

MERRITT COLLEGE COURSE OUTLINE

COLLEGE:		STATE APPROVAL DATE:	12/05/2018
ORIGINATOR:	Daniel Lawson	STATE CONTROL NUMBER:	CCC00035 5410
		BOARD OF TRUSTEES APPROVAL DATE:	11/13/2018
		CURRICULUM COMMITTEE APPROVAL DATE:	03/28/2018
		CURRENT EFFECTIVE DATE:	08/01/2019

DIVISION/DEPARTMENT:

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: MC Course Changes in Catalog Info

TOP NO. 1701.00

5. UNITS: 4.000

HRS/WK LEC: 4.00 **Total:** 70.00

HRS/WK LAB:

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

7. JUSTIFICATION FOR COURSE:

Course satisfies General Education requirements and is required for Anthropology, Economics, Human Ecology, Nutrition & Dietetics AS-T, Mathematics, and Mathematics AS-T. Course meets AA/AS area 4b, CSU area B4, IGETC area 2 requirements, and is transferable to the CSU, UC systems.

8. COURSE/CATALOG DESCRIPTION

Introduction to the 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 and nonparametric 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):

Mathematics, Mathematics

g. Meets GE/Transfer requirements (specify):

AA/AS area 4b CSU GE-Breadth area B4 IGETC area 2

h. C-ID Number: Expiration Date:

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

Date of last prereq/coreq validation: 12/11/2017

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. Discuss and explain statistical concepts (including scales of measurement) and procedures for data collection.
2. Construct and interpret univariate and bivariate tables and graphs.
3. Compute and interpret measures of central tendency, position, and variation for a given data set or discrete distribution.
4. Apply concepts of sample space and compute and interpret the probability of an event.
5. Use binomial, normal and t-distributions to calculate probabilities.
6. Distinguish the difference between sample and population distributions and analyze the role played by the Central Limit Theorem.
7. Construct and interpret confidence intervals.
8. Determine and interpret levels of statistical significance including p-values.
9. Interpret the output of a technology-based statistical analysis.
10. Identify the basic concept of hypothesis testing including Type I and Type II errors.
11. Perform and interpret hypothesis tests involving samples from one and two populations.
12. Use linear regression and ANOVA analysis for estimation and inference, and interpret the associated statistics.
13. Apply statistics to real-world applications based on data from disciplines including business, social sciences, psychology, life science, health science and education.
14. Correctly apply statistics to other fields, and read and understand statistical studies.
15. Assess given information, explore alternative approaches, and arrive at conclusions based on evidence and the application of appropriate concepts.

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 descriptive statistics: Terminology, sampling, public opinion polls, introduction to confidence intervals. 5%
2. Organizing data: Univariate numerical data, other univariate data, bivariate data. 5%
3. Describing data: Measures of location, measures of spread, standard deviations and percentage distribution of data, grouped data and levels/scales of measurement. 10%
4. Probability and probability distributions: Introduction, compound events and probability laws, random variables and expected value. 10%
5. Binomial probability distribution: Binomial probabilities, applications. 5%
6. Normal probability distribution: Normal distributions, the standard normal distribution, applications, the normal approximation to the binomial distribution. 10%
7. Sampling distributions: Sampling distribution of the sample proportion, sampling distribution of the sample mean, and the central limit theorem. 5%
8. Confidence intervals: Sample mean, large sample size; sample mean, small sample size; sample proportion. 5%
9. Introduction to statistical inference, hypothesis testing: The concept, one mean, one proportion, experiments, two means, two proportions. 5%
10. Applications of chi-square, contingency table: Independence, goodness-of-fit, homogeneity. 10%
11. Analysis of variance: The context, one-way ANOVA. 5%
12. Paired data and scatter diagrams, correlation and regression: Correlation coefficient, the SD line and regression line, the regression concept, inference concerning correlation and regression. 10%
13. Selected non-parametric statistical tests: One-sample test, two-sample test. 5%
14. Applications using data from disciplines including business, social sciences, psychology, life science, health science, and education. 5%
15. Statistical analysis using technology such as SPSS, EXCEL, Minitab, or graphing calculators. 5%

11B. LAB CONTENT:

n/a

12. METHODS OF INSTRUCTION (List methods used to present course content.)

1. Other (Specify)
2. Discussion
3. Lecture

Other Methods:

Class discussion involving question and answer sessions to explain, amplify and clarify ideas, and to emphasize alternative approaches and the underlying rationales. Illustrations and examples.

