

San Diego

SUBJECT AREA AND COURSE NUMBER: Mathematics 113

COURSE TITLE: Gateway to Experimental Statistics II (Practical Statistics ??)

UNITS: 4.00

Lecture: 3.00

Lab: 1.00

Letter Grade, Student may petition for Credit/No Credit

CATALOG COURSE DESCRIPTION:

This course is a second course in the study of statistical methods integrated with algebraic tools to prepare students to analyze these processes encountered in society and the workplace. The course covers a review of functions, their geometric properties, counting principles and probability rules, probability distribution functions, sampling, and inferential statistics of one and two variable data sets. Students will be expected to implement technology to perform calculations to analyze data and make statistical conclusions. This sequence of courses is intended for students that are not planning on majoring in a science, technology, engineering or mathematics related disciplines. It meets general education and CSU transfer requirement. (FT)

REQUISITES:

Prerequisite: MATH 47 with a grade of "C" or better, or equivalent.

ADVISORY:

ENGL 043 with a grade of "C" or better, or equivalent or Assessment Skill Level W4
&

ENGL 048 with a grade of "C" or better, or equivalent or Assessment Skill Level R5

FIELD TRIP REQUIREMENTS: May be required

TRANSFER APPLICABILITY: Associate Degree & Transfer to CSU and private colleges. CSU General Education.

LECTURE HOURS PER WEEK: 3.00

LAB HOURS PER WEEK: 3.00

STUDENT LEARNING OBJECTIVES:

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

1. Perform algebraic manipulations on rational numbers and algebraic rational expressions.
2. solve equations involving rational expressions.
3. Apply counting principles, including combination and permutation, and the Binomial probability function to calculate discrete probabilities.
4. Identify linear and non-linear functions using technology to analyze the functions.
5. Identify the various discrete and continuous probability distribution functions including the Poisson, normal, Student's t, and Chi-squared distributions.
6. Determine how the various probability distributions model the behavior of a random variable.
7. Solve by applying technology for the areas under the graphs of probability distribution functions and determine how they are used to solve cumulative probability problems.
8. Describe how sampling distributions and the theory of probability supports drawing conclusions based on data, and assessing the associated risks.
9. Describe and apply the Central Limit Theorem to a randomly chosen sample and understand how sample size affects the distribution.
10. Compute and interpret confidence intervals and carry out hypothesis tests to derive conclusions using a one-sample proportion data set with the aid of appropriate technology.

11. Compute and interpret confidence intervals and carry out hypothesis tests to derive conclusions using a two-sample proportion data set with the aid of appropriate technology.
12. Compute and interpret confidence interval estimates and carry out hypothesis tests to reach conclusions using both one- and two- sample means data sets with the aid of appropriate technology.
13. Compute confidence intervals for variance and perform Chi-Square Tests with the aid of appropriate technology.
14. Display proficiency in using theory and technology to analyze a data set, find an appropriate regression model, and draw appropriate conclusions or make an appropriate prediction.

SECTION II

I. COURSE OUTLINE AND SCOPE

A. OUTLINE OF TOPICS:

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

Reasoning About Bivariate Categorical Data and Introduction to Probability

I. Rational Functions

- A. Rational numbers
- B. Rational expressions
- C. Rational equations

II. Counting Principles

- A. Factorials
- B. Arithmetical complements
- C. Binomial Theorem

III. Probability Topics

- A. Counting
- B. Permutations and combinations
- C. Mathematical expectation
- D. Sample spaces
- E. Addition and multiplication rules
- F. Two-way tables
 - i. Joint and marginal relative frequencies
- G. Conditional probability
- H. Independence

Formalizing Probability and Probability Distributions

I. Graphs of functions

- A. Linear functions
- B. Non-linear functions
 - i. Irrational
 - ii. Exponential

II. Probability Distributions:

- A. Discrete and continuous probability distributions
- B. Binomial & Poisson
- C. Normal
- D. Student's t-Test
- E. Chi-squared
- F. Technology and Area under the curves

Linking Probability to Statistical Inference

- I. Sampling Techniques
 - A. Random sampling
 - B. Sampling distributions
 - C. Central Limit Theorem
 - D. Introduction to statistical inference

Inference for One Proportion

- I. One-sample Proportion
 - A. Large-sample confidence interval for a population proportion
 - B. One-sample Z-test for a population proportion
 - C. Estimation
 - (i) Point estimation, interval, sample size

Inference for Two Proportions

- I. Two-sample Proportion
 - A. Confidence interval for the difference in two population proportions
 - B. Two-sample Z-test for the difference in two population proportions

Inference for Means

- I. One and Two-sample Mean
 - A. One-sample confidence interval for a population mean
 - B. Two-sample confidence interval for the difference in two population means
 - C. One-sample T-test for a population mean
 - D. Two-sample T-test for the difference in two population means
 - E. Paired T-test

Chi-Square Tests

- I. Inference for Standard Deviation and Variance
 - A. Confidence intervals
 - B. Chi-square goodness-of-fit test
 - C. Chi-square tests
 - i. Independence and for homogeneity of population proportions

Optional Statistics Topics: ANOVA, Bayes' Theorem

- I. ANOVA
 - A. Definition
 - B. Using Technology to do an ANOVA
- II. Bayes Theorem
 - A. Explanation of Bayes' Theorem
 - B. Simple application