Statistics: Introduction

Course # DMNS 3031

Credits 6

Prerequisites: Calculus-I, Calculus-II

Course Description

This course is an introduction to statistics and probability. It is designed to equip students with understanding of foundations of statistics and probability and focuses on using modern statistical packages in examining relevant applications. The course is a prerequisite for advanced statistics.

Course Learning Outcomes

Upon the completion of this course, students will be able to:

- Define fundamental concepts in statistics such as population, sample, types of data and variables.
- Identify descriptive statistics from inferential statistics.
- Define the role of descriptive statistics and inferential statistics in quantitative analyses.
- Find measure of central tendency and measures of variability for given data sets.
- Create and interpret appropriate visualizations for different types of data using a statistical package such as R, Python etc.
- Apply counting principles, permutations, and combinations to solve problems involving counting and arrangements.
- Define key terms in probability, such as random experiment and event.
- Apply axioms and rules of probability.
- Apply the principles of conditional probability to real world problem.
- Describe types of random variables, probability distributions and their properties.
- Calculate probabilities and expected values for various types of probability distributions such as Binomial, Poisson and Normal distributions.
- Define jointly distribution random variables.
- Explain the joint behavior of multiple random variables using distribution functions.
- Describe the Law of Large Numbers and Central Limit Theorem and how they explain the behavior of sample means in large samples.
- Define entropy, relative entropy and mutual information and their significance in information theory.
- Calculate entropy to analyze the information content of different probability distributions.

Course Assessments and Grading

Item	Weight
Homework	12%

Item	Weight
Quizzes	15%
Project	15%
Class Participation	8%
Midterm Exam	20%
Final Exam	30%