

*“May the words of my mouth and the meditation of my heart be pleasing in your sight,
O Lord, my Rock and my Redeemer.” Psalm 19:14*

BCHS AP STATISTICS Course Outline, 2018-19

COURSE PHILOSOPHY:

As believers, *“We have the mind of Christ”* (1 Corinthians 2:16). At Berean, the AP Statistics course will strive to help you become critical thinkers who are self-directed learners able to communicate and reason in an effective way. The goal of this course is to equip you to impact our world effectively for Christ. “Behold, I am sending you out as sheep in the midst of wolves, so be wise as serpents and innocent as doves” (Matthew 10:16.) From detecting errors in the daily news to planning strategically in business and ministry, the ability to master and apply data will be an important skill in our increasingly technological world. As Dr. Xiao-Li Meng of Harvard explains, “The ability to take data—to be able to understand it, to process it, to extract value from it, to visualize it, to communicate it—that’s going to be a hugely important skill in the next decades, not only at the professional level but even at the educational level ... Because now we really do have essentially free and ubiquitous data. So the complimentary scarce factor is the ability to understand that data and extract value from it.”

COURSE DESCRIPTION:

AP Statistics is the high school equivalent of a one semester, introductory college statistics course. In this course, you will develop strategies for collecting, organizing, analyzing, and drawing conclusions from data. You will be exposed to four broad conceptual themes:

- 1. Exploring Data: Describing patterns and departures from patterns**
- 2. Sampling and Experimentation: Planning and conducting a study.**
- 3. Anticipating Patterns: Exploring random phenomena using probability and simulation**
- 4. Statistical Inference: Estimating population parameters and testing hypotheses**

COURSE GOALS:

In AP Statistics, you are expected to learn

Skills

- To produce convincing oral and written statistical arguments, using appropriate terminology, in a variety of applied settings.
- When and how to use technology to aid them in solving statistical problems

Knowledge

- Essential techniques for producing data (surveys, experiments, observational studies), analyzing data (graphical & numerical summaries), modeling data (probability, random variables, sampling distributions), and drawing conclusions from data (inference procedures – confidence intervals and significance tests)

Habits of mind

- To become critical consumers of published statistical results by heightening their awareness of ways in which statistics can be improperly used to mislead, confuse, or distort the truth.

COURSE EXPECTATIONS:

The AP Exam:

- To obtain AP credit for this course, you must take the College Board AP Statistics Exam on **Thursday, May 16, 2018, beginning at 11:45 a.m.**
- If you are unable to take the exam on this date, you must arrange with Mrs. Miller, the Director of Academic Affairs, to take the exam on Wednesday, May 22th. There may be an additional cost.
- Passing your examination may grant you college credit for Statistics. In order to be successful on this exam you must apply yourself daily both in and out of class. You are expected to treat this course as a college class and to be prompt, prepared, and professional each day.

Preparation:

- Read the textbook lesson prior to the class lecture and complete assigned homework.
- If homework is assigned from the textbook, check the odd answers in the back of your text book to ensure you are doing the work correctly.
- Bring the following materials to every class (unless otherwise instructed):
 - The Practice of Statistics, 4e, textbook (always in a thick, protective cardboard cover!)
 - Graphing calculator (TI 84 or equivalent)
 - Charged iPad.
 - Writing utensil and red pen or pencil for corrections
 - Notebook: This year, most of your notes and homework will be submitted in Google Classroom. A loose-leaf notebook will be needed to keep quizzes, tests, practice problems and other handouts.

Participation:

- A major component to statistics is the ability to communicate results both verbally and in writing. Therefore, your active participation in class activities and discussions is important as well as your individual written assignments.
- If you are absent for any reason, it is your responsibility to obtain all materials missed, including notes, homework solutions, assignments, etc.

COURSE HELP:

It is my goal to encourage you and help you to realize your unique God-given potential and to equip you to impact our world effectively for Christ. ***I encourage you to come to me for help!***

- I will be available for help on most ***Mondays, Tuesdays and Thursdays after school from 3:05-4:00*** p.m. at least. I may also offer special study sessions if needed. If you would like to meet with me during lunch time instead, please let me know.
- The best way to reach me outside of school hours is via Google Classroom or e-mail: bchsmath.apstats@gmail.com. Be sure to include your name and a detailed explanation of your question.

COURSE GRADING POLICY:

Quarter grades will be distributed by these approximate percentages:

- Class work and Participation: 25%
- Homework : 25%
- Quizzes, Tests & Projects: 50%

Participation

It is essential that all students have the opportunity to learn.

Students will receive 4 classwork points per day, 2 for listening and 2 for participation. If a student does not listen quietly when the instructor is talking and follow all directions he or she will lose one listening point. If a student is not actively involved in all assigned tasks, he or she will lose one participation point. If additional points are lost, the policies and procedures described in the “Code of Conduct” section of the Berean Student-Parent Handbook (pages 19 – 27) will be applied.

Late Work:

- Homework is due on the due date *before* the bell rings at the beginning of class. Late work will be marked down 10% for each day late.
- If students have an excused absence, they must document the dates of their absence when submitting late work to avoid the late penalty.

Tests and Quizzes:

- One or two quizzes will be given during the course of each chapter, as time allows.
- Chapter tests will be given at the end of each chapter.
- **Absences:** A missed test or quiz for an unexcused absence receives a grade of zero. For planned absences, you must arrange to take quizzes or tests and submit applicable homework prior to the absence. For excused unplanned absences, you must make up tests and submit homework as soon as possible and within the time period allowed by the Berean Student Handbook. Missed quizzes will not be made up and will receive the relevant chapter test grade.
- ***Berean’s academic honesty policy will be strictly enforced.***

Projects:

You will have quarterly individual or group projects in the first three quarters and one final project in the fourth quarter of the year.

“Honor one another above yourselves.”

Romans 12:10b

AP Statistics Class Rules

These rules are designed to protect your freedom and the freedom of your classmates to learn.

1. Listen and follow directions.
2. Raise your hand during lessons.
3. Respect your classmates and your teacher.
4. Keep your hands, feet, and objects to yourself.

Conceptual Physics Class Procedures

1. Turn your cell phone off or silence it and place it in the assigned phone pocket as you enter the classroom.
2. Be in your assigned seat when the bell rings.
3. Keep your iPad off and put away or face down unless otherwise instructed.
4. Join Apple Classroom when your iPad is in use and keep the “Allow Teacher To” settings to “Always” for “Lock Apps and Device” and “AirPlay and View Screen.”
5. Store your backpack in the back of the classroom or on the floor near your feet.
6. Follow lab procedures, clean up and put away all equipment when the lab is finished.
7. Wait in your seats until you are dismissed.

