COURSE SYLLABUS

# Inferential Statistics for Data Analysis Course (Self-Paced)

Develop the ability to draw valid conclusions and make predictions from sample data using inferential statistical methods.

> Group classes (Live Online) and onsite training are available for this course. For more information, email onsite@graduateschool.edu or visit: https://www.graduateschool.edu/courses/inferential-statistics-for-data-analysis-course-self-paced




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## Course Outline

### Module 1: Review of Statistical Symbols and Descriptive Statistics

- Refresh understanding of statistical notation used in formulas and analysis.
- Review descriptive statistics including measures of center and spread.
- Reinforce how descriptive statistics support inferential techniques.

### Module 2: The Conceptual Framework for Statistical Thinking

- Understand the logic of inferential statistics and its role in decision-making.
- Distinguish between populations, samples, and sampling distributions.
- Recognize the importance of variability and uncertainty in statistical analysis.

### Module 3: Determining Minimal Sample Size

- Calculate the minimum sample size for reliable estimation and hypothesis testing.
- Consider factors such as confidence level, margin of error, and population variability.
- Apply formulas and tools to determine required sample sizes.

### Module 4: Estimating a Population Mean from a Sample

- Compute point and interval estimates for a population mean.
- Interpret confidence intervals and their relationship to sampling error.
- Understand assumptions for accurate estimation.

### Module 5: The Central Limit Theorem

- Explain the central role of the Central Limit Theorem in inferential statistics.
- Understand how sample size affects the shape of the sampling distribution.
- Apply the theorem to make inferences about population parameters.

### Module 6: Estimating a Population Proportion from a Sample

- Calculate point and interval estimates for a population proportion.
- Interpret results in the context of sampling variability and confidence levels.
- Understand conditions for valid estimation of proportions.

### Module 7: Hypothesis Testing – Statistical Significance of a Large Sample Mean

- Formulate null and alternative hypotheses for mean testing.
- Calculate test statistics and p-values for large samples.
- Interpret statistical significance in practical terms.

### Module 8: One-tailed and Two-tailed Tests of Statistical Significance

- Differentiate between one-tailed and two-tailed hypothesis tests.
- Select the appropriate test type based on research objectives.
- Interpret results for directional and non-directional hypotheses.

### Module 9: Hypothesis Testing – Statistical Significance of a Sample Proportion

- Conduct hypothesis tests for proportions using sample data.
- Calculate and interpret p-values in the context of proportion testing.
- Understand limitations of small sample proportion tests.

### Module 10: Hypothesis Testing – The t Distribution for a Small Sample Mean

- Use the t distribution for inference with small sample sizes.
- Understand degrees of freedom and their impact on test results.
- Apply t-tests to real-world data analysis scenarios.

### Module 11: Goodness of Fit – The Chi-Square Test for Frequencies

- Test whether observed frequencies differ from expected frequencies.
- Calculate chi-square statistics and interpret results.
- Recognize assumptions and conditions for valid chi-square testing.

### Module 12: Comparing Two Sample Means

- Conduct hypothesis tests to compare means from two independent samples.
- Interpret results in terms of statistical and practical significance.
- Address assumptions for valid comparison testing.

### Module 13: Comparing Two Sample Proportions

- Perform tests to compare proportions from two groups.
- Calculate differences and assess significance levels.
- Interpret findings in the context of the research question.

### Module 14: Constructing a Scatter Diagram for Two Variables

- Plot data to visualize the relationship between two quantitative variables.
- Identify possible patterns, trends, and outliers.
- Use scatter diagrams as a precursor to correlation and regression analysis.

### Module 15: Determining the Correlation between Two Variables

- Calculate correlation coefficients to measure strength and direction of relationships.
- Interpret correlation values in real-world contexts.
- Recognize the difference between correlation and causation.

### Module 16: Linear Regression for Two Variables

- Fit and interpret a simple linear regression model.
- Assess model fit using R-squared and residual analysis.
- Use regression results to make predictions and guide decision-making.