

# The Advanced Placement Statistics Course

## Overview

This is a small (~650 students), blue-collar community. 2007-2008 will be the first year AP Statistics is offered. I've previously taught AP for three years at another high school in the state, albeit with YMS instead of POD. Inspection will reveal this syllabus is closely modeled on the Chris Olsen sample syllabi available online; I'll use this as a baseline for my first time through POD and then modify it as appropriate for the 2008-2009 school year.

Procurement of Fathom software is planned but subject to resource constraints of the district. If Fathom cannot be purchased for the 2007-2008, the students will utilize Excel to the maximum extent possible and I'll provided output from JMP to familiarize the students with computer generated output.

The usual sequence of courses leading to AP Statistics is:

Algebra I → Geometry → Algebra II

Some students take Precalculus or AP Calculus concurrently with AP Statistics. Students who have successfully completed Algebra II, or with consent of instructor are currently enrolled in Algebra II may take AP Statistics. The typical AP Statistics class has 25 students

The school is on a normal 7-period day. Classes meet for 51 minutes. School typically begins about August 29, leaving us about 151 days/class hours before AP exams and about 15 days after finishing two weeks of AP exams.

## Teaching Strategies

### **Pedagogy**

POD II provides the general layout of the course as well as being the primary source of homework problems. Students are encouraged to read the chapters in the textbook before the topics are discussed in class so that class time can be devoted to more discussion, investigation, and activities with less time spent lecturing. To facilitate this, some problems from the text are assigned before actual classroom discussion of that section.

Much of the class time is utilized working on activities and investigations from a variety of sources. These activities and investigations come mainly from Fifty Fathoms, Activity-Based Statistics, and materials gathered from Statistics Workshops, NCTM and ATOMIC<sup>1</sup> Conferences, and ideas from contributors to the AP Statistics Electronic Discussion Group. Activities and investigations are used to introduce students to and give students practice with the course content.

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<sup>1</sup> Associated Teachers of Mathematics in Connecticut.

Students, especially at the beginning of the year, are pushed to write complete responses in their homework, on write-ups from the activities and investigations, and especially on quizzes and exams. Key words such as: brief paragraph, discuss, compare, contrast, and interpret are fleshed out early in the year so students can practice communicating effectively throughout the year. Student responses are graded on statistical accuracy and communication of statistical concepts.

Students are exposed to released AP Statistics free response questions throughout the year. This exposure is mostly in-class, although some questions are assigned as homework. Beginning in the third quarter, students begin practicing free response questions with a time limit, initially about 18 minutes and gradually working down to 12 minutes. As the AP Statistics exam draws near, students are given examples of past Investigative Tasks. These are initially given as homework and as the AP Stat test draws near, done in class and timed at 25 minutes. During the fourth quarter, students practice grading each other's responses using released rubrics to get a sense of what the readers will be looking for.

On assignments, quizzes, and exams, students are expected to use an appropriate graphing calculator. Each chapter in the main text has a section on calculator use to give students instruction and practice using the statistical capabilities of their calculators. As each statistical topic is developed the "how-to"s are demonstrated on the available software choices as well as on their calculators.

Classroom is equipped with projection monitor connected to computer with Internet access. The school has a dedicated mathematics lab shared with 5 other math teachers.

## **Assessment**

Students are assigned homework virtually every day. POD II provides the majority of practice problems, and other sources are used to provide extra practice or enrichment. Students are asked to plan on about an hour of work each night for this course. Each POD assignment is due the following day; free response questions and write-ups from activities and investigations are collected a few days after they have been assigned.

Students complete two types of quizzes throughout each quarter. The first are scheduled quizzes that cover two or three sections from a chapter. These are usually taken (with some modification on occasion) from our text's Instructor's Resources Disk. Students are generally given 20 to 30 minutes of class time to finish these. The second type of quiz are unscheduled quizzes, consisting of 5 or 6 questions from the previous night's reading. These quizzes are intended to foster discussion and usually take about 5 to 10 minutes to complete.

A chapter exam is given for each chapter in the textbook. These are usually taken from the Instructor's Resources Disk, other textbooks, and previously released AP Statistics exam questions. The only exception is chapter 14 (after the AP Exam) when a group project and presentation is used in lieu of a written exam. Each test consists of multiple choice questions at the beginning of the test and free response questions following. Students have 55 minutes to finish each exam. Every chapter exam has equal weight while the final exam is weighted as two chapter exams. The final exam lasts 90 minutes and students are given 30 minutes to finish 15 to 20 multiple choice questions followed by 60 minutes to complete 5 or 6 free response questions.