Note: All policies and procedures contained in the Berean Student-Parent Handbook apply. Rules, procedures and/or expectations may be modified at the teacher’s discretion during the school year.

“Only conduct yourselves in a manner worthy of the gospel of Christ, so that whether I come and see you or remain absent, I will hear of you that you are standing firm in one spirit, with one mind striving together for the faith of the gospel;”

Philippians 1:27

COURSE RESOURCES:

College Board/ AP Central:

- <https://apstudent.collegeboard.org/apcourse/ap-statistics> - includes a detailed course description, related college and career opportunities and AP exam resources.

Primary Texts (Provided by BCHS):

- The Practice of Statistics (4th edition), by Starnes, Yates, and Moore, W. H. Freeman & Co., 2012.
- For Review: AP Statistics Examination by Michael Allwood, D&S Marketing Systems, 2012.

Selected Supplementary Texts (used for reference):

- Introduction to Statistics and Data Analysis (4th Edition), by Peck, Olsen and Devore, Wadsworth Publishing, 2011.
- Stats: Modeling the World (AP/ Teacher's Edition), by Bock, Velleman, De Veaux, Addison Wesley, 2010.
- Statistics: Learning From Data (1st Edition) by Peck, Olsen, Brooks/Cole Cengage Learning, 2014.

Technology:

- All students must have a TI 84 series graphing calculator or equivalent for use in class, at home and on the AP exam. You will use your graphing calculator extensively throughout the course. **(IPads are not allowed during quizzes, tests or the AP Exam.)**
- You may use your iPad for regular note-taking, research and application purposes.
- In most cases, homework will be submitted via Google Classroom.
- FATHOM Dynamic Data Software and/or JMP-Intro statistical software may be used in class for demonstration purposes. The FATHOM software (<http://fathom.concord.org/>) is highly recommended, though optional, at a cost of \$5/year. Access to the JMP software will be provided. Both FATHOM and JMP require computers. They are not compatible with iPads.
- Other iPad applications include StatViz (Statistics Visualizer), StatCrunch, Stats Pad and Wolfram Statistics.

Reference and Resource Materials:

- Teacher resource materials for The Practice of Statistics (4th Edition), including the Teacher's Titanium Resource Binder the Electronic Encyclopedia of Statistical Examples & Exercises, and the Professional Development Videos
- Strive for a 5: Preparing for the AP Statistics Examination by Jason Molesky, W. H. Freeman, 2012.
- Selected AP Statistics Exam Free Response questions
- Other resource materials including newspapers, ASA journals and the World Wide Web.
- Statistics Video Toolkit, W. H. Freeman, 2010

Optional AP Statistics Exam Preparation Student Resources:

- AP Statistics: All Access AP by Levine-Wissing & Theil, Research & Educational Association, *(This is the most highly recommended study guide according to the Pacific AP Institute)*
- AP Statistics with CD Rom (6th edition) by Sternstein, Barron's Educational Series.
- 5 Steps to a 5: AP Statistics by Hinders, McGraw-Hill.

Berean Christian High School
AP STATISTICS – Course Outline 2018 - 19
Mrs. Hollenbeck

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O Lord, my Rock and my Redeemer.” Psalm 19:14*

I have read and understand the AP STATISTICS Course Outline for 2018-19. (Please e-mail me, bchsmath.apstats@gmail.com , if you have any questions.)

Student Name (printed):

Date:

Student Signature:

Class Period:

Parent or Guardian Name (printed):

Date:

Parent or Guardian Signature:

(Optional) Parent or Guardian Name (printed):

Date:

Parent or Guardian Signature:

COURSE SCOPE AND SEQUENCE

Chapter 1- EXPLORING DATA (Numerical Descriptive Statistics and Graphical Displays of Data)

Day	Topics	Objectives: Students will be able to...	Homework
1	Chapter 1 Introduction; Activity: <i>Hiring discrimination</i> : This activity models the components of the statistical problem solving process: research question, data analysis, probability model, and inference	<ul style="list-style-type: none"> Identify the individuals and variables in a set of data. Classify variables as categorical or quantitative. Identify units of measurement for a quantitative variable. 	1, 3, 5, 7, 8
2	1.1 Bar Graphs and Pie Charts, Graphs: Good and Bad	<ul style="list-style-type: none"> Make a bar graph of the distribution of a categorical variable or, in general, to compare related quantities. Recognize when a pie chart can and cannot be used. Identify what makes some graphs deceptive. 	11, 13, 15, 17
3	1.1 Two-Way Tables and Marginal Distributions, Relationships Between Categorical Variables: Conditional Distributions, Organizing a Statistical Problem, <i>Technology: Analyzing Two-Way Tables with Minitab</i>	<ul style="list-style-type: none"> From a two-way table of counts, answer questions involving marginal and conditional distributions. Describe the relationship between two categorical variables in context by comparing the appropriate conditional distributions. Construct bar graphs to display the relationship between two categorical variables. 	19, 21, 23, 25, 27-32
4	1.2 Dotplots, Describing Shape, Comparing Distributions, Stemplots	<ul style="list-style-type: none"> Make a dotplot or stemplot to display small sets of data. Describe the overall pattern (shape, center, spread) of a distribution and identify any major departures from the pattern (like outliers). Identify the shape of a distribution from a dotplot, stemplot, or histogram as roughly symmetric or skewed. Identify the number of modes. 	37, 39, 41, 43, 45, 47
5	1.2 Histograms, Using Histograms Wisely, <i>Technology: Making Histograms on the Calculator</i>	<ul style="list-style-type: none"> Make a histogram with a reasonable choice of classes. Identify the shape of a distribution from a dotplot, stemplot, or histogram as roughly symmetric or skewed. Identify the number of modes. Interpret histograms. 	53, 55, 57, 59, 60, 69-74
6	1.3 Measuring Center: Mean and Median, Comparing Mean and Median, Measuring Spread: IQR, Identifying Outliers	<ul style="list-style-type: none"> Calculate and interpret measures of center (mean, median) in context Calculate and interpret measures of spread (<i>IQR</i>) in context Identify outliers using the $1.5 \times IQR$ rule. 	79, 81, 83, 87, 89
7	1.3 Five Number Summary and Boxplots, Measuring Spread: Standard Deviation, Choosing Measures of Center and Spread, <i>Technology: Making Boxplots on the Calculator, Computing Numerical Summaries with Minitab and the Calculator</i>	<ul style="list-style-type: none"> Make a boxplot. Calculate and interpret measures of spread (standard deviation) Select appropriate measures of center and spread Use appropriate graphs and numerical summaries to compare distributions of quantitative variables. 	91, 93, 95, 97, 103, 105, 107-110
8	Chapter 1 Review		Chapter 1 Review Exercises
9	Chapter 1 Test	Planned: 9/5/13	

Chapter 1 Project: Critical statistical analysis – each student collects data and analyzes it using the techniques learned in this unit and prepares a written analysis. Evaluation using a four-point rubric like the AP Free Response questions.

