StatHarbor-007: Introduction to Hypothesis Testing and Sample Size Calculation

Overall Objective:

This course is designed to introduce participants to the principles and methodologies of hypothesis testing and sample size calculation. It aims to provide a thorough understanding of how to formulate hypotheses, conduct appropriate tests, and determine the necessary sample size for various types of studies.

Specific Objectives:

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

- Understand the fundamental concepts of null and alternative hypotheses.
- Conduct various types of hypothesis tests, including parametric and non-parametric tests.
- Interpret the results of hypothesis tests, including understanding p-values and type I and II errors.
- Apply principles and techniques for calculating sample size for different study designs and objectives.

Prerequisite:

Basic knowledge of statistics and familiarity with statistical software is recommended.

Course Content:

1. Introduction to Hypothesis Testing: Understanding the concept of null and alternative hypotheses, significance levels, and the decision-making process in hypothesis testing.
2. Types of Hypothesis Tests: Exploring different hypothesis tests, including t-tests, chi-square tests, ANOVA, and non-parametric tests.
3. Interpreting Test Results: Learning about p-values, type I and II errors, power of the test, and confidence intervals.
4. Principles of Sample Size Calculation: Understanding the factors that influence sample size, such as desired power, significance level, and effect size.
5. Sample Size Calculation Techniques: Learning methods for calculating sample size in different scenarios, including comparing means, proportions, and correlation studies.
6. Software Applications: Introduction to using statistical software for hypothesis testing and sample size calculation.

Learning Process:

The course will be delivered online, requiring active participation in learning modules, practical exercises, and interactive discussions. Spanning over two months, it includes 16 hours of instruction in weekly 2-hour sessions. These sessions will focus on clarifying concepts, answering questions, and discussing practical examples. Participants will engage with exercises using statistical software to reinforce their understanding of hypothesis testing and sample size calculation. The course begins with an introductory overview and concludes with a comprehensive assessment. Successful completion of the course will be recognized with a certificate of achievement.