AP Statistics Syllabus 2017-18

Joanne Musa
jmusa@pps.net
http://joannemusa.weebly.com
Benson Polytechnic High School

COURSE DESCRIPTION:

AP Statistics is the high school equivalent of a one semester, introductory college statistics course. In this course, students develop strategies for collecting, organizing, analyzing, and drawing conclusions from data. Students design, administer, and tabulate results from surveys and experiments. Probability and simulations aid students in constructing models for chance behavior. Sampling distributions provide the logical structure for confidence intervals and hypothesis tests. Technologies used in this course are TI-84 graphing calculator, Fathom statistical software, and Web-based java applets to investigate statistical concepts. To develop effective statistical communication skills, students are required to prepare written and oral analyses of data through homework, class discussions, and an end-of-year project.

COURSE GOALS:

In AP Statistics, students 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 CONTENT OVERVIEW:

1. Exploring Data: Describing patterns and departures from patterns (20 – 30%). Exploratory analysis of data makes use of graphical and numerical techniques to study patterns and departures from patterns. Emphasis will be placed on interpreting information from graphical and numerical displays and summaries.
2. Sampling and Experimentation: Planning and conducting a study (10% - 15%). Data must be collected according to a well-developed plan if valid information on a conjecture is to be obtained. This plan includes clarifying the question and deciding upon a method of data collection and analysis.
3. Anticipating Patterns: Exploring random phenomena using probability and simulations (20-30%). Probability is the tool used for anticipating what the distribution of data should look like under a given model.
4. Statistical Inference: Estimating population parameters and testing hypotheses (30 – 40 %). Statistical inference guides the selection of appropriate models.

GRADING

Assessments (tests & quizzes) – 80%
Homework – 10%
Project – 10%
Any late assignments will carry a 50% penalty.

90-100% A
80 – 89% B
70 – 79% C
60 – 69% D
0 – 59% F

COURSE PREREQUISITE

Passing Algebra 3-4 with at least a "C" is a prerequisite for AP Statistics.

TEXTBOOK/SUPPLIES

- Textbook: *The Practice of Statistics 5th Ed* (Starnes, Tabor, Yates, & Moore)
- Choice of notebook or binder & paper
- Folder to keep assignments and handouts
- Pencils & pens
- TI-84 is recommended. A class set is available for class use. Students may access TI-84 outside of class by checking one out from the library, downloading a TI-84 app for free from *wabbitemu* for androids, or using online calculators.

ATTENDANCE & EFFORT

It is very important to attend class daily & put forth consistent effort. Use class time to your full benefit & be actively engaged in the lesson. It is the student's responsibility to keep track of missed notes, assignments (posted on my website), & due dates.

HOMEWORK

Homework will be assigned every class meeting. READING THE BOOK is ongoing homework. Homework problems from the textbook will also be assigned every class meeting. Typically, I will assign odd numbered problems to facilitate corrections. Students are required to check their answers in the back of the book and make corrections to their homework in PEN. The corrections should include what & why they got something incorrect. Homework must be done in PENCIL. Students must show all work to get full credit. Homework problems & corrections will be due at the very beginning of the next class period. Any assignments turned in after 5 minutes of the start of class will be penalized by 50%. Late homework will be accepted up until the chapter test with a 50% penalty. After the chapter test, no assignments associated with that chapter will be accepted.

ASSESSMENTS

Tests will be given at the end of every chapter. Therefore, a total of 12 tests will be given throughout the year. Tests will consist of multiple choice and free response questions. Quizzes will be given periodically to check for understanding and completion of homework assignments & readings.

RETAKES

Students may take one retake test for each chapter as long as all assignments were completed. The retake test score will be averaged with the initial test score. Students have four school days to retake a test from the date that the tests are graded. Students are responsible for scheduling a retake test.

Students may retake a quiz within four days of the quiz being graded. The retake quiz score will be averaged in with the initial quiz score.