Chapter 2: MODELING DISTRIBUTIONS OF DATA (z-Scores, Density Curve, Percentiles, Normal Distributions)

Day	Topics	Objectives: Students will be able to...	Homework
1	2.1 Introduction, Measuring Position: Percentiles, Cumulative Relative Frequency Graphs, Measuring Position: z-scores	<ul style="list-style-type: none"> Use percentiles to locate individual values within distributions of data. Interpret a cumulative relative frequency graph. Find the standardized value (z-score) of an observation. Interpret z-scores in context. 	5, 7, 9, 11, 13, 15
2	2.1 Transforming Data, Density Curves	<ul style="list-style-type: none"> Describe the effect of adding, subtracting, multiplying by, or dividing by a constant on the shape, center, and spread of a distribution of data. Approximately locate the median (equal-areas point) and the mean (balance point) on a density curve. 	19, 21, 23, 31, 33-38
3	2.2 Normal Distributions, The 68-95-99.7 Rule, The Standard Normal Distribution, <i>Technology: Standard Normal Curve Calculations with the Calculator and with an Application</i>	<ul style="list-style-type: none"> Use the 68–95–99.7 rule to estimate the percent of observations from a Normal distribution that fall in an interval involving points one, two, or three standard deviations on either side of the mean. Use the standard Normal distribution to calculate the proportion of values in a specified interval. Use the standard Normal distribution to determine a z-score from a percentile. 	41, 43, 45, 47, 49, 51
4	2.2 Normal Distribution Calculations, <i>Technology: Normal Curve Calculations with the Calculator and with an Application</i>	<ul style="list-style-type: none"> Use Table A to find the percentile of a value from any Normal distribution and the value that corresponds to a given percentile. 	53, 55, 57, 59
5	2.2 Assessing Normality, <i>Normal Probability Plots on the Calculator</i>	<ul style="list-style-type: none"> Make an appropriate graph to determine if a distribution is bell-shaped. Use the 68-95-99.7 rule to assess Normality of a data set. Interpret a Normal probability plot 	63, 65, 66, 68, 69-74
6	Chapter 2 Review		Chapter 2 Review Exercises
7	Chapter 2 Test	Planned: 9/19/13	39 ^R , 40 ^R , 75 ^R , 76 ^R

Chapter 3: DESCRIBING RELATIONSHIPS (Scatterplots, Correlation, Linear Regression)

Day	Topics	Objectives: Students will be able to ...	Homework
1	Chapter 3 Introduction, Activity: CSI Stats, 3.1 Explanatory and response variables, 3.1 Displaying relationships: scatterplots, 3.1 Interpreting scatterplots, <i>Technology: Scatterplots on the Calculator</i>	<ul style="list-style-type: none"> Describe why it is important to investigate relationships between variables. Identify explanatory and response variables in situations where one variable helps to explain or influences the other. Make a scatterplot to display the relationship between two quantitative variables. Describe the direction, form, and strength of the overall pattern of a scatterplot. Recognize outliers in a scatterplot. 	1, 5, 7, 11, 13
2	3.1 Measuring linear association: correlation, 3.1 Facts about correlation, <i>Technology: Correlation and Regression Application</i>	<ul style="list-style-type: none"> Know the basic properties of correlation. Calculate and interpret correlation in context. Explain how the correlation r is influenced by extreme observations. 	14–18, 21, 26
3	3.2 Least-squares regression, 3.2 Interpreting a regression line, 3.2 Prediction, <i>Technology: Least-Squares Regression Lines on the Calculator</i>	<ul style="list-style-type: none"> Interpret the slope and y intercept of a least-squares regression line in context. Use the least-squares regression line to predict y for a given x. Explain the dangers of extrapolation. 	27–32, 35, 37, 39, 41
4	3.2 Residuals and the least-squares regression line, 3.2 Calculating the equation of the least-squares regression line, <i>Technology: Residual Plots and s on the Calculator</i>	<ul style="list-style-type: none"> Calculate and interpret residuals in context. Explain the concept of least squares. Use technology to find a least-squares regression line. Find the slope and intercept of the least-squares regression line from the means and standard deviations of x and y and their correlation. 	43, 45, 47, 53
5	3.2 How well the line fits the data: residual plots, 3.2 How well the line fits the data: the role of r^2 in regression	<ul style="list-style-type: none"> Construct and interpret residual plots to assess if a linear model is appropriate. Use the standard deviation of the residuals to assess how well the line fits the data. Use r^2 to assess how well the line fits the data. Interpret the standard deviation of the residuals and r^2 in context. 	49, 54, 56, 58–61
6	3.2 Interpreting computer regression output, 3.2 Correlation and regression wisdom, <i>Technology: Least-Squares Regression using Minitab and JMP</i>	<ul style="list-style-type: none"> Identify the equation of a least-squares regression line from computer output. Explain why association doesn't imply causation. Recognize how the slope, y intercept, standard deviation of the residuals, and r^2 are influenced by extreme observations. 	63, 65, 68, 69, 71–78
7	Chapter 3 Review		Chapter Review Exercises
8	Chapter 3 Test	Planned : 10/3/13	33 ^R , 34 ^R , 79 ^R , 80 ^R , 81 ^R

Chapter 4: DESIGNING STUDIES (Planning and Conducting a Study, Sampling, Experiments)

