



**NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF GEOLOGICAL, MINING AND
METALLURGICAL ENGINEERING
GEOLOGICAL ENGINEERING PROGRAM**

GE120 – SAMPLING

I. GENERAL INFORMATION

CODE	:	GE120 Sampling
SEMESTER	:	6
CREDITS	:	4
HOURS PER WEEK	:	6 (3 Theory – 3 Practice)
PREREQUISITES	:	MA363, GE323
CONDITION	:	Mandatory

II. COURSE OUTCOMES

To know, develop and apply the theory of the diverse techniques of sampling that allow the student to design a sample to know the characteristics of a certain population.

III. LEARNING UNITS

1. INTRODUCTION

Basic notions of probabilities. Definition of some sampling terms. Main steps of a sample survey. Probabilistic sampling. Use of the normal distribution. Bias and its effects. The mean square error.

2. SIMPLE RANDOM SAMPLING FOR MEDIA, PROPORTIONS AND RATIOS

Description of the simple random sampling. Selection of a simple random sample. Definitions and notations. Properties of estimators. Variances of estimators. Estimation of the standard error of a sample. Confidence limits. Estimation by the ratio method. Estimates of means and totals in sub-populations. Estimating the sample size to estimate a mean or proportion.

3. STRATEGIC RANDOM SAMPLING

Description and notation. Linear unbiased estimators: application to totals, means and proportions. Estimating the variances of the estimators. Considerations on the number of strata and their limits. Sample bonding: uniform bonding, affixing of minimum variances and optimum bonding. Estimation of gain and precision from the sample. Determination of sample size. Subsequent stratification.

4. SISTEMATIC SAMPLING

Introduction. Estimators and variances. Variance of the mean estimator as a function of the intra-sample correlation coefficient. Approximate calculation of sampling errors. Comparison with stratified sampling. Comparison with simple random sampling in random populations.

5. INDIRECT METHODS OF ESTIMATION: ESTIMATORS OF RATIO

Bias of ratio estimator. Approximate bias expression. Approximate variance. Comparison of variances. Simple and combined estimators in stratified sampling. Estimators of Hartley and Ross.

6. METHODS INDIRECTOR OF ESTIMATION: REGRESSION ESTIMATORS

The linear regression estimation. Regression estimates with b , pre-assigned. Minimum variance for constant b . Regression estimates when b is calculated from the sample. Sample estimation of variance. Comparison of variances. Regression estimators in stratified sampling. Comparison of minimum variances for the simple and combined estimators.

IV. BIBLIOGRAPHY

Abad – Servin. Introduction to sampling.

Cochran, V.G. Sampling techniques.

Desraj. Theory of sampling.

Azorin, Francisco and Sánchez Crespo, José. Methods and applications of sampling.