

Common Course Outline for: MATH 0990 Statway Statistics 1

A. Course Description

1. Number of credits: 4
2. Lecture hours per week: 4
3. Prerequisites: Eligible for MATH 0990
4. Co-requisites: None
5. MnTC Goals: None

This course is the first in a two-semester sequence designed to guide students in completing the topics covered in both beginning algebra and college-level introductory statistics in one year. The two semester sequence is useful to students whose academic program is satisfied by an introductory statistics course. STATWAY Statistics 1 covers sampling methods, descriptive statistics, graphing methods, linear and exponential models, and an introduction to probability, as well as necessary topics from beginning algebra. The curriculum is based on student collaborative group learning. Students must commit to completing Math 0990 and MATH 1090 as a required sequence of courses: Math 0990 in one semester and MATH 1090 in a subsequent semester.

B. DATE LAST REVISED: November 2021

C. OUTLINE OF MAJOR CONTENT AREAS

1. The statistical analysis process, populations, sampling, studies and experiments
2. Graphical and numerical summaries of data: histograms, dotplots, means, medians and standard deviations
3. Scatterplots, correlation and regression
4. Linear and non-linear (exponential) models
5. Two-way tables, marginal, joint and conditional probabilities
6. Discrete and continuous probability distributions, z-scores and the normal distribution, including using simulation as a method for constructing distributions.
7. Necessary algebra concepts such as linear and exponential functions, exponents, graphing functions, solving equations, and working with decimals and fractions in applied problems

D. LEARNING OUTCOMES

The student will be able to:

1. Describe and critique types of statistical studies and sampling methods.
2. Calculate various numerical descriptive statistics to describe data.
3. Construct appropriate graphical descriptions of quantitative data, and interpret what these visual summaries imply about the data.
4. Use linear and exponential models to describe relationships between two quantitative variables.
5. Use appropriate theoretical probability distributions and the laws of probability to solve applied problems.

E. LEARNING OUTCOMES (Mn Transfer Curriculum)

Since MATH 0990 is not a college level course, MN Transfer Curriculum does not apply. However, since MATH 0990 and 1090 both contain college-level statistics topics, it seems appropriate to list some learning outcomes for the statistics topics in 0990. These topics would fit both Goal 2 and Goal 4, just as the continuing statistics topics in MATH 1090 do.

The student will be able to:

1. Distinguish between observational studies and experiments, and distinguish among random, simple random, and other types of sampling procedures.
2. Identify different sources of bias in sampling and devise different methods of random assignment for experiments.
3. Compute mean, median, modes, standard deviation, inter-quartile range, z-scores and percentile ranks from data, and give simple common sense interpretations of these numerical measures.
4. Construct histograms and dotplots as graphical descriptions of quantitative data, and interpret what these visual summaries imply about the data. (2a, d; 4b, d)
5. Interpret scatter plots as describing form, direction and strength of relationships in bi-variate data, and compute and interpret the correlation coefficient for linear bi-variate data.
6. 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.
7. Use exponential regression to fit certain non-linear data.
8. Construct and interpret two-way tables for data, and calculate marginal, joint, and conditional probabilities from two-way tables.
9. Use the various definitions and interpretations of probability and the laws of probability to solve problems.
11. Use theoretical discrete and continuous probability distributions to calculate probabilities, including using z-scores to calculate probabilities for a Normal distribution.
12. Be able to use the appropriate tools of algebra, such as graphing of linear and exponential functions, solving equations, use of basic functions and exponents, decimal and fraction operations, and percents to solve applied problems in each of the above topics.
13. Perform simple statistical procedures related to the above using a statistical software package or a statistical calculator.

F. METHODS FOR EVALUATION OF STUDENT LEARNING

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

G. SPECIAL INFORMATION

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