

AP STATISTICS

Primary Textbook

Yates, Daniel S., David S. Moore and Daren S. Starnes. *The Practice of Statistics*, 2nd edition. New York: W.H. Freeman, 2003.

Technology

TI-83 Plus or TI-84 graphing calculators.

Microsoft Excel

Various applets on the Internet

CHAPTER 1: EXPLORING DATA (10 days)

Pages 4 - 72

- Section 1.1: Displaying Distributions with Graphs
 - Types of Data
 - Displaying categorical variables
 - Bar graphs
 - Pie charts
 - Displaying quantitative variables
 - Dotplots
 - Stemplots
 - Histograms
 - Frequency histogram
 - Ogive
 - Time plots
 - Describe distributions with shape, center, spread and possible outliers.
 - Compare two distributions.
- Quiz on section 1.1
- Section 1.2: Describing Distributions with Numbers
 - Measures of center
 - Mean
 - Median
 - Measures of spread
 - Quartiles and IQR
 - Standard deviation and variance
 - Construct and interpret boxplots
 - Linear transformations
- Test on Chapter 1

- Students will use a graphing calculator to find numerical summaries and to make graphs.

- *Homework* : 1,2,6,8,11,12,16,19,21,31,35,36,40,44,45,48,49

- *Practice AP Questions*: #1 2001 and #5 2002(B)

- *Project*. Students will gather data to compare the distributions of the cost of lunch for males vs. females and for lunch purchased on or off school grounds.

CHAPTER 2: THE NORMAL DISTRIBUTIONS (6 days)

Pages 78 - 117

- Section 2.1: Density Curves and the Normal Distribution
 - Density curves
 - Normal distributions
 - 68-95-99.7 rule
- Quiz on Section 2.1
- Section 2.2: Standard Normal Calculations
 - Z-scores
 - Standard normal distribution
 - Finding normal proportions
 - Assessing normality
- Chapter 2 Test

- *Homework:* 2,3,4,7,8,9,21,22,23,24,27

CHAPTER 3: EXAMINING RELATIONSHIPS (10 days)

Pages 121 – 190

- Section 3.1: Scatterplots
 - Explanatory and response variables
 - Scatterplots and describing them with form, strength and direction
 - Add categorical variables to scatterplots
- Section 3.2: Correlation
 - Correlation
- Quiz on Sections 3.1 – 3.2
- Section 3.3: Least-squares regression
 - Least-squares regression line
 - Coefficient of determination
 - Residuals and residual plots
 - Outliers
- Quiz on Section 3.3
- Test on Chapter 3

- Students will use a graphing calculator and a computer program to find correlation and create scatterplots.

- *Homework:* 1,6,9,12,24,25,26,41,42,44,45,46

- *Practice AP Questions:* #1 1999 and #1 2000

CHAPTER 4: MORE ON TWO-VARIABLE DATA (7 days)

Pages 195 – 261

- Section 4.1: Transforming Relationships
 - Monotonic functions
 - Power functions
 - Linear vs. exponential growth
 - Logarithmic transformations
 - Predictions in exponential growth models
 - Power law models
 - Prediction in power laws
- Quiz on Section 4.1
- Section 4.2: Cautions about Correlation and Regression
 - Extrapolation
 - Lurking variables
 - Explain associations with causation, common response or confounding
- Section 4.3: Relations in Categorical Data
 - Two-way tables for categorical data
 - Conditional distributions
 - Simpson's paradox
- Quiz on Sections 4.2 – 4.3
- Chapter 4 Test

- Students will use a graphing calculator for transformations.

- *Homework:* 1,6,11,13,15,27,28,30,31,33-37,53,54,59,60,61

- *Practice AP Questions:* #3 1999

CHAPTER 5: PRODUCING DATA (5 days)

Pages 268 – 323

- Section 5.1: Designing Samples
 - Observational study vs. experiment
 - Population vs. sample
 - Sampling methods
 - SRS
 - Probability
 - Stratified
 - Voluntary response
 - Bias
- Section 5.2: Designing Experiments
 - Parts of an experiment
 - Units, subjects, and treatments
 - Placebo effect
 - Randomized comparative experiments
 - Double-blind experiments
 - Matched pairs design
 - Blocking
- Section 5.3: Simulating Experiments
 - Calculator
 - Table of random digits
 - Dice, cards, spinners, etc.
 - Students will have a paired activity using various simulation techniques to estimate probabilities. (Worksheet)
- Chapter 5 Test

- Students will use a graphing calculator and a computer program to generate random digits.