Day	Topics	Objectives: Students will be able to...	Homework
1	4.1 Introduction, Sampling and Surveys, How to Sample Badly, How to Sample Well: Random Samples, <i>Technology: Choosing an SRS using an Application or Calculator</i>	<ul style="list-style-type: none"> Identify the population and sample in a sample survey. Identify voluntary response samples and convenience samples. Explain how these bad sampling methods can lead to bias. Describe how to use Table D to select a simple random sample (SRS). 	1, 3, 5, 7, 9, 11
2	4.1 Other Sampling Methods	<ul style="list-style-type: none"> Distinguish a simple random sample from a stratified random sample or cluster sample. Give advantages and disadvantages of each sampling method. 	17, 19, 21, 23, 25
3	4.1 Inference for Sampling, Sample Surveys: What Can Go Wrong?	<ul style="list-style-type: none"> Explain how undercoverage, nonresponse, and question wording can lead to bias in a sample survey. 	27, 28, 29, 31, 33, 35
4	4.2 Observational Studies vs. Experiments, The Language of Experiments, How to Experiment Badly	<ul style="list-style-type: none"> Distinguish between an observational study and an experiment. Explain how a lurking variable in an observational study can lead to confounding. Identify the experimental units or subjects, explanatory variables (factors), treatments, and response variables in an experiment. 	37-42, 45, 47, 49, 51, 53
5	4.2 How to Experiment Well, Three Principles of Experimental Design	<ul style="list-style-type: none"> Describe a completely randomized design for an experiment. Explain why random assignment is an important experimental design principle. 	57, 63, 65, 67
6	4.2 Experiments: What Can Go Wrong? Inference for Experiments	<ul style="list-style-type: none"> Describe how to avoid the placebo effect in an experiment. Explain the meaning and the purpose of blinding in an experiment. Explain in context what “statistically significant” means. 	69, 71, 73, 75* (*We will analyze this data again in an Activity in chapter 10)
7	4.2 Blocking, Matched Pairs Design	<ul style="list-style-type: none"> Distinguish between a completely randomized design and a randomized block design. Know when a matched pairs experimental design is appropriate and how to implement such a design. 	77, 79, 81, 85,
8	4.3 Scope of Inference, the Challenges of Establishing Causation	<ul style="list-style-type: none"> Determine the scope of inference for a statistical study. 	91-98, 102-108
9	4.2 Class Experiments or 4.3 Data Ethics* (*optional topic)	<ul style="list-style-type: none"> Evaluate whether a statistical study has been carried out in an ethical manner. 	55, 83, 87, 89
10	Chapter 4 Review		Chapter 4 Review Exercises
11	Chapter 4 Test	Planned : 10/24/13	Part 1: Cumulative AP Review Exercises

Chapter 4 Project: Students work in teams of 2 to design and carry out an experiment to investigate response bias, write a summary report, and give a 10 minute oral synopsis to their classmates. *See rubric on page 15.*

Chapter 5: PROBABILITY: WHAT ARE THE CHANCES?

Day	Topics	Objectives: Students will be able to...	Homework
1	5.1 Introduction, The Idea of Probability, Myths about Randomness	<ul style="list-style-type: none"> Interpret probability as a long-run relative frequency in context. 	1, 3, 7, 9, 11
2	5.1 Simulation, <i>Technology: Random Numbers with Calculators</i>	<ul style="list-style-type: none"> Use simulation to model chance behavior. 	15, 17, 19, 23, 25
3	5.2 Probability Models, Basic Rules of Probability	<ul style="list-style-type: none"> Describe a probability model for a chance process. Use basic probability rules, including the complement rule and the addition rule for mutually exclusive events. 	27, 31, 32, 43, 45, 47
4	5.2 Two-Way Tables and Probability, Venn Diagrams and Probability	<ul style="list-style-type: none"> Use a Venn diagram to model a chance process involving two events. Use the general addition rule to calculate $P(A \cup B)$ 	29, 33-36, 49, 51, 53, 55
5	5.3 What is Conditional Probability?, Conditional Probability and Independence, Tree Diagrams and the General Multiplication Rule	<ul style="list-style-type: none"> When appropriate, use a tree diagram to describe chance behavior. Use the general multiplication rule to solve probability questions. Determine whether two events are independent. Find the probability that an event occurs using a two-way table. 	57-60, 63, 65, 67, 69, 73, 77, 79
6	5.3 Independence: A Special Multiplication Rule, Calculating Conditional Probabilities	<ul style="list-style-type: none"> When appropriate, use the multiplication rule for independent events to compute probabilities. Compute conditional probabilities. 	83, 85, 87, 91, 93, 95, 97, 99
7	Review		Chapter 5 Review Problems
8	Chapter 5 Test	Planned: 11/7/13	61 ^R , 62 ^R , 107 ^R , 108 ^R , 109 ^R

Chapter 6: RANDOM VARIABLES (Transforming a Single Random Variable, Combining Random Variables, Binomial and Geometric Random Variables, Normal Distribution)

Day	Topics	Objectives: Students will be able to...	Homework
1	Chapter 6 Introduction, 6.1 Discrete random Variables, Mean (Expected Value) of a Discrete Random Variable	<ul style="list-style-type: none"> Use a probability distribution to answer questions about possible values of a random variable. Calculate the mean of a discrete random variable. Interpret the mean of a random variable in context. 	1, 5, 7, 9, 13
2	6.1 Standard Deviation (and Variance) of a Discrete Random Variable, Continuous Random Variables, <i>Technology: Analyzing Random Variables on the Calculator</i>	<ul style="list-style-type: none"> Calculate the standard deviation of a discrete random variable. Interpret the standard deviation of a random variable in context. 	14, 18, 19, 23, 25
3	6.2 Linear Transformations	<ul style="list-style-type: none"> Describe the effects of transforming a random variable by adding or subtracting a constant and multiplying or dividing by a constant. 	27-30, 37, 39-41, 43, 45
4	6.2 Combining Random Variables, Combining Normal Random Variables	<ul style="list-style-type: none"> Find the mean and standard deviation of the sum or difference of independent random variables. Determine whether two random variables are independent. Find probabilities involving the sum or difference of independent Normal random variables. 	49, 51, 57-59, 63
5	6.3 Binomial Settings and Binomial Random Variables, Binomial Probabilities, <i>Technology: Binomial Probabilities on the Calculator</i>	<ul style="list-style-type: none"> Determine whether the conditions for a binomial random variable are met. Compute and interpret probabilities involving binomial distributions. 	61, 65, 66, 69, 71, 73, 75, 77
6	6.3 Mean and Standard Deviation of a Binomial Distribution, Binomial Distributions in Statistical Sampling	<ul style="list-style-type: none"> Calculate the mean and standard deviation of a binomial random variable. Interpret these values in context. 	79, 81, 83, 85, 87, 89
7	6.3 Geometric Random Variables, <i>Technology: Geometric Probabilities on the Calculator</i>	<ul style="list-style-type: none"> Find probabilities involving geometric random variables. 	93, 95, 97, 99, 101-103
8	Chapter 6 Review		Chapter 6 Review Exercises
9	Chapter 6 Test	Planned: 12/5/13	31 ^R -34 ^R

EXAM REVIEW: 3 DAYS

SEMESTER 1 EXAM: Simulated mini-AP format with Multiple Choice, Free Response
Planned: 12/18/13

