BUTTE COLLEGE
COURSE OUTLINE

I. **CATALOG DESCRIPTION**

MATH 18 - Introduction to Statistics **3 Unit(s)**

Prerequisite(s): MATH 124 or Math Level V
Recommended Prep: Two years of high school algebra and Reading Level IV
Transfer Status: CSU/UC
51 hours Lecture

The use of probability techniques, hypothesis testing, and predictive techniques to facilitate decision-making. Topics include descriptive statistics; probability and sampling distributions; statistical inference; correlation and linear regression; analysis of variance, chi-square and t-tests; and application of technology for statistical analysis including the interpretation of the relevance of the statistical findings. Applications using data from disciplines including business, social sciences, psychology, life science, health science, and education. (C-ID MATH 110).

II. **OBJECTIVES**

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

A. Distinguish among different scales of measurement and their implications.
B. Interpret data displayed in tables and graphically.
C. Apply concepts of sample space and probability.
D. Calculate measures of central tendency and variation for a given data set.
E. Identify the standard methods of obtaining data and identify advantages and disadvantages of each.
F. Calculate the mean and variance of a discrete distribution.
G. Calculate probabilities using normal and student's t-distributions.
H. Distinguish the difference between sample and population distributions and analyze the role played by the Central Limit Theorem.
I. Construct and interpret confidence intervals.
J. Determine and interpret levels of statistical significance including p-values.
K. Interpret the output of a technology-based statistical analysis.
L. Identify the basic concept of hypothesis testing including Type I and II errors.
M. Formulate hypothesis tests involving samples from one and two populations.
N. Select the appropriate technique for testing a hypothesis and interpret the result.
O. Use linear regression and ANOVA analysis for estimation and inference, and interpret the associated statistics.
P. 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.

III. **COURSE CONTENT**

A. **Unit Titles/Suggested Time Schedule**

Lecture

Topics	Hours
1. Summarizing data graphically and numerically	3.00
2. Descriptive statistics: measures of central tendency, variation, relative position, and levels/scales of measurement	4.00
3. Sample spaces and probability	4.00

4.	Random variables and expected value	4.00
5.	Sampling and sampling distributions	2.00
6.	Discrete distributions – Binomial	4.00
7.	Continuous distributions – Normal	5.00
8.	The Central Limit Theorem	4.00
9.	Estimation and confidence intervals	4.00
10.	Hypothesis Testing and inference, including t-tests for one and two populations, and Chi-square test	6.00
11.	Correlation and linear regression and analysis of variance (ANOVA)	4.00
12.	Applications using data from disciplines including business, social sciences, psychology, life science, health science, and education	4.00
13.	Statistical analysis using technology such as SPSS, EXCEL, Minitab, or graphing calculators	3.00
Total Hours		51.00

IV. METHODS OF INSTRUCTION

A. Lecture
B. Collaborative Group Work
C. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
D. Discussion
E. Board Work

V. METHODS OF EVALUATION

A. Exams/Tests
B. Quizzes
C. Class Assignments and Class Response
D. Daily Homework Assignments, where the student will demonstrate problem-solving skills

VI. EXAMPLES OF ASSIGNMENTS

A. Reading Assignments
   1. Read the section in the textbook on measures of variation and be able to describe the range, variance, and standard deviation for a data set.
   2. Read the section in the textbook on sampling distributions and be able to describe a sampling distribution of sample means and state the Central Limit Theorem.

B. Writing Assignments
   1. Write a paragraph explaining how to find a deviation of an entry in a data set and how you find the standard deviation for the data set.
   2. After applying the Central Limit Theorem to find the probability of a sample mean, write a sentence interpreting your results.

C. Out-of-Class Assignments
   1. Review the section on measures of central tendency and solve the problems in the exercises assigned by the instructor.
   2. Review the section on sampling distributions and solve the problems in the exercises assigned by the instructor.

VII. RECOMMENDED MATERIALS OF INSTRUCTION

Textbooks:

A. Larson, R. & Farber, B. Elementary Statistics. 5th Edition. Pearson, 2012.

Materials Other Than Textbooks:

A. MyMathLab, a computer web-based learning system
B. Graphing calculator with statistical capabilities

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