MASTER SYLLABUS
SCHOOL OF BUSINESS AND ECONOMICS
SONOMA STATE UNIVERSITY
BUS 211, Business Statistics, 4 units

I. **Catalog Description:** BUS 211 is an introduction to business statistics in practice. The course focuses on application of statistical methods, interpretation of statistical data, making statistical inferences, and how to use statistical data to aid in decision making or problem solving. Upon successful completion of the course, students would have gained understanding of a statistician’s role and skills in formulating coherent questions, gathering data pertinent to those questions, and addressing those questions using statistical procedures. Prerequisite: Satisfaction of ELM requirement.

II. **Prerequisites:**

The ELM is designed to assess the skill levels of entering CSU students in the areas of Mathematics typically covered in three years of rigorous college preparatory Mathematics courses in high school. Those undergraduates who do not demonstrate college-level skills will be directed to courses or programs designed to help them attain these skills.

The use of statistical software facilitates the solution of statistical problems. Computer proficiency is recommended.

III. **Course Learning Outcomes:** After successful completion of this course, the BUS 211 student would have met the General Education Area B4 programmatic learning objectives. Those objectives are:

- Improve a student’s problem-solving skills and logical and critical thinking.
- Appreciate the beauty and power of Mathematics.
- Understand and appreciate the role of Mathematics in our society and culture, today and in the past.
- Apply mathematical skills and understanding in other settings.
- Understand and communicate mathematical ideas orally and in writing and be able to work with others in a problem-solving setting.

IV. **Course Materials:** Both a textbook and software packages are required for this course. The textbook will be determined by the instructor with the approval of the Course Coordinator for adjunct faculty. The software packages will be those supported by the University in open labs for spreadsheets, web browsing, and e-mail. In addition, the instructor may select additional software packages considered necessary for completion of the course homework.
V. Teaching Methods: To be determined by instructor, may include lecture, discussion, problem review and solution. Use of a computer statistical package is required. Any teaching methods used in addition to the methods presented above will be determined by the instructor.

VI. Evaluation Tools: Evaluation of student work will be done with the use of examinations, the use of statistical packages on computers, a project and/or homework assignments.

VII. Project: To provide students with an experience in undertaking and completing a realistic and original piece of work, applying techniques learned, including the technical skills of analysis, logical and critical thinking, and, making statistical inferences, completion of a project is required. Students may decide on an appropriate and interesting question to investigate. Part of answering the question must involve regression, and/or hypothesis test, and/or analysis of variance. Students may collect data via an observational or experimental study, or from an archival source. Campus surveys must be preapproved by appropriate SSU administration and must be done representatively.

VIII. Course Topics

Data
- Elements, Variables, and Observations
- Scales of Measurement
- Categorical and Quantitative
- Cross Sectional and Time Series

Statistical Inference
- Population and Sample
- Process of Statistical Inference

Descriptive Statistics for Qualitative and Quantitative Data (Tabular and Graphical Displays)
- Frequency, Relative Frequency and Percent Frequency Distributions
- Cumulative Distributions
- Cross Tabulations & Simpson’s Paradox
- Bar Chart
- Pie Chart
- Histogram
- Boxplot
- Stem-and-Leaf Display
- Scatter Diagram, Best Fitting Trend Line and Two Variable Relationships

Descriptive Statistics: Numerical
- Measures of Location (Mean, Weighted Mean, Median, Mode, Percentile, Quartiles)
- Measures of Variability (Range, Interquartile Range, Variance, Standard Deviation, Coefficient of Variation)
Measures of Distribution Shape, Relative Location and Detecting Outliers
Measures of Association Between Two Variables (Covariance and Correlation Coefficient)

Sampling and Sampling Distributions
Finite and Infinite Populations
Expected Value of Sample Mean
Standard Deviation of Sample Means
Form of the Sampling Distribution of Sample Means
Central Limit Theorem
Relationship Between the Sample Size and the Sampling
Expected Value of Sample Proportion
Standard Deviation of Sample Proportion
Form of the Sampling Distribution of Sample Proportion
Random Samples and other Sampling Methods

Interval Estimation
Population Mean: Sigma Known
Population Mean: Sigma Unknown
Population Proportion
Margin of Error and the Interval Estimation
Using Small Samples
Determining the Sample Size

Hypothesis Tests
Forms of Null and Alternative Hypotheses
Type I and Type II Errors
Population Mean: Sigma Known
Population Mean: Sigma Unknown
One-Tailed Test
Two Tailed Test
Population Proportion
Hypothesis Testing and Business Decision Making

Inference About Means and Proportions with Two Populations
Population Means: Sigmas Known
Population Means: Sigmas Unknown
Interval Estimation of Difference Between Two Population Means
Hypothesis Test About the Difference Between Two Population Means
Interval Estimation of Difference Between Two Population Proportions
Hypothesis Test About the Difference Between Two Population Proportions

Comparing Multiple Proportions, Test of Independence and Goodness of Fit
Multiple Comparison Procedure
Chi-Square Test
Multinomial Probability Distribution
Normal Probability Distribution
Experimental Design and Analysis of Variance
  Testing for the Equality of K Population Means
  Data Collection
  Assumptions for ANOVA
  Between-Treatments Estimate of Population Variance
  Within-Treatments Estimate of Population Variance
  Comparing the Variance Estimates: The F Test
  Randomized Block Design and Factorial Experiment
  ANOVA Table and Procedure

Regression Analysis
  Simple and Multiple Linear Regression Models & Regression Equations
  Estimated Regression Equation
  Least Squares Method
  Coefficient of Determination
  Model Assumptions
  Testing for Significance: T Test and F Test
  Residual Analysis: Validating Model Assumptions
  Multicollinearity
  Variable Selection Procedures for Multiple Regression