

Syllabus

Approved 11/4/2010

Course Title: Introduction to Statistics

Course Number: Math QL 1040

Course Credit Hours: 3

Prerequisites: Math 1010 with a grade of C or better, ACT score of at least 23, or placement test.

Catalog Description: Basic concepts of probability and statistics including data collection and analysis, correlation and regression, probability, discrete and continuous distributions (binomial, normal and t distributions), estimation and hypothesis testing, with an emphasis on applications and understanding of the main ideas.

Objectives: Emphasis in this course is placed on understanding the main ideas of statistics, developing useful skills for working with data, and stating conclusions of statistical analysis.

To convey, to the extent possible using the content of this course, the Quantitative literacy skill set adopted by the Utah State Board of Regents:

1. Interpret mathematical models such as formulas, graphs, tables and schematics and draw inferences from them.
2. Represent mathematical information symbolically, visually, numerically, and verbally.
3. Use arithmetical, algebraic, geometric, and statistical methods to solve problems.
4. Estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results.
5. Recognize that mathematical and statistical methods have limits.
6. [Optional] Understand basic concepts describing time-varying systems, and how prediction follows from the formulation of basic laws of change, both analytically and numerically.

Course Coverage:

1. Data Analysis
 - a. Displaying distributions with graphs: Histograms, stem-and leaf diagrams, box and whisker plots
 - b. Summarizing distributions with numbers: measures of center and spread, five number summary, box plots
2. Regression and correlation
 - a. Scatter plots, correlation coefficient, least squares regression.
 - b. Appropriate usage of least squares regression; residual analysis, coefficient of determination
3. Data collection
 - a. Random sampling
 - b. Basic principles of design of experiments
4. Understanding randomness
 - a. Sample spaces, probability
 - b. Basic probability rules
 - c. Idea of random variable and probability distribution
 - d. *Binomial distribution*
 - e. Normal distribution
 - f. Parameters, statistics
 - g. Sampling distribution, Central Limit Theorem
5. Estimation
 - a. Point and interval estimates
 - b. Understanding statistical confidence
 - c. Confidence intervals for population mean and proportion
 - d. Student t distribution
6. Hypothesis testing
 - a. The reasoning of tests of significance
 - b. One sample procedures for population mean and proportion
7. One or more of the following optional topics.
 - a. Introduction to a statistical computer package or integrated use of graphing/statistical calculators
 - b. Counting Techniques
 - c. Conditional Probability
 - d. Poisson distribution
 - e. Assessing normality
 - f. Confidence intervals for difference in population means, proportions and/or population variance

- g. Hypothesis testing for population variance
- h. Two sample hypothesis testing for population mean and/or proportion
- i. Chi-square tests for independence, goodness of fit, and/or equality of distributions
- j. Analysis of variance
- k. Inference for regression
- l. Inference for variance

Adopted Text: (2006-7) *Statistics, Informed Decisions Using Data, 3rd Ed.* By Michael Sullivan III, Prentice Hall, 2007