



# COURSE OUTLINE OF RECORD

**Number:** MATH A160H

**TITLE:** Introduction to Statistics Honors

**ORIGINATOR:** Tab Livingston

**EFF TERM:** Fall 2015

**FORMERLY KNOWN AS:**

**DATE OF**

**OUTLINE/REVIEW:** 04-27-2016

**CROSS LISTED COURSE:**

**TOP NO:** 1701.00

**CID:** MATH 110

**SEMESTER UNITS:** 4.0

**HRS LEC:** 72.0

**HRS LAB:** 0.0

**HRS OTHER:** 0.0

**CONTACT HRS TOTAL:** 72.0

**STUDY/NON-CONTACT HRS RECOMMENDED:** 144.0

## CATALOG DESCRIPTION:

A general education course. Topics include descriptive statistics, probability, binomial and normal distributions, variation, linear regression, correlation and hypothesis testing. Applications taken from natural sciences, social sciences, business and everyday life. May be taken for grades or on a pass-no pass basis. Transfer Credit: CSU; UC.

## JUSTIFICATION FOR COURSE:

Comparable to lower division UC or CSU course

## PREREQUISITES:

- MATH A030: Intermediate Algebra with a minimum grade of C or better  
or
- Qualifying OCC mathematics placement score. See mathematics assessment requirement.

## COREQUISITES:

## ADVISORIES:

## ASSIGNED DISCIPLINES:

**MATERIAL FEE:** Yes [ ] No [X] Amount: \$0.00

**CREDIT STATUS:** Noncredit [ ] Credit - Degree Applicable [X] Credit - Not Degree Applicable [ ]

**GRADING POLICY:** Pass/No Pass [X] Standard Letter [X] Not Graded [ ]

**OPEN ENTRY/OPEN EXIT:** Yes [ ] No [X]

**TRANSFER STATUS:** CSU Transferable[ ] UC/CSU Transferable[X] Not Transferable[ ]

**BASIC SKILLS STATUS:** Yes [ ] No [X] **LEVELS BELOW TRANSFER:** Not Applicable

**CALIFORNIA CLASSIFICATION CODES:** Y - Not Applicable

**NON CREDIT COURSE CATEGORY:** Y - Not applicable, Credit Course

**OCCUPATIONAL (SAM) CODE:** E

**REPEATABLE ACCORDING TO STATE GUIDELINES:** No [X] Yes [ ] **NUMBER REPEATS:**

**REQUIRED FOR DEGREE OR CERTIFICATE:** No [ ] Yes [X]

Business Administration(Certificate of Achievement)

Business Administration(Associate in Science for Transfer)

COMPUTER PROGRAMMING(Associate in Science)

COMPUTER PROGRAMMING(Certificate of Achievement)

Journalism(Associate in Arts for Transfer)

Kinesiology(Associate in Arts for Transfer)

Sociology(Associate in Arts for Transfer)

## GE AND TRANSFER REQUIREMENTS MET:

IGETC Area 2: Mathematical Concepts and Quantitative Reasoning

2A: Mathematic

CSU GE Area B: Scientific Inquiry and Quantitative Reasoning

B4 - Mathematics/Quantitative Thinking

OCC AA Gen Ed

AREA A2: LANGUAGE AND RATIONALITY - Communication and Analytical Thinking

OCC AS Gen Ed

AREA A2 – ENGLISH COMMUNICATION - Communication and Analytical Thinking

**COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:**

1. Illustrate statistical concepts using graphical, numerical and written explanations.
2. Apply valid statistical methods to appropriate applications.
3. Explore, discover, make conjectures and formulate conclusions in statistics-based applications.

**COURSE OBJECTIVES:**

1. Distinguish among different scales of measurement and their implications.
2. Interpret data displayed in tables and graphically.
3. Apply concepts of sample space and probability.
4. Calculate measures of central tendency and variation for a given data set.
5. Identify the standard methods of obtaining data and identify advantages and disadvantages of each.
6. Calculate the mean and variance of a discrete distribution.
7. Calculate probabilities using normal and t-distributions.
8. Distinguish the difference between sample and population distributions and analyze the role played by the Central Limit Theorem.
9. Construct and interpret confidence intervals.
10. Determine and interpret levels of statistical significance including p-values.
11. Interpret the output of a technology-based statistical analysis.
12. Identify the basic concept of hypothesis testing including Type I and II errors.
13. Formulate hypothesis tests involving samples from one and two populations.
14. Select the appropriate technique for testing a hypothesis and interpret the result.
15. Use linear regression and ANOVA analysis for estimation and inference, and interpret the associated statistics.
16. Use appropriate statistical techniques to analyze and interpret applications based on data from disciplines including business, social sciences, psychology, life science, health science, and education.
17. Utilize technology throughout the semester by implementation of computer software (Excel, SAS, PHStat, Minitab, etc.) and/or graphing calculators. For example, complete a course project, weekly exercises, homework and exams.

