

Unit 3 – Planning and Conducting Studies and Experiments (3 Weeks)

Enduring Understandings

- Careful planning is essential to obtaining valid data. [C2b]
- Clarifying the question leads to appropriate methodology. [C2b]
- The analysis is only as good as the data. [C2b]
- Students will understand how to deconstruct statistical information in an effort to evaluate its validity and assess the aims of the authors in presenting the information. [C2b]

C2b: The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on sampling and experimentation.

Essential Questions

- How do we obtain data?
- To what extent is all data biased?
- To what extent does data collection methodology affect results?
- How can variable be eliminated through randomization?
- How does one decide between an observational study, an experiment, and a simulation?
- To what extent can data be purposefully biased?

Knowledge and Skills

Methods of data collection:

- Census, Sample survey, Experiment, Observational study

Planning and conducting surveys

- Know the characteristics of a well-designed survey
- Understand populations, samples, and random selection
- Recognize sources of bias in sampling and surveys (undercoverage, voluntary response, etc.)
- Recognize and apply sampling methods (simple random sampling, stratified random sampling, and cluster sampling)

Planning and conducting experiments

- Know the characteristics of a well-designed and well-conducted experiment
- Understand treatments, control groups, experimental units, random assignments, and replication
- Recognize sources of bias (including confounding variables, the placebo effect, and blinding)
- Recognize and apply completely randomized designs
- Recognize and apply different experimental designs (randomized block design, matched pairs design)

Generalize results from collected data

Understand the types of conclusions that may be drawn from collected data

Sample Assessments/Activities

- Students find and statistically analyze an article in a newspaper, magazine, or other current publication. Students consider: [C2b, C4, C3]
 - Is this an observational study or an experiment?

C4: The course teaches students how to communicate methods, results, and interpretations using the vocabulary of statistics.

- What was the sampling design or experimental design?
- What are the possible biases in the study?
- How was randomization utilized?
- To what extent are the conclusions in the article justified and able to be generalized?
- Students complete a variety of released free response items focused on sampling methods, simulations, and experimental design.

C3: The course draws connections between all aspects of the statistical process, including design, analysis, and conclusions.