## **A “typical” chapter**

In most cases, studying for a new chapter begins when a student completes the previous chapter’s exam. Students are given a short reading assignment followed by 2 or 3 problems to complete that night. I will either Powerpoint or use the whiteboard to present class notes, usually during the first few days of the chapter. After the initial assignment, students are given larger assignments as well as about 10 minutes of class time to start the assignments. As the chapter progresses, there is a shift from teacher-led lessons to more class discussion and small group work, from learning the specifics to connecting larger concepts together.

After an initial exposure to the material, some form of activity or investigation follows. Sources for these could be a web applet (such as [http://www.ruf.rice.edu/%7Elane/stat\\_sim/sampling\\_dist/index.html](http://www.ruf.rice.edu/%7Elane/stat_sim/sampling_dist/index.html)), a Fifty Fathoms file, an activity from *Activity Based Statistics*, etc.

Throughout the chapter comprehensive quizzes are given to check the students’ progress and help guide the direction of future class periods. The chapter finishes with the section in the text labeled “Communicating and Interpreting the Results of Statistical Analyses” where the focus becomes about communicating effectively about the statistical concepts. A short review and chapter exam follow, and the process starts over for the next chapter.

## **Review for AP Exam**

From a strategic standpoint, our “review for the exam” consists of teaching the course consistent with the philosophy of AP Statistics as outlined in the Course Description and Teachers Guide. Philosophically my position is that if the course is taught as designed, the AP Statistics exam will take care of itself. From a tactical standpoint I take care to inform the students about what is expected in terms of statistical communication as well as analytic writing. The best examples we have are the released free response items and their associated rubrics. Thus, these are used liberally as exemplars of student responses.

Every chapter exam contains questions building on skills the students have gained from previous chapters as well as questions from the current chapter. A short review of chapters 1 through 7 is held before the midterm exam. These are reviewed again before the Advanced Placement Exam along with chapters 8 through 13. Class time before the exam is spent working through past free response questions, past multiple choice questions, and selected practice questions from the Amsco Review and 5 Steps to a 5 books. If there is enough time, a timed practice exam is offered.

All chapter exams contain questions from the current chapter plus review questions to keep students familiar with topics from the earlier part of the year. Students review Chapters 1 through 8 briefly for the semester final. These are reviewed again before the AP exam, however, chapters 9 through 13 are stressed in this review. Class time before the exam is spent doing timed practice questions and answering student questions.

## **Course Projects**

The course projects are in the form of extended writing assignments. These are formal writing assignments. As a consequence, form and technical adequacy are enforced. These assignments are given throughout the year. Some early examples are given below.

Chapter 1 (The role of statistics): Students write up a short reflection about an article chosen from a newspaper, magazine, or news magazine. They are asked to search for examples of actual misinterpretations or unjustified interpretations of data. This is early in the year so their radars are not fully developed, and the purpose of this project is to orient the students to writing.

Chapter 2 (Data collection and experimental design) In small groups, students write-up the helicopter experiment in the second chapter. The point of the experiment is that the students walk through the experimental design process from design to collection of data to descriptive report of the results. The design, execution, and writing is a group project. Again, exemplary reports are discussed in class.

Chapter 3 (Graphical methods of describing data) Students produce graphical displays using data that they have collected or existing data they have located. This activity usually produces interesting examples that can be referenced throughout the chapter.

Chapter 4 (Numerical methods) In this chapter we perform more data collection (usually with M&M's) and focus on graphing and finding descriptive statistics on these sets of data.

Later in the year, as we progress through inference, students are responsible for increasingly longer (individual) projects involving data collection and analysis. Their writing is evaluated with increasing "pickiness" as their skills are honed, and more attention is given to the necessity for putting their project in a larger scientific context. As time permits after the AP exam, students additionally verbally make a presentation to the class of their final project.

## **Course Materials**

### **Texts, Reference and Resource Materials:**

#### **Primary Text:**

POD Peck, Olsen, and Devore. *Introduction to Statistics and Data Analysis, Second Edition*. Belmont, CA: Brooks/Cole, 2005. ISBN 0-534-46710-5.

