

AP STATISTICS SYLLABUS

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The purpose of the AP Statistics course is to introduce and develop the concepts involved in collecting, analyzing, and drawing conclusions from data. Students will learn how to describe patterns and deviations from those patterns; plan and conduct appropriate studies; explore random phenomena using probability and simulation; and estimate population parameters and test associated hypotheses.

Students who successfully complete the class and score well on the AP examination may receive credit, advanced placement, or both for a one-semester introductory college statistics course.

The official AP EXAM is scheduled for Tuesday, May 4th and is strongly recommended for all students in the class.

STUDENT REQUIREMENTS AND PREREQUISITES

- Students must successfully complete (or be concurrently enrolled in) Math 4 or Math 4X and must possess sufficient mathematical maturity as well as the ability to reason quantitatively.
- **Students will need a graphing calculator (TI-83+, TI-84+ or TI-89 recommended) that performs the functions required by the AP College Board.**
- Students should also have a familiarity with and understanding of elementary functions, including those that are linear, exponential, and logarithmic.
- Students should be willing to work with other students in a group setting.
- Students must be prepared to work diligently on reading, homework, investigations, and review.
- Students are expected to participate during class, both individually and within their groups.

Students are individually responsible for their own learning, and therefore are responsible for pursuing assistance, whether that be by coming to see me before or after school (or other available times) or by contacting other sources (tutors, peers, parents, etc.). No appointment is necessary, but be sure to check with me during class to make sure that I will be available.

GRADING

Homework/In-class Investigations (30% of grade)

- Assigned and collected on a daily basis (roughly)
- Must be done completely and legibly, on loose-leaf paper
- Make-up work in case of an excused absence is the student's responsibility.

Tests/Quizzes (70% of grade) * NO RETAKES *****

- Given weekly (roughly)
- Questions will often resemble those encountered on the AP exam
- Students who miss a test due to an absence will be required to take a makeup test within 3 school days of their return or receive a zero. Students who are absent on a designated "review day" the day before a test (excused or unexcused) will still be required to take the test. Quizzes cannot be made up. Instead, the missed quiz score will be assigned the same percentage as the test for that chapter. If needed, arrangements can be made for the completion of large projects.

CLASSROOM EXPECTATIONS

Absences: Students who miss class for any reason are responsible to make up the work. In accordance with school policy, students will have two days for each day absent (i.e., if they missed Wednesday, they need to turn the makeup work in on Friday). Exceptions will be allowed only in extreme circumstances, and must be discussed prior to the anticipated absences (unless the absences are unforeseen).

WHY? This is a difficult class, and we have to cover 14 chapters in 18 weeks. You cannot afford to get behind in any way.

Tardiness: Students are to be in their seats when the bell rings. As per school policy, excessive tardiness will result in Saturday School Detention for each tardy after the third. Tardiness may also result in a loss of points as a natural consequence of missing important instructions regarding homework or quizzes.

WHY? Tardiness affects your ability to get settled in and ready for class, and is a potential distraction to the rest of the students as well as to the instructor.

Dishonesty: Academic dishonesty of any kind will not be tolerated, and will be dealt with in accordance with school policy. In particular, students suspected of cheating will be given no credit on the assignment and will receive a letter in their personal cumulative file in the main office as well as a phone call home.

WHY? Your instructor's job is to assess YOUR work for YOUR sake. The effects of submitting someone else's work as your own may seem to go unnoticed on a test or two, but eventually, you will be forced to face the fact that you know very little of what you (and perhaps many others) thought you knew! Academic dishonesty shows disrespect for and dishonesty with oneself, and for and with any other individuals involved.

Electronic Devices: Cell phones and headphones of any kind (iPods, MP3 players, bluetooth, etc.) are to remain UNSEEN, UNHEARD, and UNTOUCHED at all times during class. This includes any sort of individual work time (such as after finishing a test). Any violation of this policy will result in confiscation until the end of the day, and if the issue persists, confiscation and delivery to the main office for retrieval by a parent or guardian.

WHY? An ill-timed cell phone ring (even in "vibrate" mode) or a loud headset is simply rude and disrespectful of those around you.

Food and Beverages: No food, candy, or beverages except for bottled water.

WHY? This is healthy for you as a student and will help maintain the cleanliness of our classrooms.

Materials: Students are to bring their materials to class each day. The materials include pencils, colored pens, a calculator, their textbook, a notebook (preferably with perforated paper), and some sort of 3-ring binder (at least 1.5" binding).

WHY? We cover a lot of material, and being organized will be of great assistance in the course. Having to stop the flow of class to borrow a pencil or a piece of paper is an unnecessary distraction to you and those around you.

Hall passes: Students are to ask to leave the room, but must do so at a time that is the least disruptive to the flow of the class. Students who appear to make excessive forays into the hall may have this privilege suspended without notice.

WHY? Being in class at all times is extremely important. Stoppage of class for reasons unrelated to the course content is a disruption to students' learning.