- *Homework:* 2,4,6,8,10,11,14,15,18,32,35,36,38,39,43,45,46

- *Practice AP Questions:* #5 2000 and #2 2002

- *Project:* Students will design an experiment to summarize what types of cars students drive. A class period may have to be used for students to go outside and actually perform the sampling needed.

CHAPTER 6: PROBABILITY AND THE STUDY OF RANDOMNESS (7 days)

Pages 330 – 386

- Section 6.1: The Idea of Probability
 - Randomness
 - Uses of probability
- Section 6.2: Probability Models
 - Probability models
 - Multiplication principle
 - Basic probability rules
- Quiz on Sections 6.1 – 6.2
- Section 6.3: General Probability Rules
 - General probability rules
 - Venn diagrams
 - Conditional probability
- Chapter 6 Test

- *Homework:*
4,8,9,11,14,15,18,19,20,22,23,26,27,28,31,33,46,51,52,54,57,58,61,64

- *Practice AP Questions:* #3 2006(B) and #3 2006

- *Project:* Study of randomness. Students will flip a coin and notice its trend by examining percents and graphs. We will compare multiple coins of different size.

CHAPTER 7: RANDOM VARIABLES (6 days)

Pages 391 – 435

- Introduction to Chapter 7 using the game of craps. Students will be able to develop an understanding of the distribution of random variables.
- Section 7.1: Discrete and Continuous Random Variables
 - Discrete random variables
 - Continuous random variables
- Section 7.2: Means and Variances of Random Variables
 - Means and variances of random variables
 - Law of large numbers
 - Rules for means and variances
- Chapter 7 Test

- *Homework:* 2,3,4,6,8,22,26,29,33,34,36,39

CHAPTER 8: BINOMIAL AND GEOMETRIC DISTRIBUTIONS (4 days)

Pages 439 – 482

- Section 8.1: The Binomial Distribution
 - Binomial settings and distributions
 - Find binomials probabilities
 - Binomial formula
 - Mean and standard deviation of a binomial random variable
 - Normal approximation to a binomial distribution
- Chapter 8 Test

- Students will use a graphing calculator to find pdf and cdf probabilities of binomial and geometric random variables.

- *Homework:* 1,4,5,7,9,13,15,37,40,44,45

- *Practice AP Questions:* #3 2004

CHAPTER 9: SAMPLING DISTRIBUTIONS (6 days)

Pages 487 – 530

- Introduction to Chapter 9 using a “Tumbling Toast” activity to note how sample statistics vary and what happens when we analyze all of our samples together.
- Section 9.1: Sampling Distributions
 - Parameter vs. statistic
 - Sampling distribution
 - Unbiased statistics
 - Variability of a statistic
- Section 9.2: Sample Proportions
 - Sampling distribution of a sample proportion
 - Mean and standard deviation
- Quiz on Sections 9.1 – 9.2
- Section 9.3: Sample means
 - Sampling distribution of a sample mean
 - Mean and standard deviation
 - Normal approximation for sample means
 - Central limit theorem
- Chapter 9 Test

- *Homework:* 1,3,9,10,19,20,21,31,34,35,37

CHAPTER 10: INFERENCE – CONCLUSIONS WITH CONFIDENCE (10 days)

Pages 535 – 612

- Introduction to Chapter 10 with tossing thumbtacks to gather data for constructing confidence intervals.
- Section 10.1: Estimating with Confidence
 - Confidence interval for a population mean
 - Critical values
 - Margin of error
 - Choosing the sample size
- Section 10.2: Tests of Significance
 - Hypothesis testing
 - Null and alternative hypotheses
 - P-values
 - Statistical significance
 - Z-test for a population mean
 - One-sided vs. two-sided tests
 - Confidence intervals for 2-sided tests
- Quiz on Sections 10.1 – 10.2
- Section 10.3: Making Sense of Statistical Significance
 - Choosing a level of significance
 - Statistical significance vs. practical significance
 - Cautions of multiple analysis
- Section 10.4: Inference as a Decision
 - Type I and Type II Errors
 - Error probabilities
 - How to increase power
- Chapter 10 Test

- Students will use a graphing calculator to find confidence intervals and to perform tests of significance.

