AP Statistics Syllabus

School Schedule

Each semester is approximately 18 weeks long broken into three 6-week marking periods. The daily schedule is often described as an alternating block schedule with each class meeting for 90 minutes every other day throughout the year.

Primary Textbook

Stats Modeling the World by Bock, Velleman, and DeVeaux, first edition, 2004

Supplemental Textbook

Introduction to Statistics and Data Analysis by Peck, Olsen, and Devore, first edition, 2001
Introduction to the Practice of Statistics by Moore and McCabe, second edition, 1993

Other Supplies

- TI-84 calculator available for each student in class. Most own their own graphing calculator.
- Class set of stop watches, rulers, calculator links
- Various supplies for labs such as elastic frogs, balloons, M&Ms, Fatal Vision goggles, etc.
- Newspaper articles, magazine articles, news clips as available and appropriate

Major Project Requirements

- Student generated topic
- Project description including a viable plan for statistical analysis
- Data collection
- Data organization, summary, and graphical displays as appropriate
- Data analysis
- Conclusions
- Comments on conditions necessary for statistical procedures and study design

A Note about Daily Lessons

Statistics lessons are enhanced using group work and what we call "labs." The labs are modeled using the approach and methods of typical science labs. On site science teachers have been most helpful over the years in sharing tips of the trade. Statistics teachers often use the term activity, but we maintain that a more scientific approach and label lends itself to more serious exploration of the statistical concepts. Some labs are listed with each unit but it should be noted that new labs are created constantly to appeal to student interest, teacher interest, and current events in the community, nation, and world. Lab times vary but always give students an opportunity to explore statistical applications and concepts first hand. Most labs are done in groups to encourage problem solving discussions among peers.

Grading Practices - Grades are based on the following:

Homework: textbook problems, teacher generated worksheets, and computer output

Quizzes: All quizzes are timed free response questions from previous AP exams. Students are taught the requirements of the rubric and often become involved in the grading to enhance their understanding of the rigor required and the common pitfalls due to weak vocabulary and unclear procedure description.

Tests: All unit tests are designed by the teacher in an AP format including multiple choice questions and free response questions requiring conclusions in context.

Technology Comments

Students use TI graphing calculators in all units to assist in computation, randomization, and graphical analysis. Computer programs and simulation applets are used in class demonstrations. Student homework includes interpretation of computer output from MiniTab and Fathom.

Lab Activity Example

Note: Lab activities require students to think for themselves using the statistical concepts they have learned. The task at hand is briefly described. Students must then decide on their design, randomization if applicable, data collection, analysis, graphical displays, and conclusions. My typical answer to all questions during labs is, "I don't know. What do you think?" Graphing calculators are used to complete data entry, some graphical displays, randomization, summary statistics, and inference procedures although students must explain procedures and show work. Following the lab, presentations, and class discussion, students may complete a teacher prepared worksheet to assist those that need more direction in bringing the concepts together and to emphasize the concepts in the current unit being studied. Proper statistical vocabulary is mandatory for full credit. Sometimes data collected is revisited weeks later as part of another unit to show a continuation of the application using more advanced processes. When possible, other classes such as health, AP biology, and HOSA join us for labs to serve as experts in their field while the statistics students handle the data analysis.

Example: Pig Rollin'

Students are given a rubber pig that rolls somewhat like a die with unequal probabilities of landing in seven possible positions. Groups of three to four students take on the roll of game designers to develop a fair game using the pigs. The lab requires students to determine probabilities, figure expected values, assign point values, describe and write about their process, test their game, and present their new game concept to the company (class). Discussion includes the Law of Large Numbers, relevant probability concepts, and experimental design.

Outline of Lesson Plans

Number of days	Topics Covered	Labs
I. Introduction		
1	Course overview	
II. Experimental Design and data collection		
5 blocks Note: This unit is continued throughout the course in all labs and as part of the discussion of homework problems and quizzes. Introduction of TI-84 random number generator	Random numbers and selection including SRS, stratified, systematic. Observational Studies Experimental Design including blocking, matched pairs, confounding variables, bias, control groups, treatments, Survey design Populations, samples, and generalizing results	Random number investigation City design and ratings
III. Graphical displays and summary statistics for univariate data		
7 blocks A great deal of class time is spent familiarizing students with the TI-84 calculator including data entry, graphical displays, summary statistics.	Interpretation and design of graphical displays including circle graphs, bar graphs, frequency tables, stemplots and boxplots Comparitive graphical displays and interpretation Note: center, shape, spread, and unusual features are used for describing distributions Mean, median, mode Standard deviation, IQR, variance, range Proportions Percentiles, z-scores, quartiles Outlier rules Transformations of statistics	Rent-a-Date – comparative graphs National Buoy Data Center Exploration Graphical name displays GPA and Class Rank – summary statistics, position Bed to door – a gender comparison

Number of days	Topics Covered	Labs
IV. Bivariate Data		
7 blocks Instruction in TI-84 calculator regression functions	Scatterplots Correlation Least squares regression line Residuals, outliers, influential points, extrapolation Nonlinear regression Two-way tables Simpson's paradox	Cheerios and circle areas – nonlinear exploration Elasticity measurements – linear model Guess my age – bivariate and regression activity
V. Probability		
5 blocks	Basic Probability Rules including addition, multiplication, complements, independence General Probability Laws The Law of Large Numbers	Pig Rollin'
VI. Probability distributions		
8 blocks Instruction in TI-84 functions AFTER students become proficient at sketching distributions, using the normal chart, and completing calculations using formulas.	Random variables Probability distributions including mean, variance, standard deviation, independence, dependence Transformations and combinations Binomial and geometric distributions Normal distributions Using the normal distribution to approximate a binomial distribution Interpretation of probabilities	Ellipse area estimation Looking for normal The draft lottery Farkle

Number of days	Topics Covered	Labs
Review and exams		
4 blocks		
VII. Simulations and Sampling Distributions		
7 blocks TI-84 used for some simulation problems.	Simulation design and interpretation Sampling distributions for means and proportions The Central Limit Theorem Independence Combining Distributions	Central Limit Theorem Lab Simulation design to build a case
VIII. Confidence Intervals and Hypothesis Tests for single samples		
8 blocks TI-84 functions explored AFTER students become proficient at using tables, formulas, and interpreting results.	Point estimates Margin of error t-distribution Confidence intervals for single sample means and proportions including the meaning of the confidence level and the meaning of the interval Hypothesis tests for single sample means and proportions including the logic involved, the meaning of the hypotheses and p-value, the significance level Type I errors, type II errors, and power	Water, water everywhere-beach globe lab
IX. Confidence Interevals and Hypothesis Tests for two samples		
7 days TI-84 functions explored AFTER students become proficient at using tables, formulas, and interpreting results.	Two sample tests for means and proportions Independence vs dependent Paired t-tests	Frog lab

Number of days	Topics Covered	Labs
X. Chi-square test		
4 days TI-84 functions explored AFTER students become proficient at using tables, formulas, and interpreting results.	Chi-square distribution Test for homogeneity Test for independence Test for goodness of fit	How Do You Learn
XI. Regression revisited		
7 days TI-84 functions used.	Review of linear regression topics Nonlinear regression and transformations Test for slope of least-squares regression line	Horsepower lab The wave
XII. AP Review and Practice Exam		
7 days	Study Design Describing data Probability Inference	
XIII. Post Exam (many students absent due to other exams)		
7 days	Modern probability applications Statistics in the news Semester exams	Group work on applications