Chapter 7: SAMPLING DISTRIBUTIONS

Day	Topics	Objectives: Students will be able to...	Homework
1	Introduction: German Tank Problem, 7.1 Parameters and Statistics, <i>Technology: Using Fathom to Simulate Sampling Distributions</i>	<ul style="list-style-type: none"> Distinguish between a parameter and a statistic. 	1, 3, 5, 7
2	7.1 Sampling Variability, Describing Sampling Distributions	<ul style="list-style-type: none"> Understand the definition of a sampling distribution. Distinguish between population distribution, sampling distribution, and the distribution of sample data. Determine whether a statistic is an unbiased estimator of a population parameter. Understand the relationship between sample size and the variability of an estimator. 	9, 11, 13, 17-20
3	7.2 The Sampling Distribution of \hat{p} , Using the Normal Approximation for \hat{p} , <i>Technology: Using an Application to Simulate the distribution of \hat{p}.</i>	<ul style="list-style-type: none"> Find the mean and standard deviation of the sampling distribution of a sample proportion \hat{p} for an SRS of size n from a population having proportion p of successes. Check whether the 10% and Normal conditions are met in a given setting. Use Normal approximation to calculate probabilities involving \hat{p}. Use the sampling distribution of \hat{p} to evaluate a claim about a population proportion. 	21-24, 27, 29, 33, 35, 37, 41
4	7.3 The Sampling Distribution of \bar{x} : Mean and Standard Deviation, Sampling from a Normal Population, <i>Technology: Using an Application to Simulate the distribution of \bar{x}.</i>	<ul style="list-style-type: none"> Find the mean and standard deviation of the sampling distribution of a sample mean \bar{x} from an SRS of size n. Calculate probabilities involving a sample mean \bar{x} when the population distribution is Normal. 	43-46, 49, 51, 53, 55
5	7.3 The Central Limit Theorem	<ul style="list-style-type: none"> Explain how the shape of the sampling distribution of \bar{x} is related to the shape of the population distribution. Use the central limit theorem to help find probabilities involving a sample mean \bar{x}. 	57, 59, 61, 63, 65-68
6	Chapter 7 Review		Chapter 7 Review Exercises
7	Chapter 7 Test	Planned : 1/16/14	69 ^R -72 ^R

Chapter 8: ESTIMATING WITH CONFIDENCE (Confidence Intervals for a Single Parameter – Proportion or Mean)

Day	Topics	Objectives: Students will be able to:	Homework
1	8.1 The Idea of a Confidence Interval, Interpreting Confidence Levels and Confidence Intervals, Constructing a Confidence Interval, <i>Technology: Simulating Confidence Intervals with the Confidence Interval Application</i>	<ul style="list-style-type: none"> Interpret a confidence level in context. Interpret a confidence interval in context. Understand that a confidence interval gives a range of plausible values for the parameter. 	5, 7, 9, 11, 13
2	8.1 Using Confidence Intervals Wisely, 8.2 Conditions for Estimating p , Constructing a Confidence Interval for p	<ul style="list-style-type: none"> Understand why each of the three inference conditions—Random, Normal, and Independent—is important. Explain how practical issues like nonresponse, undercoverage, and response bias can affect the interpretation of a confidence interval. Construct and interpret a confidence interval for a population proportion. Determine critical values for calculating a confidence interval using a table or your calculator. 	17, 19–24, 27, 31, 33
3	8.2 Putting It All Together: The Four-Step Process, Choosing the Sample Size, <i>Technology: Confidence Intervals for p on the Calculator</i>	<ul style="list-style-type: none"> Carry out the steps in constructing a confidence interval for a population proportion: define the parameter; check conditions; perform calculations; interpret results in context. Determine the sample size required to obtain a level C confidence interval for a population proportion with a specified margin of error. Understand how the margin of error of a confidence interval changes with the sample size and the level of confidence C. Understand why each of the three inference conditions—Random, Normal, and Independent—is important. 	35, 37, 41, 43, 47
4	8.3 When σ Is Known: The One-Sample z Interval for a Population Mean, When σ Is Unknown: The t Distributions, Constructing a Confidence Interval for μ , <i>Technology: Inverse t on the Calculator</i>	<ul style="list-style-type: none"> Construct and interpret a confidence interval for a population mean. Determine the sample size required to obtain a level C confidence interval for a population mean with a specified margin of error. Carry out the steps in constructing a confidence interval for a population mean: define the parameter; check conditions; perform calculations; interpret results in context. 	49–52, 55, 57, 59, 63
5	8.3 Using t Procedures Wisely, <i>Technology: Confidence Intervals for μ on the Calculator</i>	<ul style="list-style-type: none"> Understand why each of the three inference conditions—Random, Normal, and Independent—is important. 	65, 67, 71, 73, 75–78
6	Chapter 8 Review	<ul style="list-style-type: none"> Determine sample statistics from a confidence interval. 	Chapter 8 Review Exercises
7	Chapter 8 Test	Planned: 1/30/14	

Chapter 9; TESTING A CLAIM (For a Single Parameter – Proportion or Mean)

Day	Topics	Objectives: Students will be able to:	Homework
1	9.1 The Reasoning of Significance Tests, Stating Hypotheses, Interpreting <i>P</i> -values, Statistical Significance	<ul style="list-style-type: none"> State correct hypotheses for a significance test about a population proportion or mean. Interpret <i>P</i>-values in context. 	1, 3, 5, 7, 9, 11, 13
2	9.1 Type I and Type II Errors, Planning Studies: The Power of a Statistical Test, <i>Technology: Investigating Power with an Application</i>	<ul style="list-style-type: none"> Interpret a Type I error and a Type II error in context, and give the consequences of each. Understand the relationship between the significance level of a test, <i>P</i>(Type II error), and power. 	15, 19, 21, 23, 25
3	9.2 Carrying Out a Significance Test, The One-Sample <i>z</i> Test for a Proportion, <i>Technology: One-Proportion <i>z</i> Test on the Calculator</i>	<ul style="list-style-type: none"> Check conditions for carrying out a test about a population proportion. If conditions are met, conduct a significance test about a population proportion. 	27–30, 41, 43, 45
4	9.2 Two-Sided Tests, Why Confidence Intervals Give More Information, <i>Technology: Tests and Confidence Intervals using Minitab</i>	<ul style="list-style-type: none"> Use a confidence interval to draw a conclusion for a two-sided test about a population proportion. 	47, 49, 51, 53, 55
5	9.3 Carrying Out a Significance Test for μ , The One Sample <i>t</i> Test, Two-Sided Tests and Confidence Intervals, <i>Technology: Computing <i>P</i>-values from <i>t</i> Distributions on the Calculator, One Sample <i>t</i> Test on the Calculator</i>	<ul style="list-style-type: none"> Check conditions for carrying out a test about a population mean. If conditions are met, conduct a one-sample <i>t</i> test about a population mean μ. Use a confidence interval to draw a conclusion for a two-sided test about a population mean. 	57–60, 71, 73
6	9.3 Inference for Means: Paired Data, Using Tests Wisely	<ul style="list-style-type: none"> Recognize paired data and use one-sample <i>t</i> procedures to perform significance tests for such data. 	75, 77, 89, 94–97, 99–104
7	Chapter 9 Review		Chapter 9 Review Exercises
8	Chapter 9 Test	Planned: 2/20/14	

