

Course Description**STA2023 | Statistical Methods | 3.00 credits**

In this course, students will utilize descriptive and inferential statistical methods in contextual situations, using technology as appropriate. The course is designed to increase problem-solving abilities and data interpretation through practical applications of statistical concepts. This course is appropriate for students in a wide range of disciplines and programs. This is a computational course.

Student Learning Outcomes:

1. Students will visualize and summarize data using descriptive statistics
2. Students will apply basic probability concepts to draw reasonable conclusions
3. Students will employ concepts of random variables, sampling distributions, and central limit theorem to analyze and interpret representations of data
4. Students will choose an appropriate method of inferential statistics, including confidence intervals and hypothesis testing, to make broader decisions based on sample data
5. Students will model linear relationships between quantitative variables using correlation and linear regression

Course Competencies:

Competency 1: The student will demonstrate knowledge of terminology by:

1. Defining statistical terms

Competency 2: The student will be able to describe, explore, and compare data by:

1. Constructing and interpreting frequency tables and graphs such as bar graphs, pie charts, and stem and leaf plots
2. Computing and interpreting the measures of centrality: the mean, median, mode, and midrange
3. Computing and interpreting the measures of dispersion: the range, variance, and standard deviation

Competency 3: The student will be able to apply the measures of positions by:

1. Computing Z-scores
2. Applying the empirical rule to the normal distribution
3. Applying Chebyshev's rule to the non-normal (or unknown) distributions

Competency 4: The student will be able to apply the counting principles by:

1. Defining the fundamental counting principle
2. Computing the possible outcomes of compound events
3. Computing combinations and permutations.

Competency 5: The student will demonstrate knowledge of probability by:

1. Describing a sample space and an event
2. Calculating probabilities of simple, compound, and conditional events

Competency 6: The student will demonstrate knowledge of random variables by:

1. Distinguishing between discrete and continuous random variables
2. Constructing a probability distribution for a discrete random variable and be able to compute its mean and standard deviation
3. Computing probabilities for random variables having a binomial distribution
4. Computing probabilities for random variables having a normal distribution
5. Applying the central limit theorem
6. Approximating the binomial probability using the normal distribution

Competency 7: The student will demonstrate knowledge of confidence intervals by:

1. Constructing confidence intervals for the mean using the Z and T tables
2. Constructing confidence intervals for a proportion
3. Constructing confidence intervals for the difference of two means

Competency 8: The student will demonstrate knowledge of hypothesis testing by:

1. Identifying type I and type II errors
2. Identifying and interpreting p-values
3. Testing a single mean for large and small samples
4. Testing the difference between two means
5. Testing a single proportion

Competency 9: The student will demonstrate knowledge of bivariate data by:

1. Constructing and interpreting a scatter plot
2. Computing and interpreting the linear correlation coefficient

General Education Learning Outcomes:

- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning