

STA 2023 Statistical Methods I -- Course Description

The student is introduced to the fundamental concepts involved in using sample data to make inferences about populations. Included are the study of measures of central tendency and dispersion, basic probability, probability distributions, statistical inferences, linear regression, and correlation.

Purpose of STA 2023

1. Most applicable or practical for most students.
2. Required for many majors (Business, Education, Nursing, ...)
3. Ability to understand, organize, represent, interpret, draw conclusions from data.
4. Provide statistical literacy
 - a. Determine or question credibility of reported statistics.
5. Provide a solid foundation for subsequent statistics courses.
6. Introduce students to basic data analysis
 - a. How to best display data.
 - b. Using sample data to make inferences about populations.
 - c. How to use data to answer questions.
7. Part of general education curriculum
8. Population served:
 - a. Those who take the course as a terminal course
 - b. Those who take it as a pre-req for other majors
 - c. Those who take it as a background for research courses.
9. The course does need to be redefined to meet the needs of the 21st century.

Broad Topics of Elementary Statistics -STA 2023

1. Introduction of Statistics & Research Design.
2. Descriptive Statistics.
3. Linear Regression & Correlation
4. Basic Probability
5. Probability Distributions
6. Inferential Statistics

List of Specific Course Competencies/Outcomes

Upon completion of this course, the student will be able to demonstrate the following abilities:

I. Descriptive Statistics

- A. Calculate and interpret the various descriptive measures for centrality and dispersion.
- B. Determine potential outliers of data sets and understand how they affect the various numerical measures.
- C. Analyze and/or compare different sets of data using graphs, charts, tables, and numerical measures, and write about them in clear and precise sentences using statistical vocabulary.
- D. Demonstrate an understanding of the different types of distributions.
- E. Organize and display data by means of various tables, charts, and graphs.
- F. Define and use the basic terminology of statistics.

II. Simple Linear Regression and Correlation

- A. Find and interpret the sample correlation coefficient (r) to determine the strength and direction of the linear relationship between predictor and response variables.
- B. Use scatter plots to determine if outliers are present and if data can be represented by a simple linear regression model.
- C. Find the simple linear regression model and be able to interpret the slope and y-intercept.
- D. Use r-squared to determine if a simple linear regression model is a strong predictor.
- E. Predict values of y using the simple linear regression model

III. Normal Probability Distribution

- A. Understand the Normal Probability Distribution and be able to determine appropriate areas under a normal curve.
- B. Use the Empirical Rule (68-95-99.7 rule) to find probabilities on mound shape distributions.
- C. Using a histogram or normal probability plot, determine if a sample comes from a normally distributed population.

IV. Fundamentals of Probability

- A. Understand and apply basic rules of probability.
- B. Understand and apply the Binomial Probability Distribution.
- C. Identify the random variable involved in a statistical problem and distinguish between: categorical vs quantitative, discrete vs continuous, and binomial vs normal.

V. Inferential Statistics

- A. Demonstrate at least a rudimentary understanding of basic sample and experimental design (i.e. randomness, bias, etc.).
- B. Understand and apply the Central Limit Theorem.
- C. Estimate means and proportions using confidence intervals for one and/or two populations.
- D. Be able to perform hypothesis tests on means and proportions for one and/or two populations
- E. Determine and interpret p-values.

VI. Demonstrate competency in the use of technology, including graphing calculator and statistical computer software as it applies to topics I – V.

VII. Demonstrate an understanding of the course competencies through activities such as projects and/or review of journal activities.

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