STA 200 Course Outline

I. Understanding Statistics
   A. Define statistics
   B. Understand that statistics is used to make relevant decisions
   C. Understand the distinction between statistical science and the reporting of numerical facts

II. Experiments & Observational Studies
   A. Questions & Measures – Understand and distinguish between:
      1. Reliability
      2. Validity
      3. Bias
      4. Variability
   B. Random Variables
      1. Determine categorical and measurement variables
      2. Determine continuous and discrete variables
      3. Identify experimental variables
         a. Response
         b. Explanatory
         c. Confounding
         d. Interacting
         e. Lurking
   C. Experiments – Understand and identify use of the following elements:
      1. Treatments
      2. Control groups, placebo and placebo effect
      3. Experimental Design
      4. Randomization
      5. Causation
   D. Observational Studies – Understand and identify use of the following elements:
      1. Types of observational studies
         a. Case-control study
         b. Retrospective study
         c. Prospective study
      2. Efficacy

III. Sampling – Indicate knowledge of purpose and importance of random sampling
   A. Terminology
      1. Population
      2. Sampling frame
      3. Sample

B. Margin of Error
C. Sampling methods
    1. Simple Random Sampling
    2. Stratified Random Sampling
    3. Systematic Random Sampling
    4. Other Sampling Methods
D. Sampling variability
    1. Behavior of sample proportions
    2. Behavior of sample means

IV. Descriptive Statistics
A. Statistic vs. Parameter – Define and understand statistic and parameter
B. Measures of central tendency – Determine when use is appropriate and compute
    1. Mean
    2. Median
    3. Mode
C. Measures of dispersement – Understand relationship and purpose
    1. Variance
    2. Standard deviation
    3. Quartiles
D. Graphical Displays
    1. Displays for Measurement Data – Understand and determine appropriateness, shape, variability, etc.
        a. Histogram
        b. Stemplot
        c. Boxplot
        d. Scatterplot
        e. Line Graph
    2. Displays for Categorical Data – Understand and determine appropriateness
        a. Bar graph
        b. Pie chart
        c. Pictogram

V. Inferential Statistics
A. Confidence Intervals – Knowledge and understanding of confidence interval and purpose
    1. Margin of Error
    2. Standard error
    3. Confidence level
    4. Interval interpretation

B. Hypothesis Testing - Knowledge and understanding of hypothesis test and purpose
    1. Null & Alternative hypotheses
    2. Test statistic
    3. Significance level
    4. Type I and Type II errors
    5. Statistical significance
    6. Test interpretation

VI. Normal Distribution – Understand and determine information related to the normal distribution
- A. Standard Score
- B. Percentiles and probabilities
- C. Empirical Rule
- D. Relation to sampling variability

VII. Relationships – Indicate knowledge and understanding in determining types of relationships and their implications
- A. Measurement variables
    1. Scatterplots
    2. Correlation
    3. Regression
        a. Least squares equation prediction
        b. Coefficient interpretation
    4. Coefficient interpretation
- B. Categorical variables
    1. Conditional percentages
    2. Risk

VIII. Probability – Knowledge and understanding of basic probability rules and computations
- A. Relative frequency
- B. Accumulated probability
- C. Expected Value
- D. Probability rules
    1. Multiplication rule
    2. Addition rule
    3. Conditional probability
    4. Independence
- E. False Positives