Cañada College
Official Course Outline

1. **COURSE ID:** MATH 200   **TITLE:** Elementary Probability and Statistics
   Semester Units/Hours: 4.0 units; a minimum of 64.0 lecture hours/semester
   Method of Grading: Letter Grade Only
   Prerequisite: MATH 120, or MATH 121 or MATH 123 or appropriate score on the District math placement test and other measures as appropriate.
   Recommended Preparation:
   Eligibility for READ 836 and ENGL 836; or ENGL 847 or ESL 400.

2. **COURSE DESIGNATION:**
   Degree Credit
   Transfer credit: CSU; UC
   AA/AS Degree Requirements:
   Cañada GE Area A: ENGLISH LANGUAGE COMMUNICATION AND CRITICAL THINKING: A3: Critical Thinking Requirement
   Cañada: BASIC COMPETENCY REQUIREMENTS: Math
   CSU GE:
   CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B4 - Mathematics/Quantitative Reasoning
   IGETC:
   IGETC Area 2: MATHEMATICAL CONCEPTS AND QUANTITATIVE REASONING: A: Math

3. **COURSE DESCRIPTIONS:**
   Catalog Description:
   This course presents the basic concepts underlying statistical methods and covers descriptive statistics, probability, probability distributions, hypothesis testing, estimates and sample sizes, correlation and regression, chi-square tests, analysis of variance, and nonparametric statistics. Technology is integrated into the course. Applications of statistics to business, life sciences, social sciences, psychology, and other areas are included.
   Schedule of Classes Description
   This course presents the basic concepts underlying statistical methods and covers descriptive statistics, probability, probability distributions, hypothesis testing, estimates and sample sizes, correlation and regression, chi-square tests, analysis of variance, and nonparametric statistics. Technology is integrated into the course. Applications of statistics to business, life sciences, social sciences, psychology, and other areas are included.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
   Upon successful completion of this course, a student will meet the following outcomes:
   A. Define statistical terms.
   B. Compute measures of central tendency and variation.
   C. Plot histogram, scatter plot, box plot.
   D. Identify and apply the basic laws of probability such as complements, independence, and the role of probability in statistics.
   E. Given an inferential statistics problem, identify the appropriate hypothesis test, perform the hypothesis test, and interpret the results.

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
   Upon successful completion of this course, a student will be able to:
   A. Construct a frequency table and draw a histogram.
   B. Draw a stem plot and a box plot.
   C. Calculate the mean, median, mode, midrange, standard deviation, variance and range.
   D. Calculate the mean, standard deviation, and variance.
   E. Describe the 68-95-99.7 rule, the range rule of thumb, and Chebyshev's Theorem.
   F. Distinguish among the shapes of different histograms.
   G. Calculate z-scores, percentiles, deciles, and quartiles.
   H. Demonstrate the basic rules of probability.
   I. Apply the addition rule, the multiplication rule, and the conditional probability rule to simple probability

problems.

J. Construct a confidence interval for a mean (large and small sample size), a proportion, and a standard deviation or variance.
K. Conduct a hypothesis test for a claim about one mean (large or small sample size), one proportion, and one standard deviation or variance.
L. Conduct a hypothesis test for a claim about two independent means (large or small sample sizes).
M. Conduct a hypothesis test for a claim about two dependent means (before/after test)
N. Conduct a hypothesis test for a claim about two proportions.
O. Conduct a hypothesis test for a claim about two standard deviations or variances.
P. Conduct a hypothesis test for goodness of fit.
Q. Conduct a chi-square test for independence.
R. Determine whether or not there is linear correlation.
S. Determine the equation for and plot a regression line.
T. Calculate the coefficient of determination and construct a prediction interval.
U. Conduct a hypothesis test using one-way Analysis of Variance techniques.
V. Use technology to collect, compile and analyze data.