**COURSE CONTENT:**

**LECTURE CONTENT:**

It is imperative that instructors cover all topics in the outline. Instructors may determine the order of topics. The department encourages instructors to incorporate calculators and computer software wherever appropriate.

- I. Collect data

- A. Descriptive and inferential statistics
  - B. Population vs. sample; simple random sample
  - C. Observational vs. designed experiments
- II. Summarizing data graphically and numerically
- A. Frequency and relative frequency distributions
  - B. Histograms
  - C. Pie Charts
  - D. Bar graphs
- E. Stem and leaf
- III. Descriptive Statistics
- A. Measures of central tendency
    - 1. Mean
    - 2. Median
    - 3. Mode
  - B. Measures of variation
    - 1. Range
    - 2. Population and sample variance
    - 3. Population and standard deviation
  - C. Relative position (z-score)
- D. Levels/scales of measurement
- 1. Five-number summary
  - 2. Quartiles
  - 3. Box and whisker plots
- IV. Sample spaces and probability
- A. Basic probabilities
  - B. Events
  - C. Contingency tables
  - D. Permutations
  - E. Combinations
- V. Discrete random variables
- A. Probability distribution
    - 1. Creation of a probability distribution
    - 2. Mean/expected value
    - 3. Standard deviation
  - B. Binomial distribution
    - 1. Calculation of binomial experiment
    - 2. Mean
    - 3. Standard deviation
- VI. Continuous distributions - Normal
- A. Area under the standard normal curve
  - B. z-scores
- C. Normal approximation to the binomial distribution
- D. Normal probability plots
- VII. Sampling and sampling distributions
- A. Sampling error
  - B. Mean
  - C. Standard deviation
  - D. Central Limit Theorem and the Law of Large Numbers
- VIII. Estimation and construction of confidence intervals

- A. Constructing confidence intervals
  - 1. One population mean (when population standard deviation is known and unknown)
  - 2. Two population means (pooled and non-pooled)
  - 3. One population proportion
  - 4. Two population proportions
- B. Margin of error
- C. Required sample size for estimation of mean, difference of means, proportion, difference of proportions
- IX. Hypothesis testing and inference
  - A. Type I and Type II errors
  - B. Constructing hypothesis tests using either critical value and/or  $P$ -value approach
    - 1. One population mean (when population standard deviation is known and unknown)
    - 2. Two population means (pooled and non-pooled)
    - 3. One population proportion
    - 4. Two population proportions
    - 5. Categorical variable from a single population (Chi-square distribution)
- X. Correlation and linear regression and analysis of variance (ANOVA)
  - A. Graph bivariate data (scatterplots)
  - B. Find the equation of a regression line for a set of data
  - C. Find coefficient of correlation for a set of data
  - D.  $F$ -distribution
- XI. Applications, where appropriate, using data from business, social sciences, psychology, life science, health science and education
- XII. Statistical analysis, where appropriate, using technology such as SPSS, R, EXCEL, Minitab, graphing calculators and/or other statistical software.

**LABORATORY CONTENT:**

**METHODS OF INSTRUCTION:**

- A. Lecture:
- B. Independent Study:

**INSTRUCTIONAL TECHNIQUES:**

Lecture, discussion

**COURSE ASSIGNMENTS:**

**Out-of-class Assignments**

Out of class assignments may include:

- A. Practice problem sets requiring application of course material
- B. A data set assignment requiring the organization, analysis, and interpretation of raw data
- C. Preparation assignments that require students to answer specific questions that will be discussed in an upcoming class meeting
- D. Some instructors may assign research projects which may include statistical research inclusive of technology for calculations and interpretation of results along with findings and recommendations.

**Reading Assignments**

- A. Textbook chapters and supplements
- B. Contemporary academic articles using/ addressing course-specific concepts

- C. As an honors course, some instructors may assign additional reading from journals and/or research projects.

**Writing Assignments**

- A. Short-answer questions (e.g., describe statistical concepts).
- B. Essay questions (e.g., interpret statistical test results).
- C. Theoretical presentations of statistical theorems like Tchebysheff's Theorem and Bayes' Theorem may be included.
- D. Group and/or individual projects involving use of statistical software and/or graphing calculator.

**METHODS OF STUDENT EVALUATION:**

Midterm Exam  
Final Exam  
Short Quizzes  
Written Assignments  
Problem Solving Exercises

**Demonstration of Critical Thinking:**

Several written tests; a comprehensive final

**Required Writing, Problem Solving, Skills Demonstration:**

Several written tests; a comprehensive final

**TEXTS, READINGS, AND RESOURCES:**

**TextBooks:**

- 1. Moore, David. *The Basic Practice of Statistics*, latest ed. New York: WH Freeman Publishers, 2011
- 2. Weiss, N. *Introduction to Statistics*, 9th ed. Boston: Pearson Publishing, 2012

**Other:**

- 1. Other appropriate textbook as chosen by fulltime faculty.

**LIBRARY:**

**Adequate library resources include:** Print Materials  
Non-Print Materials  
Online Materials  
Services

**Comments:**

**Attachments:**

[Attached Files](#)