

**NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
MTH 241 - STATISTICS I (3 CR.)**

Course Description

Covers descriptive statistics, elementary probability, probability distributions, estimation, and hypothesis testing. Lecture 3 hours per week

General Course Purpose

The purpose of this course is to provide the student with the necessary abilities in statistics and probability to understand the results of statistical studies and to perform descriptive and basic inferential statistical studies within their areas of interest. The course concepts would be beneficial for the student with an interest in statistics. Emphasis will be placed upon the use of the calculator and the computer to perform statistical computations.

Course Prerequisites/Corequisites

Prerequisites: Prerequisites: Satisfactory score on an appropriate proficiency exam or MTH 152 or MTh 163 or MTH 182 or permission of the division.

Course Objectives

As a result of the learning experience in this course, the student should be able to:

- Organize raw data into a frequency distribution
- Compute measures of central tendency (means, median, modes) and interpret the results.
- Compute measures of variation (variances, standard deviations, quartiles) and interpret the results
- Identify and graph symmetric and asymmetric distributions
- Compute standard scores
- Define the concept of probability
- Compute probabilities of unions, intersections, and complements
- Distinguish between the concepts of independent events and mutually exclusive events
- Identify independent events and dependent events
- Compute conditional probabilities
- Compute probabilities with binomial and normal distributions
- Determine probability distributions using random variables
- Explain the differences between population means and variances and sample means and variances
- Compute confidence intervals
- Formulate null and alternative hypotheses
- Compare and contrast z-tests and t-tests
- Identify type i and type ii errors
- Use a statistical software package and graphing calculator to calculate sample means, standard deviation, and confidence intervals
- Use a statistical software package to create appropriate graphs

Major Topics To Be Included

- Introduction to Statistics
 - What is statistics?
 - Uses and misuses of statistics
 - Role of statistics in research
- Descriptive statistics
- Organizing and displaying data
 - Frequency distributions
 - Relative frequency distributions
 - Cumulative frequency distributions

- Histograms and graphs
- Measures of central tendency
 - Mean, median, and mode
 - Interpretations
- Measures of variation
 - Range
 - Variance and standard deviation
 - Quartiles and percentiles
 - Interpretations
- Types of Distributions
 - Symmetric
 - Asymmetric (positive and negative skew)
- Standard scores
- Calculations of means and standard deviations with statistical software and graphing calculator
- Introduction to Probability
 - Definition
 - Sample Space
 - Events, Operations on events, and their probabilities
 - Simple events
 - Compound events
 - Unions
 - Intersections
 - Complements
 - Mutually exclusive events
 - Independent events
 - Conditional probability
- Random Variables and Probability Distributions
 - Discrete Random Variables
 - Probability distribution of a discrete random variable
 - Mean (expected value) and standard deviation of a discrete random variable
 - Binomial coefficients and Bernoulli trials
 - Binomial distribution
 - Mean(expected value) and standard deviation of a binomial distribution
- Continuous Random Variables
 - Normal curves and their properties
 - Standard normal curve
 - Computations with normal curves
 - Normal approximation to the binomial distribution
- Sampling Distribution of the Mean
 - Random samples
 - Mean and standard deviation of the sample mean
 - Central Limit Theorem
 - Interpretation
 - Applications
- Confidence Intervals
 - For a population mean
 - Large sample
 - Small sample from a normal population
- For the Difference of Two Population Means
 - Independent samples
 - Dependent samples
- Hypothesis Testing
 - Formulation
 - Stating null and alternative hypotheses
 - Significance level
 - Regions of acceptance and rejection
 - Type I and Type II errors
 - Selection of random samples

- Selection of statistical test
- p values, define and describe use in reporting results
- Conclusion and interpretation of results
- For a population mean
 - Large sample (z-test)
 - Small sample from a normal population (t-test)
 - Use of statistical software package to compute z- or t- score
- For the difference of two population means
 - Independent samples (z- or t-test)
 - Dependent samples (z- or t-test)
 - Use of statistical software package to compute z- or t- score

EXTRA TOPICS (optional)

- Counting Techniques
 - Fundamental principle of counting
 - Permutations
 - Combinations
 - Tree diagrams
- Calculate p values via tables and statistical software