#### **References and Resource Materials:**

ABS Scheaffer, Watkins, Witmer, and Gnanadesikan. *Activity-Based Statistics: Instructor Resources, Second Edition*. Emeryville, CA: Key College, 2004. ISBN 1-930190-73-5.

B Bohan. *Amsco's AP Statistics: Preparing for the Advanced Placement Examination*. New York: Amsco, 2000. ISBN 1-56765-527-0.

FF Erickson. *Fifty Fathoms: Statistics Demonstrations for Deeper Understanding*. Oakland, CA: EEPS Media, 2002. ISBN0-9648496-2-3.

FR Selected Advanced Placement Statistics Examination Free Response questions are used throughout the course.

H Hinders. *5 Steps to a 5: AP Statistics*. New York: McGraw-Hill, 2004. ISBN 0-07-141278-6.

GCE Graphing calculator exercises

OTH Other resource materials used come from newspapers, select journals, and the World Wide Web (including NCSSM Statistics Leadership Institute material). Students often use data sets they have collected.

REA Levine-Wissing, R. & Thiel, D. *The Best Test Preparation for AP Statistics, 3rd*.

SGU Peck, et. al. *Statistics: A Guide to the Unknown*. Duxbury. 2006. Belmont, CA.

# Breakdown of assignments by text section:

## First Quarter (approximately 44 days)

- **Chapter 1: The Role of Statistics**

- Section 1: Three Reasons to Study Statistics
- Section 2: The Nature and Role of Variability
- Section 3: Statistics and Data Analysis  
POD Assgn: Pg 9-10: 1.1-1.7
- Section 4: Types of Data and Some Simple Graphical Displays  
POD Assignments: Pg 18-20: 1.8-1.13, 1.15, 1.19  
OTH: A current newspaper article is assigned in class to illustrate the pervasive nature of the course's content

- **Chapter 2: The Data Analysis Process and Collecting Data Sensibly**

- Section 1: The Data Analysis Process
- Section 2: Sampling  
POD Assgn: Pg 36-39: 2.2-2.6, 2.10, 2.13, 2.15, 2.16, 2.20-2.26  
GCE: Generating random integers
- Section 3: Statistics Studies: Observation and Experimentation  
POD Assgn: Pg 42-43: 2.27, 2.28, 2.30, 2.31, 2.35-2.37  
GCE: Randomization
- Section 4: Simple Comparative Experiments  
POD Assgn: Pg. 51-53: 2.38, 2.39, 2.40-2.43, 2.45-2.48
- Section 5: More on Experimental Design  
POD Assgn: Pg. 56-57: 2.49, 2.50, 2.52, 2.53, 2.55, 2.58
- Section 6: More on Observational Studies: Designing Surveys  
POD Assgn: Pg. 64-65: 2.59-2.63
- Section 7: Communicating and Interpreting the Results of Statistical Analyses  
POD Assgn:  
ABS Random Rectangles Activity  
SGU: The Anatomy of a pre-election poll, Evaluating School Choice Programs  
OTH Paper Helicopter Experimental Design Activity (adapted from NCSSM Statistics Leadership Institute materials)  
FR: 1999 FR#3, 2000 FR#5, 2001 #4, 2002 #2, 2002(B) #3, 2003 #4, 2004 #2, 2006 #1, #2006 #5, 2006(B) #5)

- **Chapter 3: Graphical Methods for Describing Data**

- Section 1: Displaying Categorical Data: Comparative Bar Charts and Pie Charts  
POD Assgn: pp. 96-97: 3.17-3.22  
GCE: Using lists on the calculator
- Section 2: Displaying Numerical Data: Stem-and-Leaf Displays  
POD Assgn: pp. 115-119: 3.25-3.28, 3.30, 3.32, 3.33, 3.35, 3.39  
GCE: Setting the window on the calculator

- FR: 1997 FR#2
- Section 3: Displaying Numerical Data: Frequency Distributions and Histograms  
POD Assgn: pp. 141-144: 3.55, 3.58, 3.61, 3.62  
GCE: Scaling and drawing histograms
- Section 4: Displaying Bivariate Numerical Data  
POD Assgn:
- Section 5: Communicating and Interpreting the Results of Statistical Analyses  
POD Assgn: 3, 6-9, 13, 17-22, 25-28, 30, 32, 33, 35, 39, 55, 58, 61, 62  
FR 1997 FR#2, 2000 #1  
LAB introduction to Minitab (RJC)  
FR: 2002(B) #5