Chapter 10: COMPARING TWO POPULATIONS OR GROUPS (Comparing Proportions or Means)

Day	Topics	Objectives: Students will be able to...	Homework
1	Activity: Is Yawning Contagious?, 10.1 The Sampling Distribution of a Difference Between Two Proportions	<ul style="list-style-type: none"> Describe the characteristics of the sampling distribution of $\hat{p}_1 - \hat{p}_2$ Calculate probabilities using the sampling distribution of $\hat{p}_1 - \hat{p}_2$ 	1, 3, 5
2	10.1 Confidence Intervals for $p_1 - p_2$, <i>Technology: Confidence Intervals for a Difference in Proportions on the Calculator</i>	<ul style="list-style-type: none"> Determine whether the conditions for performing inference are met. Construct and interpret a confidence interval to compare two proportions. 	7, 9, 11, 13
3	10.1 Significance Tests for $p_1 - p_2$, Inference for Experiments, <i>Technology: Significance Tests for a Difference in Proportions on the Calculator</i>	<ul style="list-style-type: none"> Perform a significance test to compare two proportions. Interpret the results of inference procedures in a randomized experiment. 	15, 17, 21, 23
4	10.2 Activity: Does Polyester Decay?, The Sampling Distribution of a Difference Between Two Means	<ul style="list-style-type: none"> Describe the characteristics of the sampling distribution of $\bar{x}_1 - \bar{x}_2$ Calculate probabilities using the sampling distribution of $\bar{x}_1 - \bar{x}_2$ 	29-32, 35, 37, 57
5	10.2 The Two-Sample t -Statistic, Confidence Intervals for $\mu_1 - \mu_2$, <i>Technology: Confidence Intervals for a Difference in Means on the Calculator</i>	<ul style="list-style-type: none"> Determine whether the conditions for performing inference are met. Use two-sample t procedures to compare two means based on summary statistics. Use two-sample t procedures to compare two means from raw data. Interpret standard computer output for two-sample t procedures. 	39, 41, 43, 45
6	10.2 Significance Tests for $\mu_1 - \mu_2$, Using Two-Sample t Procedures Wisely, <i>Technology: Two Sample t Tests with Computer Software and Calculators</i>	<ul style="list-style-type: none"> Perform a significance test to compare two means. Check conditions for using two-sample t procedures in a randomized experiment. Interpret the results of inference procedures in a randomized experiment. 	51, 53, 59, 65, 67-70
7	Chapter 10 Review	<ul style="list-style-type: none"> Determine the proper inference procedure to use in a given setting. 	Chapter 10 Review Exercises
8	Chapter 10 Test	Planned: 3/6/14	33 ^R , 34 ^R , 75 ^R , 76 ^R

Chapter 11: INFERENCE FOR DISTRIBUTIONS OF CATEGORICAL DATA (χ^2 (Chi Square)
 Tests: Goodness of Fit, Test for Association/Independence, Tests for Homogeneity)

Day	Topics	Objectives: Students will be able to...	Homework
1	Activity: The Candy Man Can, 11.1 Comparing Observed and Expected Counts: The Chi-Square Statistic, The Chi-Square Distributions and <i>P</i> -values, <i>Technology: Finding P-values for Chi-Square Tests on the Calculator</i>	<ul style="list-style-type: none"> Know how to compute expected counts, conditional distributions, and contributions to the chi-square statistic. 	1, 3, 5
2	11.1 The Chi-Square Goodness-of-Fit Test, Follow-Up Analysis, <i>Technology: Chi-Square Goodness-of-Fit Tests on the Calculator</i>	<ul style="list-style-type: none"> Check the Random, Large sample size, and Independent conditions before performing a chi-square test. Use a chi-square goodness-of-fit test to determine whether sample data are consistent with a specified distribution of a categorical variable. Examine individual components of the chi-square statistic as part of a follow-up analysis. 	7, 9, 11, 17
3	11.2 Comparing Distributions of a Categorical Variable, Expected Counts and the Chi-Square Statistic, The Chi-Square Test for Homogeneity, Follow-Up Analysis, Comparing Several Proportions, <i>Technology: Chi-Square Tests for Two-Way Tables with Computer Software and Calculators</i>	<ul style="list-style-type: none"> Check the Random, Large sample size, and Independent conditions before performing a chi-square test. Use a chi-square test for homogeneity to determine whether the distribution of a categorical variable differs for several populations or treatments. Interpret computer output for a chi-square test based on a two-way table. Examine individual components of the chi-square statistic as part of a follow-up analysis. Show that the two-sample <i>z</i> test for comparing two proportions and the chi-square test for a 2-by-2 two-way table give equivalent results. 	19-22, 27, 29, 31, 33, 35, 43
4	11.2 The Chi-Square Test of Association/Independence, Using Chi-Square Tests Wisely	<ul style="list-style-type: none"> Check the Random, Large sample size, and Independent conditions before performing a chi-square test. Use a chi-square test of association/independence to determine whether there is convincing evidence of an association between two categorical variables. Interpret computer output for a chi-square test based on a two-way table. Examine individual components of the chi-square statistic as part of a follow-up analysis. 	45, 49, 51, 53-58
5	Chapter 11 Review	<ul style="list-style-type: none"> Distinguish between the three types of chi-square tests. 	Chapter 11 Review Exercises
6	Chapter 11 Test	Planned: 3/20/14	59 ^R , 60 ^R

Chapter 12: MORE ABOUT REGRESSION (Inference for the Slope of the True Population Regression Line, Transforming Data to Achieve Linearity)