- *Homework:* 1,3,5,7,8,12,14,16,18,29-32,38,39,40,43,58,61,67,68,69,70,72,73

CHAPTER 11: INFERENCE FOR DISTRIBUTIONS (8 days)

Pages 616 – 680

- Section 11.1: Inference for the Mean of a Population
 - Conditions for inference about a mean
 - Standard error
 - One-sample t statistic and the t distribution
 - Degrees of freedom
 - T confidence intervals and tests
 - Matched pairs t procedures
 - Robustness of t procedures
 - Power of the t test
- Quiz on Section 11.1
- Section 11.2: Comparing Two Means
 - Two-sample problems
 - Conditions for comparing two means
 - Two-sample t procedures
 - Robustness
 - Approximate distribution of the two-sample t statistic
 - The pooled two-sample t procedure
- Test on Chapter 11

- Students will use a graphing calculator to find confidence intervals and perform tests of significance.

- *Homework:* 2,3,4,9,10,12,13,15,16,17,19,22,23,37,39,40,43,44,49

- *Practice AP Questions:* #4 2000, #5 2001, #5 2002, #4 2004(B)

CHAPTER 12: INFERENCE FOR PROPORTIONS (7 days)

Pages 684 – 722

- Section 12.1: Inference for a Population Proportion
 - Conditions for inference about a proportion
 - Inference for a population proportion
 - Confidence intervals and tests of significance
 - Sample size for a desired margin of error
- Quiz on Section 12.1
- Section 12.2: Comparing Two Proportions
 - Confidence intervals for comparing two proportions
 - Significance test for comparing two proportions
- Test on Chapter 12

- Students will use graphing calculators to find confidence intervals and perform tests of significance.

- *Homework:* 1,2,3,5,6,7,9,10,11,23,24,26,27

- *Practice AP Questions:* #2 2003, #4 2002(B), #4 2005

- *Project:* (part in-class and part at-home) Can you taste the difference in brown M&M's? Use random variables and significance tests.

CHAPTER 13: INFERENCE FOR TABLES: CHI-SQUARE PROCEDURES

(5 days)

Pages 727 – 775

- Introduction to Chapter 13 using M&M's in an activity called "I Didn't Get Enough Blues!"
- Section 13.1: Test for Goodness of Fit
 - The chi-square distribution
 - Degrees of freedom
 - Expected values
 - Goodness of fit test
 - Conduct inference by simulation
- Section 13.2: Inference for Two-Way Tables
 - Two-way table
 - R x C
 - Cells
 - Expected counts
 - Chi-square statistic
 - Chi-square test for homogeneity of populations
 - Chi-square test of association/independence
 - Chi-square vs. z test
- Chapter 13 Test
- Students will use graphing calculators to perform chi-square tests using matrices.
- *Homework:* 2,4,14,16,18,19,20,22,23,24
- *Practice AP Questions:* #2 1999, #5 2003, #5 2004
- *Project:* (part in-class and part at-home) Plain vs. Peanut M&M's – inference for 2 way tables. Compare the two distributions of color.

CHAPTER 14: INFERENCE FOR REGRESSION (5 days)

Pages 780 – 811

- Introduction to Chapter 14: Determine if arm span can predict height. The class will take measurements and create a scatterplot, then find r , r^2 , LSR, and residual plot.
- Section 14.1: Inference About the Model
 - The regression model
 - Conditions for regression inference
 - Standard error about the least-squares line
 - Degrees of freedom
 - Confidence interval for regression slope
 - Significance tests for regression slope
- Test on Section 14.1
- Students will use the graphing calculator and computer programs to find confidence intervals and perform significance tests for regression.
- *Homework:* 1,2,4,7,9,11,13,14,16,17
- *Practice AP Questions:* #5 2005(B), #2 2006
- *Project:* “Does height predict shoe size?”

END OF COURSE PROJECT

Students must:

1. Pose a question answered with data.
2. Explain how to collect the data and/or design the experiment.
3. List values obtained and display them with a graph.
4. Use a hypothesis test to analyze the data.
5. Summarize findings with a written and oral report.