## ● Chapter 4: Numerical Methods for Describing Data

- Section 1: Describing the Center of a Data Set  
POD Assgn: Pg. 160-162: 4.1-4.3, 4.5, 4.11, 4.12
- Section 2: Describing Variability in a Data Set  
POD Assgn: Pg. 170-171: 4.16-4.18, 4.21, 4.26-4.28  
GCE: Quartiles
- Section 3: Summarizing a Data Set: Boxplots (five number summary)  
POD Assgn: Pg. 177-178: 4.30-4.31, 4.34-4.35, 4.37, 4.38, 4.39  
GCE: Boxplots
- Section 4: Interpreting Center and Variability: Chebyshev's Rule, the Empirical Rule, and  $z$  Scores  
POD Assgn: Pg. 185-187: 4.41, 4.43, 4.44, 4.45, 4.46, 4.48, 4.50, 4.52  
GCE: z-scores
- Section 5: Communicating and Interpreting the Results of Statistical Analyses  
POD Assgn: Pg. 193-196: 4.53-4.55, 4.58, 4.63, 4.64, 4.68  
OTH students graph, find measures of center, and measures of variability for data sets that they have collected  
OTH students match boxplots, histograms, and summary statistics in an activity adapted from ABS  
FR: 2004 #1, 2005 #1, 2005(B) #1

## ● Chapter 5: Summarizing Bivariate Data

- Section 1: Correlation  
POD Assgn: pp. 210-213: 5.1, 5.10 – 5.12, 5.14 – 5.16  
GCE: Linear regression on the calculator
- Section 2: Linear Regression: Fitting a Line to Bivariate Data  
POD Assgn: pp. 222: 5.19, 5.20, 5.22, 223 – 224: 5.26 – 5.28
- Section 3: Assessing the Fit of a Line  
POD Assgn: pp. 235 – 237: 5.32, 5.35, 5.38, 235 – 237: 5.39 – 5.41, 5.43  
GCE: Residuals
- Section 4: Nonlinear Relationships and Transformations  
POD Assgn: pp. 252-254: 5.47--5.48, 5.53  
FR: 1999 FR#1, 2000 FR#1
- Section 5: Communicating and Interpreting the Results of Statistical Analyses  
POD Assgn: pp. 260-263: 5.55 – 5.57, 5.60, 5.62, 5.64, 5.67  
OTH students play the “correlation game” – a web applet on matching correlation coefficients and scatterplots  
FF students use a Fathom demonstration for fitting a line to bivariate data  
SGU: Monitoring tiger prey abundance in the Russian Far East

OTH students complete a worksheet for “understanding the meaning of  $r^2$ ”  
WSC students complete a worksheet adapted from this text using the Anscombe data sets  
FR 2000 FR#1, 2999 FR#1

## **Second Quarter (approximately 43 days)**

### **• Chapter 6: Probability**

- Section 1: Chance Experiments and Events  
POD Assgn: pp. 278-280: 6.1, 6.2, 6.7, 6.8, 6.10-6.12
- Section 2: Definition of Probability  
GCE: Simulating independent events
- Section 3: Basic Properties of Probability  
POD Assgn: pp. 292-295: 6.14, 6.17, 6.18, 6.19, 6.21-6.24
- Section 4: Conditional Probability  
POD Assgn: pp. 302-305: 6.29, 6.30, 6.35, 6.38, 6.39
- Section 5: Independence  
POD Assgn: pp. 312-315: 6.43, 6.45, 6.47-6.51, 6.54, 6.55
- Section 6: Some General Probability Rules  
POD Assgn: pp. 325-327: 6.59-6.61, 6.65, 6.68, 6.73
- Section 7: Estimating Probabilities Empirically and Using Simulation  
POD Assgn: pp. 336-339: 6.75-6.77, 6.81, 6.82  
OTH students complete an activity derived from the game “Pass the Pigs”, using dice that are small plastic pigs (empirical probability) and then compare their results to a web applet simulating the game  
OTH students complete some activities using playing cards adapted from a presentation at the 2006 Annual NCTM Conference  
FR: 1999 #4, 2001 #3

