### STA 2023 Statistical Methods

**Course Description:** This course will introduce students to statistical methods. Students will learn topics to include collecting data, grouping data, presenting data, measures of central tendency, dispersion, probability, hypotheses testing, confidence intervals, and correlation. (3-hour lecture)

<table>
<thead>
<tr>
<th><strong>Course Competency</strong></th>
<th><strong>Learning Outcomes</strong></th>
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<tbody>
<tr>
<td><strong>Competency 1:</strong> The student will demonstrate knowledge of terminology by:</td>
<td>• Communication</td>
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<tr>
<td>1. Defining statistical terms.</td>
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| **Competency 2:** The student will be able to describe, explore, and compare data by: | • Communication  
• Numbers / Data  
• Critical thinking  
• Information Literacy  
• Social Responsibility |
| 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: | • Communication  
• Numbers / Data  
• Critical thinking  
• Information Literacy  
• Social Responsibility |
| 1. Computing z-scores.  
3. Applying the Chebyshev's Rule to the Non-Normal (or unknown) Distributions. | |
**Competency 4:** The student will be able to apply the counting principles by:
- Communication
- Numbers / Data
- Critical thinking
- Information Literacy
- Social Responsibility

2. Computing the possible outcomes of compound events.

**Course Competency 5:** The student will demonstrate knowledge of probability by:
- Communication
- Numbers / Data
- Critical thinking
- Information Literacy
- Social Responsibility

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

**Course Competency 6:** The student will demonstrate knowledge of random variables by:
- Communication
- Numbers / Data
- Critical thinking
- Information Literacy
- Social Responsibility

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.

**Course Competency 7:** The student will demonstrate knowledge of confidence intervals by:
- Communication
- Numbers / Data
- Critical thinking
- Information Literacy
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.

**Course Competency 8:** The student will demonstrate knowledge of hypotheses 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.

**Course 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.