13. ASSIGNMENTS: 0.00 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. Assigned text readings.
2. Problem sets/exercises, equivalent in content and level, but different from those covered in the lectures.
3. Assigned problems/exercises introducing supplemental concepts and requiring the synthesis of various concepts.

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:

Robert Johnson and Patricia Kuby. 2012. *Elementary Statistics* 11th . Cengage Learning
Triola, Mario. 2014. *Essentials of Statistics* 5th. 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? No

Are electronic/online resources available? No

Are services adequate? No

Specific materials and/or services needed have been identified and discussed. Librarian comments:

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
- 18. CALIFORNIA CLASSIFICATION CODE:**
Y - Credit Course
- 19. NON CREDIT COURSE CATEGORY:**
Y - Not Applicable
- 20. FUNDING AGENCY CATEGORY:**
Not Applicable - 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:

- MATH 203: Intermediate Algebra
or

PREREQUISITE:

- MATH 206 Algebra for Statistics
or

PREREQUISITE:

- MATH 211D: Intermediate Algebra (Lab)
or

PREREQUISITE:

- MATH 230: Elementary and Intermediate Algebra for Business or STEM majors
or

PREREQUISITE:

- MATH 240: Elementary and Intermediate Algebra for Liberal Arts and Social Science

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STUDENT LEARNING OUTCOMES

1. **Outcome:** Describe numerical and categorical data using statistical terminology and notation.

This outcome maps to the following Institution Outcomes:

- Quantitive Reasoning - Apply college-level mathematical reasoning to analyze and explain real world issues and to interpret and construct graphs, charts, and tables.
- Critical Thinking - Think critically using appropriate methods of reasoning to evaluate ideas and identify and investigate problems and to develop creative and practical solutions to issues that arise in workplaces, institutions, and local and global communities.
- Information & Computer Literacy - Use appropriate technology to identify, locate, evaluate and present information for personal, educational and workplace goals.

Assessment: exam, essay, student project, written exercise

2. **Outcome:** Analyze and explain relationships between variables in a sample or a population.

This outcome maps to the following Institution Outcomes:

- Critical Thinking - Think critically using appropriate methods of reasoning to evaluate ideas and identify and investigate problems and to develop creative and practical solutions to issues that arise in workplaces, institutions, and local and global communities.

- Quantitive Reasoning - Apply college-level mathematical reasoning to analyze and explain real world issues and to interpret and construct graphs, charts, and tables.
- Information & Computer Literacy - Use appropriate technology to identify, locate, evaluate and present information for personal, educational and workplace goals.

Assessment: exam, essay, student project, written exercise

3. **Outcome:** Make inferences about populations based on data obtained from samples.

This outcome maps to the following Institution Outcomes:

- Critical Thinking - Think critically using appropriate methods of reasoning to evaluate ideas and identify and investigate problems and to develop creative and practical solutions to issues that arise in workplaces, institutions, and local and global communities.
- Quantitive Reasoning - Apply college-level mathematical reasoning to analyze and explain real world issues and to interpret and construct graphs, charts, and tables.
- Information & Computer Literacy - Use appropriate technology to identify, locate, evaluate and present information for personal, educational and workplace goals.

Assessment: exam, essay, student project, written exercise

4. **Outcome:** Given a particular statistical or probabilistic context, determine whether or not a particular analytical methodology is appropriate and explain why.

This outcome maps to the following Institution Outcomes:

- Critical Thinking - Think critically using appropriate methods of reasoning to evaluate ideas and identify and investigate problems and to develop creative and practical solutions to issues that arise in workplaces, institutions, and local and global communities.
- Quantitive Reasoning - Apply college-level mathematical reasoning to analyze and explain real world issues and to interpret and construct graphs, charts, and tables.
- Information & Computer Literacy - Use appropriate technology to identify, locate, evaluate and present information for personal, educational and workplace goals.

Assessment: exam, essay, student project, written exercise

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