

## Generic Elective (GE) Courses

### Generic Elective (GE) Course 3a: Essentials of Survey Sampling and Experimental Designs

Structure 1: PG Curricular Structure with only Course Work  
Structure 2: PG Curricular Structure with Course Work + Research

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Prerequisite of the course (if any)
		Lecture (45 Hours)	Tutorial (00 Hours)	Practical (30 Hours)		
<b>GE 3a: Essentials of Survey Sampling and Experimental Designs</b>	4	03	00	01	NIL	Knowledge of Basic Statistics

#### Course Objectives:

- Equip students with essential tools and techniques of survey sampling.
- Develop skills to design and conduct experiments effectively.
- Train students to analyze and interpret data using appropriate statistical methods.

**Course Learning Outcomes:** After completing this course, the students will be able to:

- Plan and conduct a sample survey.
- Choose an appropriate sampling design for conducting a sample survey.
- Understand the basic concepts design of experiments.
- Understand and use simple and complex designs.
- Analyse and interpret the data from designed experiments.

#### Unit I (8 Hours)

Population and sample, types of sampling, basic principles of sample survey, steps involved in survey sampling, sampling and non-sampling errors, sample size determination.

#### Unit II (12 Hours)

Simple random sampling (SRS) with and without replacement, stratified sampling- equal, proportional and Neyman allocation, systematic sampling, presence of linear trend, large scale surveys.

**Unit III (11 Hours)**

Linear regression, least squares estimators and their properties, analysis of variance (ANOVA), ANOVA for fixed effect models - one-way and two-way classified data, Analysis of Covariance (ANCOVA).

**Unit IV (14 Hours)**

Design of experiments- role, terminology, basic principles, uniformity trials, error control, determination of optimal plot size, Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD), missing plot technique, Balanced Incomplete Block Design (BIBD), Factorial experiments –  $2^n$  ( $n \leq 5$ ) and  $3^n$  ( $n \leq 3$ ) designs.

**Essential Readings:**

1. Cochran, W.G. (2011). *Sampling Techniques*, John Wiley & Sons.
2. Das, M.N. and Giri, N.C. (2015). *Design and Analysis of Experiments*, New Age International Publishers.
3. Montgomery, D.C. (2007). *Design and Analysis of Experiments*, Ninth Edition, John Wiley & Sons.
4. Mukhopadhyay, P. (1998). *Theory and Methods of Survey Sampling*, Prentice Hall of India.
5. Sukhatme, P.V., Sukhatme, B.V., Sukhatme, S. and Ashok, C. (1984). *Sampling Theory of Surveys with Applications*, Iowa State University Press, Iowa, USA.

**Suggested Readings:**

1. Bethlehem, J. (2009). *Applied Survey Methods: A Statistical Perspective*, John Wiley & Sons.
2. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2005). *Fundamentals of Statistics*, Vol. II, World Press, Kolkata.
3. Murthy M.N. (1977). *Sampling Theory & Statistical Methods*, Statistical Pub. Society, Calcutta.
4. Mukhopadhyay, P. (2011). *Applied Statistics*, 2<sup>nd</sup> ed., Books and Allied (P) Ltd.
5. Scheaffer, R.L., Mendenhall, W., Ott, R.L. and Gerow, K. (2012). *Elementary Survey Sampling*, 7<sup>th</sup> ed., Cengage Learning.

**List of Practicals:**

1. SRS with and without replacement
2. Stratified sampling- equal, proportional and Neyman's allocation.
3. Systematic sampling.
4. Simple Linear regression.
5. ANOVA.

6. ANCOVA.
7. CRD
8. RBD
9. LSD
10. BIBD
11. Factorial designs.