*All retakes will take place outside of class time.

MAKE UP POLICY

During absence, the student is responsible to email me and/or check my website to see what was missed. If a student has an excused absence, then the student has three school days upon return to school to make up a test or quiz and to turn in missed assignments. If a student has an unexcused absence, the student will receive a zero for any missed test, quiz, and assignment(s) missed. Accommodations for extraneous situations will be considered on a case-by-case basis.

*All make-up tests and quizzes will take place outside of class time.

ACADEMIC DISHONESTY
Collaborate responsibly & submit your own work. I value collaboration & encourage you to form study groups because it can facilitate learning, but it is essential that everyone learns the material. Collaboration has little value if each group member works only a few problems & just copies the rest. It is better to make an honest attempt at every problem & then compare & discuss your results. Academic honesty should be maintained at all times. Academic dishonesty includes, but is not limited to:

- communicating verbally or nonverbally in order to exchange information during a test, quiz, or other assessment
- giving or receiving information during a test, quiz, or other assessment without permission
- using unauthorized materials during a test, quiz, or other assessment
- copying the work of another & presenting it as your own
- helping someone else to cheat
- taking any assessments outside of the classroom

Any and all academic dishonesty incidents will be reported immediately.

EXTRA CREDIT
No extra credit will be offered in this course.

CLASSROOM RULES

1. Be kind to one another and the environment.
2. Respect ideas even if they're different from yours
3. Only approved use of electronic devices
4. Be on task and engaged – seek help when needed
5. Seek help as soon as concepts are not clear or understood. Avoid waiting until quiz/test day to decide help is needed.
6. During instruction, take notes, pay attention, ask questions, engage in classroom discussions, and refrain from side conversations.
7. If extenuating circumstances arise, please speak with me.

ADVANCED PLACEMENT (AP) EXAM
The AP Statistics Exam is scheduled for May 17, 2018 at 12pm. Students who earn a 4 or 5 on the exam will earn college credit.

END-OF-YEAR PROJECT
Students will complete a project post-AP Exam. The project will integrate "Exploring Data", "Sampling and Experimentation", "Anticipating Pattern", and "Statistical Inference", as listed under the AP Statistics Course Content Overview. This project will include both a written and oral report. The rubric for this project is listed later in this syllabus.

COURSE OUTLINE:
Text: The Practice of Statistics (5^{th} edition), by Starnes, Yates, and Moore, W. H. Freeman & Co., 2010.
Chapter 1

Day	Topics	Objectives: Students will be able to…	Homework*
1	Syllabus & Logistics "Let's Get to Know Everyone" activity Chapter 1 Introduction; Activity: *Hiring discrimination*: This activity models the components of the statistical problem solving process: research question, data analysis, probability model, and inference	• Identify the individuals and variables in a set of data. • Classify variables as categorical or quantitative. Identify units of measurement for a quantitative variable.	Read xii – xxiii Do 1, 3, 5, 7, 8

2	1.1 Bar Graphs and Pie Charts, Graphs: Good and Bad 1.1 Two-Way Tables and Marginal Distributions, Relationships Between Categorical Variables: Conditional Distributions, Organizing a Statistical Problem.	• 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. • 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.	11, 13, 15, 17, 19, 21, 23, 25, 27
3	1.2 Dotplots, Describing Shape, Comparing Distributions, Stemplots 1.2 Histograms, Using Histograms Wisely, *Technology: Making Histograms on the Calculator*	• 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. • 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.	37, 39, 41, 43, 45, 47, 53, 55, 57, 59
4	1.3 Measuring Center: Mean and Median, Comparing Mean and Median, Measuring Spread: IQR, Identifying Outliers 1.3 Five Number Summary and Boxplots, Measuring Spread: Standard Deviation, Choosing Measures of Center and Spread.	• Calculate and interpret measures of center (mean, median) in context • Calculate and interpret measures of spread (*IQR*) in context • Identify outliers using the 1.5 × *IQR* rule. • 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.	79, 81, 83, 87, 89, 91, 93, 95, 97, 103
5	Chapter 1 Review/Practice Test		Chapter 1 Review Exercises
6	Chapter 1 Test		

