

## STAT 113, FALL 2020: SPECIFIC LEARNING OBJECTIVES (SLOS)

Below is a list of the Specific Learning Objectives (SLOs) that the course grade is based on. Each graded item is associated with one or more of these objectives. The lion's share (70%) of the course grade is based on individual SLO grades. The grade for an individual SLO is the average of the highest mark associated with that SLO from an individual assignment (quiz or exam question), and the highest (or next highest) mark associated with that SLO from any other source (which can be another quiz or exam question, or can come from homework or the project).

### A. Elements of Data, Study Design and Confounding

1. Identifying Cases, and Variables in a Data Set
2. Classifying Variables Based on Measurement Scale and Role
3. Identifying Potential Sources of Sampling Bias (Lack of Representativeness of a Data Set)
4. Identifying Potential Sources of Measurement Bias
5. Distinguishing Between Observational and Experimental Designs
6. Identifying Potential Confounding Variables
7. Distinguishing Between Conditional and Marginal Associations

### B. Description and Visualization of Data

1. Numerical and Graphical Summaries for Single Categorical Variables
2. Reasoning about Center and Shape of Distributions of a Quantitative Variable
3. Numerical and Graphical Summaries for Two Categorical Variables
4. Reasoning about Variability of a Quantitative Variable
5. Correlation to Describe Associations Between Quantitative Variables
6. Using Regression Models to Predict One Quantitative Variable from Another
7. Recognizing and Diagnosing the Appropriateness of Regression Models

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*Date:* Last Revised September 20, 2020.

C. Generalizing from the Data to the Phenomenon

1. Distinguishing Between the Data and the Phenomenon
2. Reasoning about Sampling Error
3. Interpreting Interval Estimates
4. Formulating and Interpreting Statistical Hypotheses
5. Interpreting P-Values
6. Reasoning about False Positives and False Negatives
7. Reasoning about Statistical Power and Effect Size

D. Techniques and Technology

1. Producing Descriptive Summaries and Visualizations
2. Techniques for Transparent and Reproducible Results
3. Using Randomization and Simulation Techniques for Inference
4. Parameter Estimation Techniques Based on the Central Limit Theorem and Standardized Statistics
5. Basic Hypothesis Testing Techniques Using the Central Limit Theorem and Standardized Statistics
6. Techniques for Comparing Categorical Data From More than Two Groups
7. Techniques for Comparing Quantitative Data From More than Two Groups

E. Application and Communication

1. Framing Research Questions in Statistical Terms
2. Collecting Appropriate and Representative Data
3. Selecting Appropriate Descriptive Tools
4. Selecting Appropriate Inferential Tools
5. Interpreting Results in the Concrete Context of the Question
6. Identifying Limitations and Communicating Caveats
7. Producing Clean and Concise Written Reports