Most of the above expectations, rules, and policies have to do primarily with one concept:

RESPECT YOURSELF and OTHERS.

You need to ask yourself at all times, "Is my behavior infringing in any way on others' abilities to concentrate or learn?"

COURSE OUTLINE (from the College Board AP web-site):

- I. Exploring Data: Describing patterns and departures from patterns
 - A. Constructing and interpreting graphical displays of distributions of univariate data (dotplot, stemplot, histogram, cumulative frequency plot)
 - 1. Center and spread
 - 2. Clusters and gaps
 - 3. Outliers and other unusual features
 - 4. Shape
 - B. Summarizing distributions of univariate data
 - 1. Measuring center: median, mean
 - 2. Measuring spread: range, interquartile range, standard deviation
 - 3. Measuring position: quartiles, percentiles, standardized scores (z-scores)
 - 4. Using boxplots
 - 5. The effect of changing units on summary measures
 - C. Comparing distributions of univariate data (dotplots, back-to-back stemplots, parallel boxplots)
 - 1. Comparing center and spread: within group, between group variation
 - 2. Comparing clusters and gaps
 - 3. Comparing outliers and other unusual features
 - 4. Comparing shapes
 - D. Exploring bivariate data
 - 1. Analyzing patterns in scatterplots
 - 2. Correlation and linearity
 - 3. Least-squares regression line
 - 4. Residual plots, outliers, and influential points
 - 5. Transformations to achieve linearity: logarithmic and power transformations
 - E. Exploring categorical data
 - 1. Frequency tables and bar charts
 - 2. Marginal and joint frequencies for two-way tables
 - 3. Conditional relative frequencies and association
 - 4. Comparing distributions using bar charts
- II. Sampling and Experimentation: Planning and conducting a study
 - A. Overview of methods of data collection
 - 1. Census
 - 2. Sample survey
 - 3. Experiment
 - 4. Observational study
 - B. Planning and conducting surveys
 - 1. Characteristics of a well-designed and well-conducted survey
 - 2. Populations, samples, and random selection
 - 3. Sources of bias in sampling and surveys
 - 4. Sampling methods, including simple random sampling, stratified random sampling, and cluster sampling
 - C. Planning and conducting experiments
 - 1. Characteristics of a well-designed and well-conducted experiment
 - 2. Treatments, control groups, experimental units, random assignments, and replication
 - 3. Sources of bias and confounding, including placebo effect and blinding
 - 4. Completely randomized design
 - 5. Randomized block design, including matched pairs design
 - D. Generalizability of results and types of conclusions that can be drawn from observational studies, experiments, and surveys

- III. Anticipating Patterns: Exploring random phenomena using probability and simulation
 - A. Probability
 - 1. Interpreting probability, including long-run relative frequency interpretation
 - 2. "Law of Large Numbers" concept
 - 3. Addition rule, multiplication rule, conditional probability, and independence
 - 4. Discrete random variables and their probability distributions, including binomial and geometric
 - 5. Simulation of random behavior and probability distributions
 - 6. Mean (expected value) and standard deviation of a random variable, and linear transformation of a random variable
 - B. Combining independent random variables
 - 1. Notion of independence versus dependence
 - 2. Mean and standard deviation for sums and differences of independent random variables
 - C. The normal distribution
 - 1. Properties of the normal distribution
 - 2. Using tables of the normal distribution
 - 3. The normal distribution as a model for measurements
 - D. Sampling distributions
 - 1. Sampling distribution of a sample proportion
 - 2. Sampling distribution of a sample mean
 - 3. Central Limit Theorem
 - 4. Sampling distribution of a difference between two independent sample proportions
 - 5. Sampling distribution of a difference between two independent sample means
 - 6. Simulation of sampling distributions
 - 7. t-distribution
 - 8. Chi-square distribution
- IV. Statistical Inference: Estimating population parameters and testing hypotheses
 - A. Estimation (point estimators and confidence intervals)
 - 1. Estimating population parameters and margins of error
 - 2. Properties of point estimators, including unbiasedness and variability
 - 3. Logic of confidence intervals, meaning of confidence level and confidence intervals, and properties of confidence intervals
 - 4. Large sample confidence interval for a proportion
 - 5. Large sample confidence interval for a difference between two proportions
 - 6. Confidence interval for a mean
 - 7. Confidence interval for a difference between two means (unpaired and paired)
 - 8. Confidence interval for the slope of a least-squares regression line
 - B. Tests of significance
 - 1. Logic of significance testing, null and alternative hypotheses; p-values; one- and two-sided tests; concepts of Type I and Type II errors; concept of power
 - 2. Large sample test for a proportion
 - 3. Large sample test for a difference between two proportions
 - 4. Test for a mean
 - 5. Test for a difference between two means (unpaired and paired)
 - 6. Chi-square test for goodness of fit, homogeneity of proportions, and independence (one- and two-way tables)
 - 7. Test for the slope of a least-squares regression line

VISIT the class website at <http://home.comcast.net/~bskerbitz/apstats.html>