Chapter 2

Day	Topics	Objectives: Students will be able to…	Homework
1	2.1 Describing Location in a Distribution	• Find and interpret the percentile of an individual value within a distribution of data. • Estimate percentiles and individual values using a cumulative relative frequency graph. • Find and interpret the standardized score (z-score) of an individual value within a distribution of data.	
2	2.1 Transforming Data, Density Curves	• 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
2	2.2 Normal Distributions, The 68-95-99.7 Rule, The Standard Normal Distribution	• 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
3	2.2 Normal Distribution Calculations,	• 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
3	2.2 Assessing Normality, *Normal Probability Plots on the Calculator*	• 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
4	Chapter 2 Review		Chapter 2 Review Exercises
5	Chapter 2 Test		

Chapter 3

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.	• 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.	• 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.	• 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, 29, 31, 35, 37, 39, 41
3	3.2 Residuals and the least-squares regression line, 3.2 Calculating the equation of the least-squares regression line,	• 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
4	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	• 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, 59, 61
4	3.2 Interpreting computer regression output, 3.2 Correlation and regression wisdom.	• 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
5	Chapter 3 Review		Chapter Review Exercises
6	Chapter 3 Test		

Chapter 4

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.	• 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
1	4.1 Other Sampling Methods	• 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
2	4.1 Inference for Sampling, Sample Surveys: What Can Go Wrong?	• Explain how undercoverage, nonresponse, and question wording can lead to bias in a sample survey.	27, 28, 29, 31, 33, 35
3	4.2 Observational Studies vs. Experiments, The Language of Experiments, How to Experiment Badly	• 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, 41, 45, 47, 49, 51, 53
3	4.2 How to Experiment Well, Three Principles of Experimental Design	• Describe a completely randomized design for an experiment. • Explain why random assignment is an important experimental design principle.	57, 61, 63, 65, 67
4	4.2 Experiments: What Can Go Wrong? Inference for Experiments	• 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)
4	4.2 Blocking, Matched Pairs Design	• 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
5	4.3 Scope of Inference, the Challenges of Establishing Causation	• Determine the scope of inference for a statistical study.	91, 93, 95, 97, 103, 105, 107
5	4.3 Using Studies Wisely	• Evaluate whether a statistical study has been carried out in an ethical manner.	55, 83, 87, 89
6	Chapter 4 Review		Chapter 4 Review Exercises
7	Chapter 4 Test		

Chapter 1-4 Cummulative Practice Test (one day): Students will work on a cumulative practice test to self-assess for readiness for topics on the AP Exam.

Chapter 5

Day	Topics	Objectives: Students will be able to…	Homework
1	5.1 Introduction, The Idea of Probability, Myths about Randomness	• Interpret probability as a long-run relative frequency in context.	1, 3, 7, 9, 11
1	5.1 Simulation, *Technology: Random Numbers with Calculators*	• Use simulation to model chance behavior.	15, 17, 19, 23, 25
2	5.2 Probability Models, Basic Rules of Probability	• 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
2	5.2 Two-Way Tables and Probability, Venn Diagrams and Probability	• 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, 35, 49, 51, 53, 55
3	5.3 What is Conditional Probability?, Conditional Probability and Independence, Tree Diagrams and the General Multiplication Rule	• 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, 59, 63, 65, 67, 69, 73, 77, 79
4	5.3 Independence: A Special Multiplication Rule, Calculating Conditional Probabilities	• When appropriate, use the multiplication rule for independent events to compute probabilities. • Compute conditional probabilities.	83, 85, 87, 91, 93, 95, 97, 99
5	Review		Chapter 5 Review Problems
6	Chapter 5 Test		

