

SYLLABUS

COURSE # & TITLE: MATH 251, Statistics

OF CREDITS: 4 (3+2P)

CATALOG DESCRIPTION:

Instructs the student in the knowledge of an introduction to descriptive and inferential statistics, which includes the following topics: sampling theory, experimental design, probability, probability distributions, confidence intervals, correlation and regression, tests of hypotheses (using the normal, student –T, Chi-square and F – distributions), and ANOVA. Lab time is provided for data analysis using statistical software.

Semester Offered: Fall, Spring and Summer

Prerequisites: ACCUPLACER score: 104 – 120. Grade of “C” or better in Math 115, Math 130 or higher. .

Common Student Learning Outcomes

Upon successful completion of San Juan College programs and degrees, the student will...

Learn *Students will actively and independently acquire, apply and adapt skills and knowledge to develop expertise and a broader understanding of the world as lifelong learners.*

Think *Students will think analytically and creatively to explore ideas, make connections, draw conclusions, and solve problems.*

Communicate *Students will exchange ideas and information with clarity and originality in multiple contexts.*

Integrate *Students will demonstrate proficiency in the use of technologies in the broadest sense related to their field of study.*

Act *Students will act purposefully, reflectively, and respectfully in diverse and complex environments.*

GENERAL LEARNING OUTCOMES:

Upon completion of the course, the student should understand the following content areas:

- 1.) Descriptive statistics.
- 2.) Regression and correlations.
- 3.) Experimental Design.
- 4.) Probability.
- 5.) Distributions – Normal, Binomial, Student – T, Chi-square.
- 6.) Inference/hypothesis Testing.

SPECIFIC LEARNING OUTCOMES:

Upon completion of this course, the student should be able to:

- 1.1 Organize data into a frequency distribution and find percentile points and ranks for the distribution
- 1.2 Graph data distributions using the correct format for graphs, to include: histograms, frequency polygons, stem-and-leaf, box plots and scatter plots
- 1.3 Compute measures of central tendency (mean, median and mode) and measures of dispersion (range, standard deviation, percentile and variance) for both grouped and ungrouped data

- 1.4 Describe data by appropriate interpretation of measures of central tendency and measures of dispersion
- 1.5 Determine percentiles
- 1.6 Use computer software (MINITAB) or a calculator to graph and describe data sets
- 1.7 Understand how to use and compute Z-scores
- 1.8 Use the normal distribution and standard scores to compare measures
- 1.9 Make time plots using computer software or a graphing calculator
- 1.10 Identify and analyze possible outliers
- 1.11 Code data and compute the statistics based on the coding

- 2.1 Construct scatter plots and draw inferences from the scatter plot
- 2.2 Find the least-square regression equation and use it to predict values
- 2.3 Understand the impact of outliers on data representation and inferences
- 2.4 Know how to compute and interpret the correlation coefficient
- 2.5 Determine the most plausible explanation of a strong association between two variables

- 3.1 Know the elements of an experiment and how to design an experiment using these elements
- 3.2 Know the difference between a sample and a census
- 3.3 Select appropriate random sampling techniques
- 3.4 Know the difference between a parameter and a statistic

- 4.1 Have a general understanding of probability theory
- 4.2 Determine sample spaces and events
- 4.3 Apply the basic rules of probability to determine probabilities of complementary, disjoint, conditional, mutually exclusive and independent events
- 4.4 Understand random variables and decide when random variables are discrete or continuous
- 4.5 Construct probability distributions
- 4.6 Compute means and variances of random variables
- 4.7 Understand the law of large numbers
- 4.8 Apply the Fundamental Counting Rule and compute factorials
- 4.9 Compute permutations and combinations

- 5.1 Understand the binomial distribution and how to compute associated probabilities, the mean and variance
- 5.2 Compute the mean and variance of a binomial distribution
- 5.3 Understand sample means and compute the mean and standard deviation of sample means
- 5.4 Understand when confidence intervals and significance tests are appropriate, the conclusions that can be drawn and how, and what their limitations are
- 5.5 Be familiar with normal distributions, when they occur and how to determine if a data set is normally distributed
- 5.6 Find probabilities associated with normal, student – T, and Chi-square distributions
- 5.7 Compute confidence intervals for various statistics
- 5.8 Know the Central Limit Theorem and when to apply it
- 5.9 Know when and how to approximate binomial distributions with normal distributions
- 5.10 Determine sample size for a specified margin of error for various statistics

- 6.1 Write the null hypothesis and alternate hypothesis
- 6.2 Understand the concepts of significance level and statistically significant
- 6.3 Apply the steps for inference/hypothesis testing
- 6.4 Test hypotheses using P – value or appropriate test statistics
- 6.5 Understand how the laws of probability affect the inferences that can be drawn from an experiment
- 6.6 Understand the difference between Type I and Type II errors

OTHER REQUIREMENTS:

The TI-82, TI-83, TI-84, TI-85 or TI-86 graphing calculator is required for the course. A **TI-83 Plus or TI-84 Plus Graphing Calculator** is strongly recommended. Graphing calculators capable of symbolic manipulation (such as TI-89 or TI-92 and other such calculators) will not be allowed on examinations, the final exam and where the instructor finds fit.

Dean, School of Science: Frank Williams Date: 5/2/06

A current syllabus must be on file in the dean's office for every course being taught during a given semester.