Course Code: STAT-106

Title: Probability and Probability Distributions
Credit Hours: 03
Prerequisite: Elementary Statistics

Course Objectives:

This course is designed to equip students with higher statistical tools and their application in economic analysis.

Course Contents:

Random Variables and Discrete Probability Distribution

Random variables, discrete random variable, continuous random variable, discrete probability distribution; The mean, variance and standard deviation of a probability distribution; binomial probability distribution, and its computation. Cumulative probability distributions, properties of binomial probability distribution.

Continuous Probability Distribution

Continuous probability distribution: the normal probability distribution: properties of normal distribution, Applications of the standard normal distribution, finding areas under the normal curve.

Sampling and Sampling Distributions

What is sampling? Defining population, determining sampling frame, sampling design (probability versus non-probability sampling) and appropriate sample size. Issues of precision and confidence in determining a sample size. Sampling with and without replacement, sampling and non-sampling error, sampling bias; sampling distribution of the mean; The central limit theorem; sampling distribution of differences between means; sampling distribution of sample proportion; sampling distribution of differences between proportions.

Estimation and Confidence Intervals

Point estimates and confidence intervals; estimation by confidence interval: confidence interval estimate of a population mean (known variance), confidence interval estimate of a population mean (unknown variance) confidence interval for differences of means,

confidence interval for differences of means; confidence interval for population proportion, confidence interval for differences between proportions.

Hypothesis Testing

One sample test of hypothesis; one sample; one tail and two tails tests of significance; testing for a population mean with a known population standard deviation: two-tailed test, one-tailed test; P-value in hypothesis testing; testing for a population mean: large sample, population standard deviation unknown.

Chi Square Applications

Introduction; goodness-of-fit test: equal expected frequencies; goodness-of-fit test: Unequal expected frequencies; limitations of Chi square.

Analysis of Variance

Introduction, the F-distribution; comparing two population variances; ANOVA assumptions; ANOVA test; inferences about pairs of treatment means; two-way analysis of variance.

Recommended Books:

- Anderson, D. R., Sweeney, D. J., Williams, T. A., Camm, J. D., & Cochran, J. J. (2014). Essentials of statistics for business and economics. Cengage Learning.
- Anderson, D. R., Williams, T. A., & Sweeney, D. J. (2011). Statistics for Business and Economics. 12th. Cengage Learning.
- Lind, Douglas A., Marshal, William G. and Mason, Robert D., (2015) Statistical Techniques in Business and Economics (16th edition). Boston: McGraw Hill, 2003.