**AP Statistics Syllabus**

**Academy for Technology and the Classics 2016-2017**

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**Course Description:** <https://secure-media.collegeboard.org/digitalServices/pdf/ap/ap-statistics-course-description.pdf>

**Primary Textbook**

Starnes, D., Tabor, J., Yates, D., and Moore, D. *The Practice of Statistics*, 5th Edition. New York, NY: W.H. Freeman and Company/BFW, 2014.

**Technology**

* All students have TI-83/TI-83+/TI-84 graphing calculator for use in class, at home and on the AP Exam. Students will use their graphing calculators extensively throughout the course.
* Various applets on the Internet.

**Course Outline**

**(organized by chapters in primary textbook):**

**Chapter 1: Exploring Data (total time: 9 days)**

* Activity: Hiring discrimination—it just won’t fly!
	+ Bar graphs and pie charts, graphs: good and bad
	+ Two-way tables and marginal distributions, relationships between categorical variables: conditional distributions
	+ Dotplots, describing shape, comparing distributions, stemplots
	+ Histograms
	+ Measuring center: mean and median, measuring spread: IQR, identifying outliers, five-number summary and boxplots
	+ Measuring spread: standard deviation, choosing measures of center and spread, organizing a statistics problem

**Chapter 2: Modeling Distributions of Data (total time: 7 days)**

* Activity: Where do I stand?
	+ Measuring position: percentiles; Cumulative relative frequency graphs; Measuring position: z-scores
	+ Transforming data
	+ Density curves; the 68-95-99.7 rule; The Standard Normal Distribution
	+ Normal distribution calculations
	+ Assessing normality

**Chapter 3: Describing Relationships (total time: 8 days)**

* Activity: CSI Stats: The case of the missing cookies
	+ Explanatory and response variables
	+ Measuring linear association: correlation
	+ Least-squares regression, interpreting a regression line, prediction, residuals
	+ Calculating the equation of the least-squares regression line, appropriateness of a linear model: residual plots
	+ Role of s and r2 in regression
	+ Interpreting computer regression output, regression to the mean, correlation and regression wisdom

**Chapter 4: Designing Studies (total time: 12 days)**

* Activity: See no evil, hear no evil?
	+ Simple random sampling
	+ Other random sampling methods
	+ Inference for sampling, sample surveys
	+ Observational study versus experiment, the language of experiments
	+ Completely randomized designs
	+ Inference for experiments
	+ Blocking
	+ Class experiments
	+ Scope of inference, the challenges of establishing causation
	+ Data ethics

**Chapter 5: Probability: What Are the Chances? (total time: 8 days)**

* Activity: the “1 in 6 wins” game
	+ The idea of probability, myths about randomness
	+ Simulation
	+ Probability models, basic rules of probability
	+ Two-way tables, probability and the general addition rule, venn diagrams and probability
	+ The general multiplication rule and tree diagrams
	+ Conditional probability and independence: special multiplication rule

**Chapter 6: Random Variables (total time: 9 days)**

* Activity: Bottled Water versus Tap Water
	+ Discrete random variables, mean (expected value) of a discrete random variable
	+ Standard deviation (and variance) of a discrete random variable, continuous random variables
	+ Linear transformations
	+ Combining random variables, combining normal random variables
	+ Binomial settings and binomial random variables, binomial probabilities
	+ Mean and standard deviation of a binomial distribution, binomial distributions in statistical sampling
	+ Geometric random variables

**Chapter 7: Sampling Distributions (total time: 7 days)**

* Activity: The German Tank Problem
	+ Parameters and statistics
	+ Sampling variability, describing sampling distributions
	+ The sampling distribution of $\hat{p}$, using the normal approximation for $\hat{p}$
	+ The sampling distribution of $\overbar{x}$: mean and standard deviation, sampling from a normal population
	+ The central limit theorem

**Chapter 8: Estimating with Confidence (total time: 8 days)**

* Activity: The Mystery Mean
	+ Interpreting confidence intervals and confidence levels
	+ Constructing a confidence interval
	+ Conditions for estimating p, constructing a confidence interval for p
	+ Four step process
	+ Choosing a sample size
	+ The problem of unknown σ, when σ is unknown: the t distributions, conditions for estimating µ
	+ Constructing a confidence interval for µ, choosing a sample size

**Chapter 9: Testing a Claim (total time: 8 days)**

* Activity: I’m a Great Free-Throw Shooter!
	+ Stating the hypotheses, the reasoning of significance tests, interpreting P-values, statistical significance
	+ Type I and Type II errors
	+ Carrying out a significance test, the one-sample z test for a proportion
	+ Two-sided tests
	+ Carrying out a significance test for µ, the one sample t test, two-sided tests and confidence intervals
	+ Interference for means

