**Las Positas College**
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**Course Outline for MATH 42A**

**INTRO TO PROB AND STATISTICS**

**Effective: Fall 2009**

I. CATALOG DESCRIPTION:
MATH 42A — INTRO TO PROB AND STATISTICS — 3.00 units

Descriptive statistics, including measures of central tendency and dispersion; elements of probability; tests of statistical hypotheses; correlation and regression; applications in various fields. Introduction to the use of a computer software package to complete both descriptive and inferential statistics problems.

3.00 Units Lecture

**Prerequisite**
MATH 55 - Intermediate Algebra for STEM
with a minimum grade of C
or

MATH 55B - Intermediate Algebra for STEM B
with a minimum grade of C
or

MATH 55Y - Intermediate Algebra
with a minimum grade of C

**Grading Methods:**
Letter Grade

**Discipline:**

| | MIN |
|---|---|
| **Lecture Hours:** | 54.00 |
| **No Unit Value Lab** | 18.00 |
| **Total Hours:** | 72.00 |

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:
**Before entering the course a student should be able to:**

A. MATH55
B. MATH55B
C. MATH55Y

IV. MEASURABLE OBJECTIVES:
**Upon completion of this course, the student should be able to:**

A. Define different types of statistics, how they are used and misused;
B. Take raw data and organize it into tables, charts, and/or graphs;
C. Calculate and understand the meaning of the mean, median, mode range, variance, and standard deviation as they relate to a population, sample or distribution;
D. Determine the fundamental concepts of probability and be able to calculate probabilities using some basic rules of probability;
E. Solve problems involving the binomial, normal or chi-square distribution;
F. Find confidence intervals and perform hypothesis tests for single populations;
G. Introduction to scatter diagrams and correlation;
H. Perform descriptive and inferential statistics using a software package.

V. CONTENT:
A. Introduction to Statistics
    1. Descriptive vs. Inferential
    2. Types of data
    3. Basic concepts of random section, population, samples
    4. Misuse of statistics
B. Analysis of data

1. Ungrouped data
    a. Measures of central tendency - mean, median, mode
    b. Measures of variation - range, mean absolute deviation, variance, standard deviation
    c. Measures of position - percentiles, deciles, quartiles, z-score
    d. Graphs -stem and leaf, box plot
2. Grouped data
    a. Frequency distributions
    b. Measures of central tendency - mean
    c. Measures of variation - variance, standard deviation
    d. Graphs - histograms, frequency polygons, ogives, pie charts

C. Probability
1. Counting techniques, permutations, combinations
2. Finding sample spaces
3. Solve by addition and multiplication rules
4. Solve using complements and conditional probability
5. Solve using binomial formula
6. Bayes Theorem (optional)

D. Probability distributions - discrete variable
1. Find mean and standard deviation for a probability distribution in general
2. Find mean and standard deviation for a binomial distribution
3. Graph using histograms

E. Normal distributions
1. Basic concepts of normal distributions and the standard distribution
2. Find probabilities for normal distributions using he standard normal distribution
3. Approximate binomials using the standard normal distribution

F. Chi-square distributions
1. Find critical values, using the Chi-square tables

G. Confidence intervals
1. Find for the mean, proportion, variance and standard deviation for a single population

H. Hypothesis testing
1. Mean, proportion, standard deviation, variance of a single population

I. Correlation
1. Scatter diagrams
2. Basic concepts of correlation and its application
3. Find correlation coefficient

J. Software
1. Learn how to use a statistical software package

## VI. METHODS OF INSTRUCTION:

A. Classroom discussion
B. **Lecture** -
C. Demonstration in computer lab
D. Collaborative learning and class projects where applicable

## VII. TYPICAL ASSIGNMENTS:

A. Problems tend to be long and students struggle to understand basic concepts. A typical assignment in hypothesis testing for a single population might be problems 1 through 11 odd. B. A class project (optional) might be to have students select a random sample and find confidence intervals or perform hypothesis tests. C. A typical computer lab assignment might be to randomly generate a sample, and then find specified statistical calculations (mean, median, mode, standard deviation, etc) and graphs (histogram, line graph, pie chart, etc). D. Problem solving 1. Calculate the mean, median, and mode for a set of ungrouped data; 2. Roll a die twice; find the probability of rolling a pair.

## VIII. EVALUATION:

A. **Methods**

1. Exams/Tests
2. Quizzes
3. Projects
4. Lab Activities
5. Other:
    a. Method of evaluation
        1. Text Examinations
            a. Questions involving statistical calculations should be open-ended;
            b. Questions testing properties and definitions may be true/false, multiple choice, completion, or fill-in;
            c. Types of problems:
                1. A study of 40 bowlers showed that their average score was 186.
                2. The standard deviation ws. 6. Find the following:
                    1. 95% confidence interval for the true average score;
                    2. test the claim that the true average score was at least 190;
                3. Roll a die 5 times. Let x = number of odds that turn up. Find the probability distribution, construct a histogram, and calculate the mean and standard deviation.
                4. List the 6 properties of a binomial probability distribution;
                5. True or false: P(A and B) = P(A) + P(B) ? P(A or B);
                6. _____and_____ are the 2 types of statistics;
                7. Give an example of qualitive data;
                8. The median is the same as which one of the following:
                    1. a) P50 b) D5 c) Q2 d) none e) all
        2. Announced or unannounced quizzes at the option of the instructor
        3. Collect homework at the option of the instructor
        4. Computer assignments
        5. Graphing calculator assignments
        6. Term project at the option of the instructor
        7. Computer lab final at the option of the instructor

B. **Frequency**

1. Frequency of evaluations:
    a. Minimum of 2 exams plus a comprehensive final:
    b. 8 to 12 computer lab assignments;

IX. TYPICAL TEXTS:

1. Triola *Introduction to Statistics.* 11th ed., Pearson, Addison-Wesley Publishers, 2009.
2. Bluman *Elementary Statistics.* 7th ed., McGraw-Hall Publishers, 2009.
3. Sullivan *Statistics: Informed Decisions Using Data.* 2nd ed., Pearson-Prentice Hall Publishers, 2007.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. A scientific or graphing calculator may be required.