Day	Topics	Objectives: Students will be able to...	Homework
1	Activity: The Helicopter Experiment, 12.1 The Sampling Distribution of b , Conditions for Regression Inference	<ul style="list-style-type: none"> Check conditions for performing inference about the slope β of the population regression line. 	1, 3
2	12.1 Estimating Parameters, Constructing a Confidence Interval for the Slope, <i>Technology: Regression Inference using Computer Software and Calculators</i>	<ul style="list-style-type: none"> Interpret computer output from a least-squares regression analysis. Construct and interpret a confidence interval for the slope β of the population regression line. 	5, 7, 9, 11
3	12.1 Performing a Significance Test for the Slope	<ul style="list-style-type: none"> Perform a significance test about the slope β of a population regression line. 	13, 15, 17, 19
4	12.2 Transforming with Powers and Roots, <i>Technology: Transforming to Achieve Linearity on the Calculator</i>	<ul style="list-style-type: none"> Use transformations involving powers and roots to achieve linearity for a relationship between two variables. Make predictions from a least-squares regression line involving transformed data. 	21-26, 33, 35
5	12.2 Transforming with Logarithms	<ul style="list-style-type: none"> Use transformations involving logarithms to achieve linearity for a relationship between two variables. Make predictions from a least-squares regression line involving transformed data. Determine which of several transformations does a better job of producing a linear relationship. 	37, 39, 41, 45-48
6	Chapter 12 Review		Chapter 12 Review Exercises
7	Chapter 12 Test	Planned: 4/3/14	Cumulative AP Practice Test 4

AP STATISTICS FINAL PROJECT/ PRESENTATIONS: Beginning 4/14/14 (Easter is on 4/20/14)

AP EXAM REVIEW

- Practice AP Free Response Questions
- Choosing the Correct Inference Procedure
- Mock Grading Sessions
- Rubric development by student teams
- Practice Multiple Choice Questions

AP STATISTICS EXAM (May 9, 2014)

AP STATISTICS 1Q PROJECT: EXPLORING QUANTITATIVE DATA

Locate two sets of related quantitative data (each having at least 25 data values) suitable for comparison in a newspaper, magazine, periodical, recent book, or on the Internet. YOU must obtain this data without consultation from other students. Be certain to make a copy of the source data and to record the bibliographical information. They are part of the project scoring rubric. Once you have obtained your data, use appropriate graphical and numerical techniques (back-to-back stemplots, side-by-side boxplots, histograms and measures of center and spread) to compare the two sets of data. Then, write a narrative comparison of the two data sets in context based on your graphical and numerical summaries. Comment on each of your graphical comparisons. Discuss which display(s) and statistics are most helpful in comparing the data sets. Use appropriate terminology, and write in complete, grammatically correct sentences. DO NOT discuss your analysis with any other person – it is to be your own work. Aim for one page of narrative and one to two pages of figures.

DUE: Monday, September 24, 2014. Your project will be evaluated on: accuracy of graphical representations and numerical summaries, quality of your written analysis, neatness, and organization.

Category	4	3	2	1
Accuracy of Graphical/Numerical Summary Techniques	The student has used all required statistical techniques correctly and appropriately. All minor points are included.	The student has generally used each of the required statistical techniques correctly and appropriately. There may be minor omissions or errors.	The student has used some of the required statistical techniques correctly and appropriately. There are, however, significant errors in one or more techniques or a plethora of minor mistakes.	The student has made some attempt to use required techniques correctly and appropriately, but the effort is flawed in some major way.
Quality of Statistical Comparison	The student thoroughly and accurately compares the two sets of data based on the statistical techniques employed in the context of the data. Correct terminology is used throughout.	The student accurately compares the datasets based on statistical techniques employed in the context of the data and generally uses correct terminology. There are minor omissions/errors.	The student produces a generally accurate comparison of the datasets based on the statistical techniques employed with some use of appropriate terminology or with inadequate connection to context. A key omission or inaccurate conclusion may also have been made	The student attempted to use statistical techniques employed to compare the datasets, but missed some key ideas. Terminology and reference to context are inadequate or missing.
Organization, Transition, Appearance	The project shows evidence of careful organization, flows naturally from statistical technique to statistical analysis, and is neat in appearance.	There are minor flaws in one of the areas: organization, transition, appearance	There are major flaws in one of the areas: organization, transition, appearance, OR minor flaws in two areas.	Completely inadequate in two or more of: organization, transition, appearance.
English Mechanics	The student's writing is grammatically correct, is punctuated properly, and flows logically from one point to the next. No spelling mistakes	The student's writing has a minor flaw in one of the areas: grammatically correct, punctuated properly, logical flow, spelling.	The student has made significant errors in one of the areas: grammatically correct, punctuated properly, logical flow, spelling, OR minor flaws in two areas.	The student's writing has major flaws in two or more of the areas: grammatically correct, punctuated properly, logical flow, spelling.
Source Documentation	The student has selected a source that is appropriate for the assignment and has correctly referenced the source	The student has selected a source that is appropriate for the assignment, but has made some error or omission in the citation	The chosen source is slightly inappropriate for the assignment OR referencing is incomplete or inaccurate.	The chosen source is inappropriate.

Scoring Guide: Your grade on this project will be determined based on your total points, as follows:

21-24 A	16-20 B	11-15 C	6-10 D	< 6 F
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AP STATISTICS 2Q PROJECT: RESPONSE BIAS EXPERIMENT

Due: Monday, November 4, 2013

Students work in teams of 2 to design and carry out an experiment to investigate response bias, write a summary report, and give a 10 minute oral synopsis to their classmates.