### **• Chapter 7: Random Variables and Probability Distributions**

- Section 1: Random Variables  
POD Assgn: pp. 355: 7.1-7.7  
GCE: Discrete probability distributions
- Section 2: Probability Distributions for Discrete Random Variables  
POD Assgn: pp. 359-361: 7.8, 7.10-7.12, 7.14, 7.19  
GCE: Binomial probability calculations
- Section 3: Probability Distributions for Continuous Random Variables  
POD Assgn: pp. 365-366: 7.20-7.22, 7.24-7.26  
GCE: Geometric probability calculations
- Section 4: Mean and Standard Deviation of a Random Variable  
POD Assgn: pp. 378: 7.28, 7.29, 7.31, 7.32, 7.33, 7.34, 7.37, 7.43  
FR: 2005 #2, 2005(B) #2, 2006 #3
- Section 5: The Binomial and Geometric Distributions  
POD Assgn: 389-391: 7.45, 7.46, 7.49, 7.50, 7.54-7.58, 7.61, 7.62
- Section 6: Normal Distributions  
POD Assgn: pp. 407-409: 7.64, 7.66, 7.68, 7.70, 7.71, 7.73, 7.74, 7.76, 7.79, 7.80  
GCE: The normal approximation to the binomial
- Section 7: Checking for Normality and Normalizing Transformations  
POD Assgn: pp. 416-419: 7.83, 7.84, 7.87, 7.89, 7.92
- Section 8: Using the Normal Distribution to Approximate a Discrete Distribution  
POD Assgn: pp. 423-424: 7.97-7.100, 7.103-7.105, 7.113, 7.120, 7.121  
FF Demonstrations on normally-distributed data, transforming the mean and standard deviation, adding uniform random variables, and binomial distributions

## **Third Quarter (approximately 44 days)**

*Chapter 8 will most likely span the end of second and beginning of the third quarter.*

### • **Chapter 8: Sampling Variability and Sampling Distributions**

- Section 1: Statistics and Sampling Variability  
POD Assgn: pp. 449-450: 8.1, 8.3, 8.4, 8.10, 8.11
- Section 2: The Sampling Distribution of a Sample Mean  
POD Assgn: pp. 460-461: 8.14 – 8.17, 8.19, 8.20, 8.21, 8.22, 8.25  
GCE: The sampling distribution of the mean
- Section 3: The Sampling Distribution of a Sample Proportion  
POD Assgn: pp. 466–467: 8.27, 8.28, 8.31, 8.33, 8.35  
pp. 469-470: 8.36, 8.38, 8.39 – 8.41  
FF Demonstrations on sampling distributions and sample size, the central limit theorem, standard error and standard deviation, what is standard error, and the distribution of sample proportions  
FR: 1998 #1

### • **Chapter 9: Estimation Using a Single Sample**

- Section 1: Point Estimation  
POD Assgn: pp. 480-482: 9.1, 9.5, 9.9
- Section 2: Large-Sample confidence Interval for a Population Proportion  
POD Assgn: pp. 493-494: 9.11-9.13, 9.14 – 9.16, 9.22--9.24, 9.27  
GCE: Confidence interval for a population proportion
- Section 3: Confidence Interval for a Population Mean  
POD Assgn: pp. 505-508: 9.28 – 9.31, 9.38, 9.42, 9.43, 9.45  
GCE: Confidence interval for a population mean
- Section 4: Communicating and Interpreting the Results of Statistical Analyses  
POD Assignments: pp. 516-517: 9.53, 9.57, 9.58  
FF Demonstrations on confidence intervals of proportions, capturing with confidence intervals, where does that  $\sqrt{p(1-p)}$  come from, why  $np > 10$  is a good rule of thumb, how the width of the confidence interval depends on  $N$ , exploring confidence intervals, and capturing the mean with confidence intervals  
OTH students use a web applet to further explore confidence intervals  
FR: 2002(B) #4, 2004(B) # 2 2005 #5

### • **Chapter 10: Hypothesis Testing Using a Single Sample**

- Section 1: Hypotheses and Test Procedures  
POD Assgn: pp. 525-526: 10.1 – 10.7
- Section 2: Errors in Hypothesis Testing  
POD Assgn: pp. 530-532: 10.11, 10.15, 10.17, 10.19, 10.21
- Section 3: Large-Sample Hypothesis Tests for a Population Proportion  
POD Assgn: pp. 543-545: 10.22 – 10.26, 10.32, 10.33, 10.37, 10.38, 10.34, 10.35, 10.39, 10.40  
GCE: Hypothesis test for a population proportion
- Section 4: Hypothesis Tests for a Population Mean  
POD Assgn: pp. 553-556: 10.41-10.45, 10.51, 10.54, 10.57, 10.58

