Common Course Outline for: MATH 1080, Introduction to Statistics

A. Course Description

1. Number of credits: 4
2. Lecture hours per week: 4
   Lab hours per week: None
3. Prerequisites: MATH 0630 or eligible for MATH 1080
4. Co-requisites None
5. MnTC Goals: 4

Concepts and application of descriptive and inferential statistics. Measures of central tendency and variance: z-scores and percentiles, normal distribution and central limit theorem. Estimation, hypothesis testing, t and z tests, chi-square tests, analysis of variance (ANOVA), and linear regression.

B. Date last reviewed: January 2018

C. Outline of Major Content Areas

1. Elements of experimental design - controlled experiments vs. observational studies
2. Statistical variables and variable values
3. Numerical measures of central tendency/variability - mean, median, mode, standard deviation, z-scores, and percentile rank
4. Graphical summaries of data - histograms
5. Normal approximation to data
6. Correlation coefficient and linear regression
7. Expected value and standard error for sampling distributions
8. Central limit theorem
9. Confidence intervals for population means and proportions
10. One and two sample hypothesis testing (z and t)
11. Chi-square test
12. Analysis of variance
13. Additional topics may include nonparametric tests, control charts, etc.

D. Course Learning Outcomes

Upon successful completion of MATH 1080, students will be able to: (Letters in parentheses refer to student competencies of the Minnesota Transfer Curriculum, Goal 2–Critical Thinking, and Goal 4–Mathematical/Logical Reasoning.)

1. Compute mean, median, modes, standard deviation, z-scores and percentile ranks from data, and give simple common sense interpretations of these numerical measures. (Goal 4b)
2. Construct histograms as graphical descriptions of numerical data, and estimate the common numerical measures from them. (Goal 2a; 4b)
3. Apply the normal approximation to estimate percentages and percentiles for data that is normally distributed. (Goal 4b, d)
4. Compute and interpret the correlation coefficient as a measure of the strength of the linear association between two numerical variables. (Goal 4a, b, d)
5. Apply regression methods to estimate dependent variable values from a single independent variable value, and interpret the slope and constant in regression equations. (Goal 4a, b, c, d)
6. Compute and interpret the expected value and standard error for probability distributions. (Goal 4b, d)
7. Apply the central limit theorem to estimate probabilities of sample means and percentages falling in a range of values. (Goal 2a, c; 4b, d)
8. Compute and interpret confidence intervals for means and proportions. (Goal 2a, c; 4a, b, d)
9. Carry out one and two sample hypothesis test (z or t) for population means and percentages, including the formulation of null/alternative and interpretation of p-value. (Goal 2a, c; 4a, b, c, d)
    a. Perform chi-square tests of goodness of fit, independence, and homogeneity. (Goal 2a, c; 4a, b, c, d)
    b. Perform analysis of variance. (Goal 2a, c; 4a, b, c, d)
    c. Perform simple statistical procedures related to the above using a statistical software package (e.g. Excel) or a statistical calculator (e.g. TI-83/84). (Goal 4a, b, d)

E. Methods for Assessing Student Learning

The instructor will choose from among various evaluation techniques including – but not limited to – in-class testing, take- home testing, assignments, quizzes, attendance, group or individual projects, and research. The instructor will also choose a method for end-of-the-semester evaluation.

F. Special Information

Your instructor will choose the use of either Excel or TI-83/84 calculator or MiniTab software. After registering for your section, contact the instructor.