**Chapter 10: Comparing Two Populations or Groups (total time: 8 days)**

* Activity: Is Yawning Contagious?
	+ The sampling distribution of a difference between two proportions
	+ Confidence intervals for p1 – p2
	+ Significance tests for p1 – p2, inference for experiments
* Activity: Does Polyester Decay?
	+ The sampling distribution of a difference between two means
	+ The two-sample t statistic, confidence intervals for µ1 - µ2, using two-sample t procedures wisely

**Chapter 11: Inference for Distributions of Categorical Data (total time: 6 days)**

* Activity: The Candy Man Can
	+ Comparing observed and expected counts: the chi-square statistic
	+ The chi-square distributions and P-values
	+ Carrying out a test and follow-up analysis
	+ Comparing distributions of a categorical variable
	+ Expected counts and the chi-square statistic
	+ The chi-square test for homogeneity
	+ Relationships between two categorical variables
	+ The chi-square test for independence and using chi-square tests wisely

**Chapter 12: More about Regression (total time: 7 days)**

* Activity: The Helicopter Experiment
	+ Sampling distribution of b
	+ Conditions for regression inference
	+ Estimating the parameters
	+ Constructing a confidence interval for the slope
	+ Performing a significance test for the slope
	+ Transforming with powers and roots
	+ Transforming with logarithms
	+ Putting it all together

**Review for AP Exam and Final Exam**

* 20?? Complete AP Exam
* Remaining previous AP questions
* Final exam
* AP Exam

**Post-AP Exam**

* Second semester project
* Chapter 13 Analysis of Variance
* Chapter 14 Multiple Linear Regression
* Chapter 15 Logistic Regression

**The Project**: Students will design and conduct an experiment to investigate the effects of response bias in surveys. They may choose the topic for their surveys, but they must design their experiment so that it can answer at least one of the following questions:

* Can the wording of a question create response bias?
* Do the characteristics of the interviewer create response bias?
* Does anonymity change the responses to sensitive questions?
* Does manipulating the answer choices change the response?

Develop a hypothesis that will enable the question you choose to study to be answered. For example you might choose the second question and have two different interviewers (good cop/bad-cop style) conduct the survey.

The project will be done in pairs. Students will turn in one project per pair. A written report must be typed (single-spaced, 12-point font), and included graphs should be done on the computer Excel.

**Proposal:** The proposal should

* Describe the topic and state which type of bias is being investigated;
* Describe how to obtain subjects (minimum sample size is 50); and
* Describe what questions will be used and how they will be asked, including how to incorporate direct control, blocking, and randomization.

**Written Report:** The written report should include a title in the form of a question and the following sections (clearly labeled):

* Introduction: What form of response bias was investigated? Why was the topic chosen for the survey?
* Methodology: Describe how the experiment was conducted and justify why the design was effective. Note: This section should be very similar to the proposal.
* Results: Present the data in both tables and graphs in such a way that conclusions can be easily made. Make sure to label the graphs/tables clearly and consistently. Perform a hypothesis test on the data gathered and report conclusions based on statistical inference.
* Conclusions: What conclusions can be drawn from the experiment? Be specific. Were any problems encountered during the project? What could be done differently if the experiment were to be repeated? What was learned from this project?
* The original proposal.

**Poster:** The poster should completely summarize the project yet be simple enough to be understood by any reader. Students should include some pictures of the data collection in progress.

**Oral Presentation:** Both members will participate equally. The poster should be used as a visual aid. Students should be prepared for questions.

**Classroom Rules**

* Do things that support my teaching and your learning.
* Only positivity can enter this classroom, leave negativity at the door.
* Be respectful. Be responsible. Be here, be on time, and be prepared.
* Never stop trying, and always do your best!

**Course Requirements:**

* Students must be self-motivated, punctual, and disciplined as deadlines must be met.
* Students need to study and practice examples in the text to enhance their awareness of the content.
* All students are required to keep a notebook/binder for notes, in-class assignments, and bell work, etc.
* Notes will be taken often except on days of quizzes or tests.
* Notebook checks will be done periodically as often as the teacher requests, which can be as often as every week or as seldom as every unit.
* Homework, tests, quizzes, and any other assignment that will be turned in for a grade should be done in **pencil.**
* Every student is required to show all of their work or give an explanation written in complete sentences for each problem on an assignment. If the student chooses not to do either, the assignment will not receive full credit.