- GCE: Hypothesis test for a population mean
- Section 5: Power and the Probability of Type II Error  
POD Assgn: pp. 564-565: 10.59, 10.63
- Section 6: Communicating and Interpreting the Results of Statistical Analyses  
POD Assgn: pp. 571-572: 10.66 – 10.68  
FF Demonstration on equivalence of tests and estimates, distribution of p values, power, and power and sample size  
FR: 2003 #2, 2004(B) #3, 2005 #4

## • Chapter 11: Comparing Two Populations or Treatments

- Section 1: Inferences Concerning the Difference Between Two Population or Treatment Means Using Independent Samples  
POD Assgn: pp. 588-594: 11.1, 11.5, 11.6, 11.7, 11.11, 11.12, 11.14, 11.24, 11.25  
GCE: Inferences about differences in independent means  
FR: 2006 #4
- Section 2: Inferences Concerning the difference Between Two Population or Treatment Means Using Paired Samples  
POD Assgn: 603-605: 11.37, 11.38, 11.39  
GCE: Inferences about differences in means with paired samples
- Section 3: Large-Sample Inferences Concerning a Difference Between Two Population or Treatment Proportions  
POD Assgn: pp. 612-615: 11.45, 11.47, 11.50, 11.53, 11.55, 11.56  
GCE: Inferences for differences in proportions  
FR: 2006(B) #2
- Section 4: Distribution-Free Procedures for Inferences Using Independent Samples  
POD Assgn: pp. 622-623: 11.57, 11.59
- Section 5: Communicating and Interpreting the Results of Statistical Analyses  
POD Assignments: pp. 628-631: 11.64, 11.67  
OTH students complete activities using independent samples and other activities using paired samples, adapted from various sources  
FR: 1998 #4, 2000 #4, 2002 #5, 2003(B) #3, 2003(B) #4, 2004(B) #3, 2004(B) #4, 2005(B) #5, 2005(B) #4, 2006(B) #3, 2006(B) #4

## Fourth Quarter (approximately 21 days before exam)

### • Chapter 12: The Analysis of Categorical Data and Goodness-of-Fit Tests

- Section 1: Chi-Square Tests for Univariate Categorical Data  
POD Assgn: pp. 644-646: 12.1, 12.2, 12.3, 12.8, 12.9, 12.12  
GCE: The goodness-of-fit test
- Section 2: Tests for Homogeneity and Independence in a Two-Way Table  
POD Assgn: 658-662: 12.18, 12.21, 12.24, 12.28, 12.29, 12.33  
GCE: Homogeneity and independence
- Section 3: Communicating and Interpreting the Results of Statistical Analyses  
POD Assgn: pp. 668-669: 12.35, 12.43, 12.44,  
OTH students complete activities (using M&Ms) to complete chi-square tests for univariate data, for homogeneity, and for independence  
FR: 1998 #3, 1999 #2, 2003 #5, 2003(B) #5

### • Chapter 13: Simple Linear Regression and Correlation: Inferential Methods

- Section 1: The Simple Linear Regression Model  
POD Assgn: pp. 686-688: 13.1, 13.8, 13.11
- Section 2: Inferences About the Slope of the Population Regression Line  
POD Assgn: pp. 695-697: 13.13, 13.18, 13.20, 13.21
- Section 3: Checking Model Adequacy  
POD Assgn: pp. 707-708:13.27, 13.29, 13.33  
FR: 1999 #1, 2002(B) #1, 2002 #4, 2003(B) #2, 2004(B) #1, 2005 #3, 2005(B) #5, 2006 #2
- (if time and inclination) Section 4: Inferences Based on the Estimated Regression Line
- (if time and inclination) Section 5: Inferences About the Population Correlation Coefficient
- Section 6: Communicating and Interpreting the Results of Statistical Analyses

- **Review for the Advanced Placement Examination**

- Students complete a practice examination (H and/or B)
- Scoring of the exam is discussed

## After the Advanced Placement Exam

- **Chapter 14 Multiple Regression Analysis**

- Section 1: Multiple Regression Models
- Section 2: Fitting a Model and Assessing Its Utility
- Section 3: Inferences Based on an Estimated Model
- Section 4: Other Issues in Multiple Regression
- Section 5: Communicating and Interpreting the Results of Statistical Analyses

