

Course Design

This course is designed to introduce students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. The students will begin by looking at a variety of data displays. They will display and describe the data from the given information. Students will learn probability rules, and then produce their own data, and use probability, hypothesis testing, and models to support inferences about their data. The students will also analyze two-way tables and find inferences for regression.

Remarks

This class is mainly based on making inferences based on surveys, samples, and experiments. Therefore the students will have hands on activities where they will come up with their own judgments based statistical inference procedures.

This course is part of the KAP Program at Kenyon College, overseen by Dr. Brad Hartlaub, Mathematics Professor. Students can receive Kenyon College credit.

Technology

The use of the TI-83 and/or TI 83 plus for everyday activities will be required. We will also be using existing websites and programs to complete some of the experiments. From these websites, we will use the applets they provide to enhance understanding. Finally, we will use Minitab for computer technology in the classroom. For Minitab activities, our school's Math lab and library is equipped with Minitab.

Primary Textbook

David S. Moore/George P. McCabe: *Introduction to the Practice of Statistics*, 4th edition
Freeman: 2003

Supplementary material

“Against all odds” videos
Various Articles
Educational website Activities
Various old AP Exam Questions

Projects

The students will be required to do one project per quarter.

- The first project will be collecting and graphing the dates of pennies. This project will be an introduction to types of distribution such as *normal*, *uniform*, and *skewed*. This project will lead into the discussion of the Central Limit Theorem.
- The second project is a collection and display of univariate and bivariate data. Students will be required to collect their own data and present it graphically to the class.
- The third project is an experimental design involving catapulting Gummi Bears. The students are responsible for deciding a treatment that would make the flight of the Gummi Bear change. The students' goal is to compare the treatment results with a control group.
- The last project is a choice between a survey, sample, or experiment where the students collect data and draw inferences based on hypothesis testing procedures.

COURSE OUTLINE

Chapter 1: Looking at Data

1. Displaying Distributions with Graphs
2. Describing Distributions with Graphs
3. The Normal Distribution

Chapter 2: Looking at Data-Relationships

1. Scatterplots
2. Correlations
3. Least- Squares Regression
4. Cautions about Regression and Correlation
5. The Question of Causation
6. Transforming Relationships

Chapter 3: Producing Data

1. First Steps
2. Design of Experiments
3. Sampling Design
4. Toward Statistical Inference

Chapter 4: Probability – The Study of Randomness

1. Randomness
2. Probability Models
3. Random Variables
4. Means and Variances of Random Variables
5. General Probability Rules

Chapter 5: Sampling Distributions

1. Sampling Distributions for Counts and Proportions
2. The Sampling Distribution of a Sampling Mean

Chapter 6: Introduction to Inference

1. Estimating with Confidence
2. Test of Significance
3. Use and Abuse of Tests
4. Power and Inference as a Decision

Chapter 7: Inference for Distributions

1. Inference for the Mean of a Population
2. Comparing Two Means
3. Optional Topics in Comparing Distributions

Chapter 8: Inference for Proportions

1. Inference for a single Proportion
2. Comparing Two Proportions

Chapter 9: Analysis of Two-Way Tables

1. Data Analysis for Two-Way Tables
2. Inference for Two-Way Tables
3. Formulas and Models for Two-Way Tables

Chapter 10: Inference for Regression

1. Simple Linear Regression