Common Course Outline for: MATH 1095 Statway Statistics: Accelerated

A. Course Description

1. Number of credits: 4
2. Lecture hours per week: 4
   Lab/Studio/Clinical hours per week: None
3. Prerequisites: Eligible for MATH 0990
4. Co-requisites: MATH 0900
5. MnTC Goals: Goal 4 Logical/Mathematical Reasoning

This course is an accelerated version of the Statway Statistics 1 and 2 sequence (MATH 0990 and 1090) and is taken simultaneously with the corequisite MATH 0995. Along with MATH 0995, it is designed to guide students in completing the topics covered in both beginning algebra and college-level introductory statistics in one semester. MATH 1095 (4 credits) and the corequisite MATH 0995 (2 credits) are useful to students whose academic program is satisfied by an introductory statistics course, and the corequisite course allows those students who do not place at the MATH 1080 eligibility level to complete a college-level statistics course in 1 semester. Statway Statistics: Accelerated covers sampling distributions, Central Limit Theorems, confidence intervals, and hypothesis testing for population proportions, population means, and means of paired differences. Chi-square tests for one and two-way tables are also covered, as well as necessary topics from beginning algebra. Students must complete MATH 0995 AND MATH 1095 in the same semester. **MATH 1095 with MATH 0995 is equivalent to MATH 1090.**

B. Date last reviewed: November 2020

C. Outline of Major Content Areas

1. Discrete and continuous probability distributions, z-scores and the normal distribution, including using simulation as a method for constructing distributions.
2. Sampling distributions, Central Limit Theorem, and Introduction to Confidence Intervals for a Population Proportion.
3. Constructing Confidence Intervals for a Population Proportion, an Introduction to Hypothesis Testing, and Constructing a Hypothesis Test for a Population Proportion.
4. Constructing Confidence Intervals and Performing Hypothesis Tests for the Difference of Two Population Proportions.
5. Sampling distributions, Central Limit Theorem, Confidence Intervals, and Hypothesis Tests for a Population Mean and for Means of Paired Differences.
6. Chi-square Tests for One-way Tables (Goodness of Fit) and for Two-way Tables (Independence and Homogeneity).
7. One-way ANOVA methods for detecting differences in several means (optional)
8. Linear regression, correlation coefficient, and coefficient of determination; slope/rate of change and initial value for a linear model.
9. Necessary algebra concepts such as linear and exponential functions, exponents, graphing functions, and working with percents, decimals and fractions in applied problems.

D. Course Learning Outcomes

Upon successful completion of the course, the student will be able to:

1. Use simulations to explain the properties of a sampling distribution for a proportion and use sampling distributions to construct and interpret confidence intervals for a population proportion. (Goal 4b, d)
2. Construct a hypothesis test for the value of a population proportion. (Goal 4a, b, d)
3. Interpret the use of evidence in drawing a conclusion, including interpreting the meanings and consequences of Type I and Type II errors. (Goal 4a, b, d)
4. Use simulations to explain the properties of a sampling distribution for a sample mean and use sampling distributions to construct and interpret confidence intervals for a population mean. (Goal 4b, d)
5. Construct a hypothesis test for the value of a population mean and for the mean of the differences between paired data. (Goal 4a, b, d)
6. Calculate and interpret the chi-square value for both one-way tables (goodness of fit) and two-way tables (independence and homogeneity). (Goal 4a, b, d)
7. Apply one-way ANOVA methods to test for possible differences between several population means. (Goal 4a, b, d)
8. Choose the appropriate linear or exponential model to best summarize bi-variate data. (Goal 4a, b, c, d)
9. Be able to use the appropriate tools of Algebra, such as graphing of linear and exponential functions, use of basic functions and exponents, decimal and fraction operations, and percents to solve applied problems in each of the above topics. (Goal 4a, b, d)
10. Perform simple statistical procedures related to the above using a statistical software package or a statistical calculator. (Goal 4a, b, d)
11. Use theoretical discrete and continuous probability distributions to calculate probabilities, including using z-scores to calculate probabilities for a Normal distribution. (Goal 4b, d)
12. Use technology to compute the least squares regression line and use it to make predictions, interpret the meaning of the slope and intercept of the regression line, and compute and interpret the residuals to decide on the appropriateness of the regression line model. (Goal 4b, d)
13. Use exponential regression to fit certain non-linear data. (Goal 4b, d)

E. Methods for Assessing Student Learning

The instructor will use the assessments that are included in the STATWAY curriculum created by the Carnegie Foundation for the Advancement of Teaching, in order to provide consistent data on the effectiveness of the project. The instructor may choose other assessment methods to complement the included methods, including attendance and participation in group learning activities.

F. Special Information

The curriculum requires extensive use of either computer software (some of which is included in the STATWAY curriculum, web-based and MS Excel) and a statistical calculator (TI-83/84 is recommended).