POD Assgn:5, 7, 15, 23, 38, 41, 49, 53-55

OTH students complete an activity adapted from ABS (gummi bears in space)

LAB students utilize Fathom to analyze the data from their activity and then use Microsoft Office to produce the write up

Breakdown of time by AP Statistics outline topic:

**Chapter 1 – The Role of Statistics**  
**Chapter 2 – The Data Analysis Process and Collecting Data Sensibly**

<b>Approx # of days</b>	<b>Topics</b>	<b>AP Statistics Course Topic Outline</b>
1	Course Overview Policies and Expectations	
1	Variability Data Analysis	I A. 1. Center and spread 2. Clusters and gaps
1	Bar Charts Dotplots	
2	Planning and Conducting a Study Sampling	
1	Quiz Random Rectangles Activity	
3	Observation and Experimentation	II A. Overview of methods of data Collection II B. Planning and conducting surveys
1	Quiz: 2.1-2.2	II C. Planning and conducting experiments II D. Generalizability of results and types of conclusions that can be drawn
2	Designing Surveys	
3	Helicopter Experiment	
1	Review	
1	Chapter 1 & 2 Test	

### Chapter 3 – Graphical Methods for Describing Data

Approx # of days	Topics	AP Statistics Course Description Topic
1	Bar Charts and Pie Charts	
1	Stem-and-Leaf Displays	I A. 1. Center and spread 2. Clusters and gaps
1	Frequency Distribution and Histograms	
1	Frequency Dist. And Histograms Con't.	
1	Displaying Bivariate Numerical Data	I A. Cumulative frequency plot
1	Communicating and Interpreting the Results of Statistical Analyses	
1	Chapter 3 Test	

## Chapter 4 – Numerical Models for Describing Data

Approx # of days	Topics	AP Statistics Course Description Topic
2	Describing Variability in a Data Set	
1	Summarizing a Data Set: Boxplots	I B 4. Using boxplots
2	Interpreting Center and Variability	I A 3. Outliers and other unusual features 4. Shape  I B 1. Measuring center: median, mean 2. Measuring spread: range, inter-quartile range, standard deviation I B 3. Measuring position I B 5. The effect of changing units  I C. Comparing distributions of univariate data
1	Quiz	
1	Communicating and Interpreting the Results of Statistical Analyses	I E 1. Frequency tables and bar charts I E 4. Comparing distributions using bar charts
1	Review	
1	Chapter 4 Test	

## Chapter 5 – Summarizing Bivariate Data

Approx # of days	Topics	AP Statistics Course Description Topic
2	Correlation	
1	Review: Correlation Game <a href="http://www.stat.uiuc.edu/~stat100/java/guess/GCApplet.html">http://www.stat.uiuc.edu/~stat100/java/guess/GCApplet.html</a>	I. D 1. Analyzing patterns in scatterplots 2. Correlation and linearity 3. Least squares regression line
1	Using Fathom to Find the Line of Best Fit	
2	Fitting a Line to Bivariate Data	
1	Exercise for Understanding the meaning of $r^2$	
1	Quiz	
1	Assessing the Fit of a Line (Anscombe Activity)	I D 4. Residual plots, outliers, and influential points.
2	Nonlinear Relationships and Transformations	I D 5. Transformations to achieve linearity
1	Quiz	
1	Review	
1	Chapter 5 Test	

## Chapter 6 – Probability

Approx # of days	Topics	AP Statistics Course Description Topic
2	Chance Experiments and Events	
2	Definition of Probability	III A 1. Interpreting probability 2. Law of Large Numbers
2	Basic Properties of Probability	III A 3. Addition rule, multiplication rule
1	Review	
1	Quiz	
2	Conditional Probability	I E 2. Marginal and joint frequencies I E 3. Conditional relative frequencies and association III A 3. Conditional probability
2	Independence	III A 3. Independence
2	General Probability Rules	
1	Review	
1	Quiz	
3	Estimating Probabilities Empirically/Using Simulation	III A 5. Simulation of random behavior
1	Quiz	
1	Review	
1	Chapter 6 Test	

