

PERALTA COMMUNITY COLLEGE DISTRICT COURSE OUTLINE

COLLEGE:	Laney College	STATE APPROVAL DATE:	09/26/2010
ORIGINATOR:	Hung-wen Chang	STATE CONTROL NUMBER:	CCC000374873
		BOARD OF TRUSTEES APPROVAL DATE:	06/14/2016
		CURRICULUM COMMITTEE APPROVAL DATE:	04/15/2016
		CURRENT EFFECTIVE DATE:	08/22/2016

DIVISION/DEPARTMENT: Laney College

1. REQUESTED CREDIT CLASSIFICATION:

Credit - Degree Applicable
Course is not a basic skills course.
Program Applicable

2. DEPT/COURSE NO:

MATH 013

3. COURSE TITLE:

Introduction to Statistics

4. COURSE: Laney Course Updating

TOP NO. 1701.00

5. UNITS: 4.00

HRS/WK LEC: 4.00 Total: 70.00

HRS/WK LAB:

HRS/WK TBA:

6. NO. OF TIMES OFFERED AS SELETED TOPIC: AVERAGE ENROLLMENT:

7. JUSTIFICATION FOR COURSE:

Satisfies the General Education Analytical Thinking requirement for Associate Degrees. Partially satisfies mathematics requirement for the Associate in Arts degree with a major in mathematics. Satisfies the quantitative reasoning component required for transfer to UC, CSU, and some independent four-year colleges.

8. COURSE/CATALOG DESCRIPTION

Introduction to theory and practice of statistics: Collecting data, Sampling; observational and experimental studies. Organizing data: Univariate and bivariate tables and graphs; histograms. Describing data: Measures of location, spread, and correlation. Theory: Probability; random variables; binomial and normal distributions. Drawing conclusions from data: Confidence intervals; hypothesis testing; z-tests, t-tests, and chi-square tests; one-way analysis of variance. Regression. Non-parametric methods.

9. OTHER CATALOG INFORMATION

- a. Modular: No If yes, how many modules:
- b. Open entry/open exit: No
- c. Grading Policy: Letter Grade Only
- d. Eligible for credit by Exam: No
- e. Repeatable according to state guidelines: No
- f. Required for degree/certificate (specify):
Existing - AA/AS area 4b
- g. Meets GE/Transfer requirements (specify):
Acceptable for credit: CSU, UC
- h. C-ID Number: Math 110 Expiration Date:

i. Are there prerequisites/corequisites/recommended preparation for this course? Yes

Date of last prereq/coreq validation: 04/15/2016

j. Acceptable for Credit: CSU/UC

- 10. LIST STUDENT PERFORMANCE OBJECTIVES (EXIT SKILLS):** (Objectives must define the exit skills required of students and include criteria identified in Items 12, 14, and 15 - critical thinking, essay writing, problem solving, written/verbal communications, computational skills, working with others, workplace needs, SCANS competencies, all aspects of the industry, etc.)(See SCANS/All Aspects of Industry Worksheet.)

Students will be able to:

1. Distinguish among different scales of measurement and their implications;
2. Present and interpret data in tables and graphs;
3. Compute measures of central tendency and variation for a data set;
4. Identify the sample space and interpret the probability of an event;
5. Calculate the mean, standard deviation, and variance of a discrete distribution;
6. Calculate probabilities related to normal and t-distributions;
7. Identify standard sampling and data-gathering methods and their respective advantages and disadvantages;
8. Distinguish the difference between sampling distributions and population distributions, and use the Central Limit Theorem for analysis;
9. Construct and interpret confidence intervals involving normal and t-distributions;
10. Formulate appropriate hypothesis tests in various contexts involving one and two populations and involving normal, t- and chi-square distributions, and interpret the results;
11. Determine and interpret levels of statistical significance and p-values;
12. Identify basic concepts of hypothesis testing, such as Type I and Type II errors;
13. Interpret the output of a technology-based statistical analysis;
14. Use linear regression for estimation and inference and interpret the associated statistics;
15. Use ANOVA 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.

- 11A. COURSE CONTENT:** List major topics to be covered. This section must be more than listing chapter headings from a textbook. Outline the course content, including essential topics, major subdivisions, and supporting details. It should include enough information so that a faculty member from any institution will have a clear understanding of the material taught in the course and the approximate length of time devoted to each. There should be congruence among the catalog description, lecture and/or lab content, student performance objectives, and the student learning outcomes. List percent of time spent on each topic; ensure percentages total 100%.