6. **COURSE CONTENT:**
   Lecture Content:
   1. Use technology throughout the course. Technology may include, but is not limited to a graphing calculator, a spreadsheet program such as excel, or any other statistical program.
   2. Describing, Exploring, and Comparing Data
      - Summarizing Data with Frequency Tables, Pictures of Data, Measures of Center, Measures of Variation, Measures of Position
      - Optional - Computer Aided Data Exploration
   3. Probability
      - Fundamentals, The Addition Rule, The Multiplication Rule, Complements and Conditional Probability
      - Optional - Computer Aided Simulations and Counting, Permutations and Combinations
   4. Probability Distributions
      - Random Variables, Binominal Probability Distributions, Mean, Variance, and Standard Deviation for the Binomial Distribution, The Poisson Distribution
   5. Normal Probability Distributions
      - The Standard Normal Distribution, Nonstandard Normal Distributions - Finding Probabilities and Finding Values, The Central Limit Theorem
      - Optional - Normal Distribution as Approximate to Binomial Distribution and Determining Normality
   6. Estimates and Sample Sizes
      - Estimating a Population Mean - Large and Small Samples, Determining Sample Size, Estimating - a Population Proportion and a Population Variance.
      - Apply to disciplines including business, social sciences, psychology, life science, health science, education, and other fields.
   7. Hypothesis Testing
      - Fundamentals of Hypothesis Testing, Testing Claims - about a Mean given a Large Sample, about a Mean given a Small Sample, about a Proportion, about a Standard Deviation or a Variance.
      - Apply to disciplines including business, social sciences, psychology, life science, health science, education, and other fields.
   8. Inferences for Two Samples
      - Inferences about Two Means - Independent and Large Samples, Independent and Small Samples, Matched Pairs, Inferences about Two Proportions, Comparing Variation in Two Samples.
      - Apply to disciplines including business, social sciences, psychology, life science, health science, education, and other fields.
   9. Correlation and Regression
      - Correlation, Regression, Variation and Prediction Intervals.
      - Optional - Multiple Regression and Modeling.
      - Apply to disciplines including business, social sciences, psychology, life science, health science, education, and other fields.
   10. Multinomial Experiments and Contingency Tables
      - Multinomial Experiments: Goodness-Of-Fit.
      - Contingency Tables: Independence and Homogeneity.
      - Apply to disciplines including business, social sciences, psychology, life science, health science,

education, and other fields.
11. Analysis of Variance
   - One-Way ANOVA.
   - Apply to disciplines including business, social sciences, psychology, life science, health science, education, and other fields.

Honors Content:
1. Describing, Exploring, and Comparing Data
   - Summarizing Data with Frequency Tables, Pictures of Data, Measures of Center, Measures of Variation, Measures of Position
   - Optional - Computer Aided Data Exploration
2. Probability
   - Fundamentals, The Addition Rule, The Multiplication Rule, Complements and Conditional Probability
   - Optional - Computer Aided Simulations and Counting, Permutations and Combinations
3. Probability Distributions
   - Random Variables, Binominal Probability Distributions, Mean, Variance, and Standard Deviation for the Binomial Distribution, The Poisson Distribution
4. Normal Probability Distributions
   - The Standard Normal Distribution, Nonstandard Normal Distributions - Finding Probabilities and Finding Values, The Central Limit Theorem
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6. Hypothesis Testing
   - Fundamentals of Hypothesis Testing, Testing Claims- about a Mean given a Large Sample, about a Mean given a Small Sample, about a Proportion, about a Standard Deviation or a Variance
7. Inferences for Two Samples
   - Inferences about Two Means - Independent and Large Samples, Independent and Small Samples, Matched Pairs, Inferences about Two Proportions, Comparing Variation in Two Samples
8. Correlation and Regression
   - Correlation, Regression, Variation and Prediction Intervals
   - Optional - Multiple Regression and Modeling
9. Multinomial Experiments and Contingency Tables
   - Multinomial Experiments: Goodness-Of-Fit
   - Contingency Tables: Independence and Homogeneity
10. Analysis of Variance
    - One-Way ANOVA
11. Projects, Procedures, Perspectives (Recommended)
    - Statistics Group Project, Which Procedure Applies, A Perspective
    - Use of Statistical Tools such as Excel, SAS, MiniTab, or other statistical program to compile and make analysis on data

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**
   Typical methods of instruction may include:
   A. Lecture
   B. Critique
   C. Discussion
   D. Guest Speakers
   E. Individualized Instruction
   F. Observation and Demonstration
   G. Other (Specify): Online Instruction

8. **REPRESENTATIVE ASSIGNMENTS**
   Representative assignments in this course may include, but are not limited to the following:
   Writing Assignments:
   A. Test the claim that the proportion of students who are left handed is 10%.
      (1 to 4 page report, 250-750 words, including diagrams)
   B. Explain how you designed the experiment. Describe your findings.
      (1 to 2 page report, 250-500 words)

Reading Assignments:
- One chapter (approximately 10-30 pages) for each 1-2 weeks.

Other Outside Assignments:
- Research Project: Collect data to support your research.

To be Arranged Assignments (if applicable):
- Not applicable.

9. **REPRESENTATIVE METHODS OF EVALUATION**

Representative methods of evaluation may include:

    A. Exams/Tests
    B. Home Work
    C. Projects
    D. Quizzes

10. **REPRESENTATIVE TEXT(S):**

Possible textbooks include:

    A. Triola, Mario. *Essentials of Statistics*, 3rd ed. New York: Pearson/Addison-Wesley, 2008
    B. DeVeaux, Velleman & Bock. *Intro Stats Technology Update plu MyStatLab Access Card Package*, 3 ed. Pearson, 2012

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Course Originator: Raymond Lapuz