.). John Wiley and Sons, New York.
2. Fuller, W.A. (2009). *Sampling Statistics*. John Wiley and Sons, New Jersey.

### **Suggested Readings**

1. Bethelam, J. (2009). *Applied Survey Methods: A Statistical Perspective*. Wiley.
2. Brewer, K. (2002). *Combined Survey Sampling Inference*. Oxford University Press, New York.
3. Kish, L. (1992). *Survey Sampling*. John Wiley, New York.
4. Raj, D. (1971). *Sampling Theory*. Mc-Graw-Hill Book Company, New York.
5. Raj, D., & Chandhok, P. (1998). *Sample Survey Theory*. Narosa Publishing House, New Delhi.
6. Singh, R., & Singh, N. (1996). *Elements of Survey Sampling*. Kulwar, Dodrecht