NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
MDE 55 – LEARNING SUPPORT FOR STATISTICAL REASONING (3 CR.)

Course Description

Provides support to ensure success for students co-enrolled in Statistical Reasoning (MTH 155). Course will review foundational topics through direct instruction, guided practice, and individualized support.
Lecture 3 credits. Total 3 hours per week.

General Course Purpose

This course provides support to ensure student success with the MTH 155 objectives.

Course Prerequisites/Corequisites

Corequisite: MTH 155

Course Objectives

Upon completing the course, the student will be able to:

- Communication
  - Interpret and communicate quantitative information and mathematical and statistical concepts using language appropriate to the context and intended audience
    - Use appropriate statistical language in oral, written, and graphical terms.
    - Read and interpret graphs and descriptive statistics.
- Problem Solving
  - Make sense of problems, develop strategies to find solutions, and persevere in solving them.
  - Understand what statistical question is being addressed, use appropriate strategies to answer the question of interest, and state conclusions using appropriate statistical language.
- Reasoning
  - Reason, model, and draw conclusions or make decisions with quantitative information.
    - Use probability, graphical, and numerical summaries of data, confidence intervals, and hypothesis testing methods to make decisions.
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- Evaluation
  - Critique and evaluate quantitative arguments that utilize mathematical, statistical, and quantitative information.
    - Identify errors such as inappropriate sampling methods, sources of bias, and potentially confounding variables, in both observational and experimental studies.
    - Identify mathematical or statistical errors, inconsistencies, or missing information in arguments.
- Technology
  - Use appropriate technology in a given context.
    - Use some form of spreadsheet application to organize information and make repeated calculations using simple formulas and statistical functions.
    - Use technology to calculate descriptive statistics and test hypotheses.
- Graphical and Numerical Data Analysis
  - Identify the difference between quantitative and qualitative data
  - Identify the difference between discrete and continuous quantitative data
  - Construct and interpret graphical displays of data, including (but not limited to) box plots, line charts, histograms, and bar charts
  - Construct and interpret frequency tables
  - Compute measures of center (mean, median, mode), measures of variation, (range,

interquartile range, standard deviation), and measures of position (percentiles, quartiles, standard scores)

- Sampling and Experimental Design
  - Recognize a representative sample and describe its importance
  - Identify methods of sampling
  - Explain the differences between observational studies and experiments
  - Recognize and explain the key concepts in experiments, including the selection of treatment and control groups, the placebo effect, and blinding
- Probability Concepts
  - Describe the difference between relative frequency and theoretical probabilities and use each method to calculate probabilities of events
  - Calculate probabilities of composite events using the complement rule, the addition rule, and the multiplication rule.
  - Use the normal distribution to calculate probabilities
  - Identify when the use of the normal distribution is appropriate.
  - Recognize or restate the Central Limit Theorem and use it as appropriate.
- Statistical Inference
  - Explain the difference between point and interval estimates.
  - Construct and interpret confidence intervals for population means and proportions.
  - Interpret the confidence level associated with an interval estimate.
  - Conduct hypothesis tests for population means and proportions.
  - Interpret the meaning of both rejecting and failing to reject the null hypothesis.
  - Use a p-value to reach a conclusion in a hypothesis test.
  - Identify the difference between practical significance and statistical significance.
- Correlation and Regression
  - Analyze scatterplots for patterns, linearity, and influential points
  - Determine the equation of a least-squares regression line and interpret its slope and intercept.
  - Calculate and interpret the correlation coefficient and the coefficient of determination.
- Categorical Data Analysis
  - Conduct a chi-squared test for independence between rows and columns of a two-way contingency table.

Major Topics to be Included

a) Arithmetic and order of operations
b) Operations with fractions, percentages, and decimals
c) Exponents
d) Formulas
e) Units and measurement
f) Simplifying algebraic expressions and solving linear equations
g) Using technology including calculators and spreadsheet software