**General Classroom Procedures:**

Procedure for entering the classroom:

1. Students will walk into the classroom quietly.
2. Students will go straight to their seat and sit down.
3. Students will prepare themselves for the class session. (For example, take out their notebooks and writing utensils, sharpen their pencils, if necessary, etc.)
4. Students will begin working on their bell work quietly.

Procedure for taking attendance:

1. Students will have assigned seats.
2. Students must be in their seats by the time attendance is taken.
3. If a student is not in their seat when attendance is taken, that student will be marked absent.

Procedure for labeling homework assignments:

1. First Name Last Name
2. Class Title, Class Period
3. Date Homework was Assigned
4. Date Homework is Due
5. Homework Assignment Title
6. Page Number(s) and Problem Numbers

Procedure for turning in homework:

1. After student have completed the bell work, if there is homework that is due that day, they should be taking it out for review.
2. There will be a few minutes set aside to answer “big” questions on the homework but it will not take up a considerable amount of time.
3. Homework will be stacked neatly and passed from each table from the left side of the classroom to the right side of the classroom. There is no need for students to get out of their seat to turn in their homework.
4. The teacher will collect the homework from the table on the right side of the classroom.
5. Also, none of the papers that are turned in should have any frayed edges. Cut the edges off of these papers before class or use loose leaf paper to eliminate any mess.

Procedure for restroom breaks:

1. Only one student is allowed outside the classroom at any given time.
2. Students will not be allowed to use a pass during the first 10 minutes or the last 10 minutes of class.
3. Passes will not be given during direct instructional time.
4. In order to receive a hall pass, the student must leave their phone (Or if they do not have a phone, something else as collateral).
5. Students will completely fill out the hall pass on the clipboard, including name, date, time, and destination, before it will be initialed by the teacher as permission to leave the classroom.
6. The teacher must not be interrupted during direct instruction so students must wait for appropriate times to ask for permission (For example, during independent practice time or while small groups are working on activities, etc.).
7. The student must take the clipboard with them as their hall pass to leave the classroom.

Procedures for exiting the classroom:

1. Students will remain working until the last 5 minutes of class, when the lesson is brought to a close.
2. One minute before the bell rings, students will then begin to clean up their areas and pack up their materials.
3. Students will remain in their seats until the teacher dismisses them.

**Tardy Policy**

If you are tardy to first period, you must check in with the office to receive a pass. The front office will determine whether a tardy is excused or unexcused. If a student is tardy to any class, they will be assigned lunch detention. Excessive tardiness will lead to more severe consequences, like I.S.S. (In-school suspension).

**My Grading Philosophy**

I want my students to be able to reflect the learning process in their work and what they accomplish in my class be being able to redo tests and quizzes for a better grade, excluding the semester exam. Students will be able to correct a test in order to show mastery of the concepts. Correcting and retaking tests is always at the teacher’s discretion. Assignments will be weighted as follows:

 In-class assignments (notes, practice, bellwork, etc.) 20%

 Homework (hw from book, handouts, including projects) 30%

 Tests/Quizzes 50%

Classes are also weighted by averaging the 9 weeks grade from each quarter with the semester exam. This is shown below:

 1st Semester 2nd Semester

 Q1 – 40% Q3 – 40%

 Q2 – 40% Q4 – 40%

 Semester Exam – 20% Semester Exam – 20%

**Late Assignment Policy**

Every assignment has a due date. For Mathematics, the due dates are on Tuesday and Thursday. Assignments not handed in by the due date will not receive full credit. The highest grade that can be attained after an assignment is late is a 60%. Late assignments will no longer be accepted one week after the date that the assignment was due.

Work can be turned in late, especially for projects, if prior arrangements have been made. These arrangements must be communicated and agreed to 24 hours before the day that the assignment/project is due. However, this cannot become a common practice or extensions will not be granted in the future.

**Grading Scale**

100 – 90 A

89 – 80 B

79 – 70 C

69 – 60 D

Below 60 F

**Materials/Supplies for class**

1 spiral notebook (notes and classwork) – at least 3 subject

Loose leaf paper for homework assignments

Pencils with erasers

Graph paper

Graphing calculator (TI-84)

1 package of highlighters **(optional)**

**Online Resources**

* Khan Academy: <https://www.khanacademy.org/>
* Online graphing calculator: <http://www.desmos.com>
* AP Statistics student page: <https://apstudent.collegeboard.org/apcourse/ap-statistics>

Looking forward to a fantastic year!

Please return bottom portion of the syllabus to the teacher.

I have read the syllabus with my child and I understand if I have any questions I can contact the teacher at any time.

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Print Student’s Name

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Print Parent/Guardian’s Name

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Parent/Guardian’s Signature Date

Best means of communication:

Phone:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ E-mail:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_