Chapter 6

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	• 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
1	6.1 Standard Deviation (and Variance) of a Discrete Random Variable, Continuous Random Variables.	• Calculate the standard deviation of a discrete random variable. • Interpret the standard deviation of a random variable in context.	14, 18, 19, 23, 25
2	6.2 Linear Transformations	• Describe the effects of transforming a random variable by adding or subtracting a constant and multiplying or dividing by a constant.	27, 29, 31, 37, 39, 41, 43, 45
2	6.2 Combining Random Variables, Combining Normal Random Variables	• 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
3	6.3 Binomial Settings and Binomial Random Variables, Binomial Probabilities.	• 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
4	6.3 Mean and Standard Deviation of a Binomial Distribution, Binomial Distributions in Statistical Sampling	• Calculate the mean and standard deviation of a binomial random variable. Interpret these values in context.	79, 81, 83, 85, 87, 89
4	6.3 Geometric Random Variables.	• Find probabilities involving geometric random variables.	93, 95, 97, 99, 101-103
5	Chapter 6 Review		Chapter 6 Review Exercises
6	Chapter 6 Test		

Chapter 7

Day	Topics	Objectives: Students will be able to…	Homework
1	Introduction: German Tank Problem, 7.1 Parameters and Statistics, *Technology: Using Fathom to Simulate Sampling Distributions*	• Distinguish between a parameter and a statistic.	1, 3, 5, 7
1	7.1 Sampling Variability, Describing Sampling Distributions	• 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, 19
2	7.2 The Sampling Distribution of $\hat{p}$, Using the Normal Approximation for $\hat{p}$, *Technology: Using an Applet to Simulate the distribution of* $\hat{p}$.	• 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, 23, 27, 29, 33, 35, 37, 41
3	7.3 The Sampling Distribution of $\overline{x}$: Mean and Standard Deviation, Sampling from a Normal Population, *Technology: Using an Applet to Simulate the distribution of* $\overline{x}$.	• Find the mean and standard deviation of the sampling distribution of a sample mean $\overline{x}$ from an SRS of size *n*. • Calculate probabilities involving a sample mean $\overline{x}$ when the population distribution is Normal.	43, 45, 46, 49, 51, 53, 55
4	7.3 The Central Limit Theorem	• Explain how the shape of the sampling distribution of $\overline{x}$ is related to the shape of the population distribution. • Use the central limit theorem to help find probabilities involving a sample mean $\overline{x}$.	57, 59, 61, 63, 65, 67
5	Chapter 7 Review		Chapter 7 Review Exercises
6	Chapter 7 Test		

Chapter 1-7 Cummulative Practice Test (one day): Students will work on a cumulative practice test to self-assess for readiness for topics on the AP Exam.

Chapter 8

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.	• 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
1	8.1 Using Confidence Intervals Wisely, 8.2 Conditions for Estimating *p*, Constructing a Confidence Interval for *p*	• 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, 21, 23, 27, 31, 33
2	8.2 Putting It All Together: The Four-Step Process, Choosing the Sample Size, *Technology: Confidence Intervals for p on the Calculator*	• 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
3	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, *Technology: Inverse t on the Calculator*	• 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, 51, 52, 55, 57, 59, 63
4	8.3 Using *t* Procedures Wisely, *Technology: Confidence Intervals for μ on the Calculator*	• Understand why each of the three inference conditions—Random, Normal, and Independent—is important.	65, 67, 71, 73, 75, 77, 78
5	Chapter 8 Review	• Determine sample statistics from a confidence interval.	Chapter 8 Review Exercises
6	Chapter 8 Test		