## Chapter 7 – Random Variables and Probability Distributions

Approx # of days	Topics	AP Statistics Course Description Topic
1	Random Variables	
2	Probability Distributions for Discrete Random Variables Probability Distributions for Continuous Random Variables	III A 4. Discrete random variables
1	Quiz	
3	Mean and Standard Deviation of a Random Variable	III A 6. Mean and standard deviation of RV, and linear transformation of an RV  III B. Combining independent RVs
2	Binomial and Geometric Distributions	III A 4. Binomial and geometric RVs
2	Normal Distributions	III C. The normal distribution
1	Checking for Normality and Normalizing Transformations	
1	Using the Normal Distribution to Approximate a Discrete Distribution	
1	Quiz Review for Test	
1	Chapter 7 Test	

**Chapter 8 – Sampling Variability and Sampling Distributions**  
**Chapter 9 – Estimation Using a Single Sample**

Approx # of days	Topics	AP Statistics Course Description Topic
2	Statistics and Sampling Variability	
1	The Sampling Distribution of a Sample Mean	III D 2. Sampling distribution of the sample Mean 3. The Central Limit Theorem
1	The Sampling Distribution of a Sample Proportion	III D 1. Sampling distribution of the sample proportion
1	Quiz	
2	Simulation of sampling distributions	III D 6. Simulation of sampling distributions.
1	Quiz	
1	Test	
1	Point Estimation	III D 7. t-distribution
2	Large-Sample Confidence Interval for a Population Proportion	IV A. 1 – 4; 6 Estimation (point estimators and confidence intervals)
1	Quiz	
2	Confidence Interval for a Population Mean	
1	Quiz	
1	Communicating and Interpreting the Results of Statistical Analyses	
1	Review	
1	Chapter 9 Test	

## Chapter 10 – Hypothesis Testing Using a Single Sample

Approx # of days	Topics	AP Statistics Course Description Topic
1	Hypotheses and Test Procedures	IV B 1. Logic of hypothesis testing
1	Errors in Hypothesis Testing	
2	Large-Sample Hypothesis Tests for a Population Proportion	IV B 2. Large sample test for a proportion
1	Quiz	
2	Hypothesis Tests for a Population Mean	IV B 4. Test for a mean
2	Power and Probability of Type II Error	IV B 1. Concepts of Type I and Type II Errors; concept of power
1	Quiz	
1	Communicating and Interpreting the Results of Statistical Analyses	
1	Review	
1	Chapter 10 Test	

## Chapter 11 – Comparing Two Populations or Treatments

Approx # of days	Topics	AP Statistics Course Description Topic
1	Inferences Concerning the Difference Between Means Using Independent Samples	<p>III D 5. Sampling distribution of a difference between two independent sample means.</p> <p>IV A 7. Large sample confidence interval for a difference between two means</p> <p>IV B 5. Test for difference between two Independent means.</p>
1	Inferences Concerning the Difference Between Means Using Paired Samples	<p>IV A 7. Large sample confidence interval for a difference between two means (paired)</p> <p>IV B 5. Test for difference between two means (paired)</p>
1	Quiz	
	Large-Sample Inferences Concerning a Difference Between Two Proportions	<p>III D 4. Sampling distribution of a difference between two independent sample proportions.</p> <p>IV A 5. Large sample confidence interval for a difference between two proportions</p> <p>IV B 3. Large sample test for a difference between proportions</p>
1	Quiz	
1	Distribution-Free Procedures for Inferences Using Independent Samples	

1	Review	
1	Chapter 11 Test	

### Chapter 12 – The Analysis of Categorical Data and Goodness-of-Fit Tests

<b>Approx # of days</b>	<b>Topics</b>	<b>AP Statistics Course Description Topic</b>
2	Chi-Square Tests for Univariate Categorical Data	III D 8. Chi-square distribution IV B 6. Chi-square test for goodness of fit
1	Quiz	
4	Tests for Homogeneity and Independence in a Two-Way Table	IV B 6. Chi-square test for homogeneity of Proportions and independence
1	Quiz	
1	Review	
1	Chapter 12 Test	

### Chapter 13 – Simple Linear Regression and Correlation: Inferential Methods

<b>Approx # of days</b>	<b>Topics</b>	<b>AP Statistics Course Description Topic</b>
2	Simple Linear Regression Model	
1	Quiz	
2	Inferences About the Slope of the Population Regression Line	IV A 8. Confidence interval for the slope of A least-squares regression line IV B 7. Test for the slope of a least-squares Regression line
2	Checking Model Adequacy	
1	Quiz	
1	Review	
1	Chapter 13 Test	
???	REVIEW FOR AP EXAM!!	