Chapter 4 Project Rubric	4 = Complete	3 = Substantial	2 = Developing	1 = Minimal
Introduction	<ul style="list-style-type: none"> Describes the context of the research Has a clearly stated question of interest Provides a hypothesis about the answer to the question of interest Question of interest is of appropriate difficulty 	<ul style="list-style-type: none"> Introduces the context of the research and has a specific question of interest Suggests hypothesis OR has appropriate difficulty 	<ul style="list-style-type: none"> Introduces the context of the research and has a specific question of interest OR has question of interest and a hypothesis 	<ul style="list-style-type: none"> Briefly describes the context of the research
Data Collection	<ul style="list-style-type: none"> Method of data collection is clearly described Includes appropriate randomization Describes efforts to reduce bias, variability, confounding Quantity of data collected is appropriate 	<ul style="list-style-type: none"> Method of data collection is clearly described Some effort is made to incorporate principles of good data collection Quantity of data is appropriate 	<ul style="list-style-type: none"> Method of data collection is described Some effort is made to incorporate principles of good data collection 	<ul style="list-style-type: none"> Some evidence of data collection
Graphs and Summary Statistics	<ul style="list-style-type: none"> Appropriate graphs are included (to help answer the question of interest) Graphs are neat, clearly labeled, and easy to compare Appropriate summary statistics are included Summary statistics are discussed and correctly interpreted 	<ul style="list-style-type: none"> Appropriate graphs are included (to help answer the question of interest) Graphs are neat, clearly labeled, and easy to compare Appropriate summary statistics are included 	<ul style="list-style-type: none"> Graphs and summary statistics are included 	<ul style="list-style-type: none"> Graphs or summary statistics are included
Conclusions	<ul style="list-style-type: none"> Uses the results of the study to correctly answer question of interest Discusses what inferences are appropriate based on study design Shows good evidence of critical reflection (discusses possible errors, shortcomings, limitations, alternate explanations, etc.) 	<ul style="list-style-type: none"> Makes a correct conclusion Discusses what inferences are appropriate Shows some evidence of critical reflection 	<ul style="list-style-type: none"> Makes a partially correct conclusion Shows some evidence of critical reflection 	<ul style="list-style-type: none"> Makes a conclusion
Overall Presentation/Communication	<ul style="list-style-type: none"> Clear, holistic understanding of the project Poster is well organized, neat and easy to read Statistical vocabulary is used correctly Poster is visually appealing 	<ul style="list-style-type: none"> Clear, holistic understanding of the project Statistical vocabulary is used correctly Poster is unorganized or isn't visually appealing, 	<ul style="list-style-type: none"> Poster is not well done or communication is poor 	<ul style="list-style-type: none"> Communication and organization are very poor

AP STATISTICS: FINAL PROJECT (See rubric on next page)

Due: Monday, April 14, 2014

Purpose: The purpose of this project is for you to actually do statistics. You are to form a hypothesis, design a study, conduct the study, collect the data, describe the data, and make conclusions using the data. You are going to do it all!!

Topics: You may do your study on any topic, but you must be able to do all 6 steps listed above. Make it interesting and note that degree of difficulty is part of the grade.

Group Size: You may work alone or with a partner for this project.

Proposal (20 points): To get your project approved, you must be able to demonstrate how your study will meet the requirements of the project. In other words, you need to clearly and completely communicate your hypotheses, your explanatory and response variables, the test/interval you will use to analyze the results, and how you will collect the data so the conditions for inference will be satisfied. You must also make sure that your study will be safe and ethical if you are using human subjects. This should be typed. If your proposal isn't approved, you must resubmit the proposal for partial credit until it is approved.

Poster (80 points):

The key to a good statistical poster is communication and organization. Make sure all components of the poster are focused on answering the question of interest and that statistical vocabulary is used correctly. The poster should include:

- Title (in the form of a question).
- Introduction. In the introduction you should discuss what question you are trying to answer, why you chose this topic, what your hypotheses are, and how you will analyze your data.
- Data Collection. In this section you will describe how you obtained your data. Be specific.
- Graphs, Summary Statistics and the Raw Data (if numerical). Make sure the graphs are well labeled, easy to compare, and *help answer the question of interest*. You should include a brief discussion of the graphs and interpretations of the summary statistics. Use JMP-Intro Statistical software to analyze and present your data.
- Discussion and Conclusions. In this section, you will state your conclusion (with the name of the test, test statistic and P -value) and you should discuss why your inference procedure is valid. You should also discuss any errors you made, what you could do to improve the study next time, and any other critical reflections
- Live action pictures of your data collection in progress.

Presentation: Each individual will be required to give a 5 minute oral presentation to the class.

RUBRIC FOR FINAL PROJECT:

Final Project	4 = Complete	3 = Substantial	2 = Developing	1 = Minimal
Introduction	<ul style="list-style-type: none"> Describes the context of the research Has a clearly stated question of interest Clearly defines the parameter of interest and states correct hypotheses Question of interest is of appropriate difficulty 	<ul style="list-style-type: none"> Introduces the context of the research and has a specific question of interest Has correct parameter/hypotheses OR has appropriate difficulty 	<ul style="list-style-type: none"> Introduces the context of the research and has a specific question of interest OR has question of interest and hypotheses 	<ul style="list-style-type: none"> Briefly describes the context of the research
Data Collection	<ul style="list-style-type: none"> Method of data collection is clearly described Includes appropriate randomization Describes efforts to reduce bias, variability, confounding Quantity of data collected is appropriate 	<ul style="list-style-type: none"> Method of data collection is clearly described Some effort is made to incorporate principles of good data collection Quantity of data is appropriate 	<ul style="list-style-type: none"> Method of data collection is described Some effort is made to incorporate principles of good data collection 	<ul style="list-style-type: none"> Some evidence of data collection
Graphs and Summary Statistics	<ul style="list-style-type: none"> Appropriate graphs are included (to help answer the question of interest) Graphs are neat, clearly labeled, and easy to compare Appropriate summary statistics are included Summary statistics are discussed and correctly interpreted 	<ul style="list-style-type: none"> Appropriate graphs are included (to help answer the question of interest) Graphs are neat, clearly labeled, and easy to compare Appropriate summary statistics are included 	<ul style="list-style-type: none"> Graphs and summary statistics are included 	<ul style="list-style-type: none"> Graphs or summary statistics are included
Analysis	<ul style="list-style-type: none"> Correct inference procedure is chosen Use of inference procedure is justified Test statistic/p-value or confidence interval is calculated correctly p-value or confidence interval is interpreted correctly 	<ul style="list-style-type: none"> Correct inference procedure is chosen Lacks justification, lacks interpretation, or makes a calculation error 	<ul style="list-style-type: none"> Correct inference procedure is chosen Test statistic/p-value or confidence interval is calculated correctly 	<ul style="list-style-type: none"> Inference procedure is attempted
Conclusions	<ul style="list-style-type: none"> Uses p-value/confidence interval to correctly answer question of interest Discusses what inferences are appropriate based on study design Shows good evidence of critical reflection (discusses possible errors, shortcomings, limitations, alternate explanations, etc.) 	<ul style="list-style-type: none"> Makes a correct conclusion Discusses what inferences are appropriate Shows some evidence of critical reflection 	<ul style="list-style-type: none"> Makes a partially correct conclusion (such as accepting null). Shows some evidence of critical reflection 	<ul style="list-style-type: none"> Makes a conclusion
Overall Presentation/Communication	<ul style="list-style-type: none"> Clear, holistic understanding of the project Poster is well organized, neat and easy to read Statistical vocabulary is used correctly Poster is visually appealing 	<ul style="list-style-type: none"> Clear, holistic understanding of the project Statistical vocabulary is used correctly Poster is unorganized or isn't visually appealing, 	<ul style="list-style-type: none"> Poster is not well done or communication is poor 	<ul style="list-style-type: none"> Communication and organization are very poor