LECTURE CONTENT:

1. Introduction to statistical thinking (10%):
 - (a) Types of variables
 - (b) Different levels and scales of measurement
 - (c) Populations and samples, parameters and statistics
2. Descriptive statistics (15%):
 - (a) Describing and exploring categorical data using charts, graphs, tables and numerical summaries
 - (b) Describing and exploring numerical data using charts, graphs, tables and numerical summaries
 - (c) Measures of central tendency, variation, and relative position
3. Probability (12%):
 - (a) Sample spaces, outcomes, events, and probabilities
 - (b) Interpretation of probability in terms of the long-term behavior of the relative frequency
 - (c) Probability rules
 - (d) Random variables and expected value

4. The binomial distribution (12%):
 - (a) Binomial procedures and binomial distributions
 - (b) Mean and standard deviation of a binomial distribution
5. The normal distribution (12%):
 - (a) Normal distributions and the standard normal distribution
 - (b) Sampling and sampling distributions
 - (c) The Central Limit Theorem
 - (d) The normal approximation to a binomial distribution
6. Confidence intervals (12%):
 - (a) The meaning of a confidence interval
 - (b) Confidence interval estimation involving samples from one and two populations, including cases employing the t-distribution
 - (c) Applications using data from business, social sciences, psychology, life science, health science, and education
7. Hypothesis testing (12%):
 - (a) Elements of hypothesis testing
 - (b) Hypothesis tests involving samples from one and two populations, including cases employing the t-distribution.
 - (c) Type I and Type II errors
 - (d) Applications using data from business, social sciences, psychology, life science, health science, and education
8. Chi-square tests (2%):
 - (a) The chi-square distribution
 - (b) Test for independence; test for goodness-of-fit
9. Correlation and linear regression (10%):
 - (a) Scatterplots
 - (b) The linear correlation coefficient and its interpretation
 - (c) The regression line
 - (d) Estimation and inference
 - (e) Applications
10. Analysis of variance (2%):
 - (a) One-way ANOVA: decomposition of the total variation and the meaning of the components
 - (b) The test statistic and the F-distribution
 - (c) Applications
11. Non-parametric statistics (1%):
 - (a) One-sample test
 - (b) Two-sample test
12. Statistical analysis using EXCEL or graphing calculators (throughout the course)

11B. LAB CONTENT:**12. METHODS OF INSTRUCTION** (List methods used to present course content.)

1. Lecture
2. Projects
3. Other (Specify)
4. Discussion
5. Distance Education

Other Methods:

1. Lecture, introducing the major concepts, theory, and applications.
2. Class discussion, involving

questions and answers, to amplify and clarify ideas, and to emphasize alternative approaches and their underlying rationales.

- 13. ASSIGNMENTS:** 8.00 hours/week (List all assignments, including library assignments. Requires two (2) hours of independent work outside of class for each unit/weekly lecture hour. Outside assignments are not required for lab-only courses, although they can be given.)

Out-of-class Assignments:

1. Problem sets: equivalent in content and level of difficulty to those covered in the lectures; additional problems introduce supplemental concepts requiring the synthesizing of various concepts. 2. Test and Final examination.

ASSIGNMENTS ARE: (See definition of college level):
Primarily College Level

- 14. STUDENT ASSESSMENT:** (Grades are based on):
ESSAY (Includes "blue book" exams and any written assignment of sufficient length and complexity to require students to select and organize ideas, to explain and support the ideas, and to demonstrate critical thinking skills.)

COMPUTATION SKILLS

NON-COMPUTATIONAL PROBLEM SOLVING (Critical thinking should be demonstrated by solving unfamiliar problems via various strategies.)

SKILL DEMONSTRATION

- 15. TEXTS, READINGS, AND MATERIALS**

A. Textbooks:

Lepowsky, W.. 2015. *Statistics in Action* 2nd. Krishna

Triola, M.. 2015. *Essentials of Statistics* 5th. Pearson

Weiss, N.. 2012. *Introductory Statistics* 9th. Pearson

*Date is required: Transfer institutions require current publication date(s) within 5 years of outline addition/update.

B. Additional Resources:

Library/LRC Materials and Services:

The instructor, in consultation with a librarian, has reviewed the materials and services of the College Library/LRC in the subject areas related to the proposed new course

Are print materials adequate? Yes

Are nonprint materials adequate? Yes

Are electronic/online resources available? Yes

Are services adequate? Yes

Specific materials and/or services needed have been identified and discussed. Librarian comments:
Please provide librarian with list of recommended supplementary (non-textbook) titles to support the curriculum.

C. Readings listed in A and B above are: (See definition of college level):

Primarily college level

- 16. DESIGNATE OCCUPATIONAL CODE:**

E - Non-Occupational

17. LEVEL BELOW TRANSFER:

Y = Not Applicable

SUPPLEMENTAL PAGE

Use only if additional space is needed. (Type the item number which is to be continued, followed by "continued.")

Show the page number in the blank at the bottom of the page. If the item being continued is on page 2 of the outline, the first supplemental page will be "2a." If additional supplemental pages are required for page 2, they are to be numbered as 2b, 2c, etc.)

1a. Prerequisites/Corequisites/Recommended Preparation:

PREREQUISITE(S):

MATH 203: Intermediate Algebra

Subject course and pre/corequisite is: Sequential

or

MATH 211D: Intermediate Algebra (Lab)

Subject course and pre/corequisite is: Sequential

or

MATH 206: Algebra for Statistics

Subject course and pre/corequisite is: Sequential

or

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