Chapter 9

Day	Topics	Objectives: Students will be able to:	Homework
1	9.1 The Reasoning of Significance Tests, Stating Hypotheses, Interpreting *P*-values, Statistical Significance	• State correct hypotheses for a significance test about a population proportion or mean. • Interpret *P*-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, *Technology: Investigating Power with an Applet*	• 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, *P*(Type II error), and power.	15, 19, 21, 23, 25
2	9.2 Carrying Out a Significance Test, The One-Sample *z* Test for a Proportion, *Technology: One-Proportion z Test on the Calculator*	• Check conditions for carrying out a test about a population proportion. • If conditions are met, conduct a significance test about a population proportion.	27, 29, 41, 43, 45
3	9.2 Two-Sided Tests, Why Confidence Intervals Give More Information, *Technology: Tests and Confidence Intervals using Minitab*	• Use a confidence interval to draw a conclusion for a two-sided test about a population proportion.	47, 49, 51, 53, 55
4	9.3 Carrying Out a Significance Test for μ, The One Sample *t* Test, Two-Sided Tests and Confidence Intervals, *Technology: Computing P-values from t Distributions on the Calculator, One Sample t Test on the Calculator*	• Check conditions for carrying out a test about a population mean. • If conditions are met, conduct a one-sample *t* test about a population mean μ. • Use a confidence interval to draw a conclusion for a two-sided test about a population mean.	57, 59, 60, 71, 73
5	9.3 Inference for Means: Paired Data, Using Tests Wisely	• Recognize paired data and use one-sample *t* procedures to perform significance tests for such data.	75, 77, 89, 94–97, 99–104
6	Chapter 9 Review		Chapter 9 Review Exercises
7	Chapter 9 Test		

Chapter 10

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	• 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
1	10.1 Confidence Intervals for $p_1 - p_2$, *Technology: Confidence Intervals for a Difference in Proportions on the Calculator*	• Determine whether the conditions for performing inference are met. • Construct and interpret a confidence interval to compare two proportions.	7, 9, 11, 13
2	10.1 Significance Tests for $p_1 - p_2$, Inference for Experiments, *Technology: Significance Tests for a Difference in Proportions on the Calculator*	• Perform a significance test to compare two proportions. • Interpret the results of inference procedures in a randomized experiment.	15, 17, 21, 23
2	10.2 Activity: Does Polyester Decay?, The Sampling Distribution of a Difference Between Two Means	• 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
3	10.2 The Two-Sample *t*-Statistic, Confidence Intervals for $\mu_1 - \mu_2$, *Technology: Confidence Intervals for a Difference in Means on the Calculator*	• 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
3	10.2 Significance Tests for $\mu_1 - \mu_2$, Using Two-Sample *t* Procedures Wisely, *Technology: Two Sample t Tests with Computer Software and Calculators*	• 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, 69
4	Chapter 10 Review	• Determine the proper inference procedure to use in a given setting.	Chapter 10 Review Exercises
5	Chapter 10 Test		

Chapter 11

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 *P*-values, *Technology: Finding P-values for Chi-Square Tests on the Calculator*	• Know how to compute expected counts, conditional distributions, and contributions to the chi-square statistic.	1, 3, 5
1	11.1 The Chi-Square Goodness-of-Fit Test, Follow-Up Analysis, *Technology: Chi-Square Goodness-of-Fit Tests on the Calculator*	• 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
2	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, *Technology: Chi-Square Tests for Two-Way Tables with Computer Software and Calculators*	• 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 *z* test for comparing two proportions and the chi-square test for a 2-by-2 two-way table give equivalent results.	19, 21,23, 27, 29, 31, 33, 35, 43
2	11.2 The Chi-Square Test of Association/Independence, Using Chi-Square Tests Wisely	• 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
3	Chapter 11 Review	• Distinguish between the three types of chi-square tests.	Chapter 11 Review Exercises
4	Chapter 11 Test		

Chapter 12

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	• Check conditions for performing inference about the slope β of the population regression line.	1, 3
1	12.1 Estimating Parameters, Constructing a Confidence Interval for the Slope, *Technology: Regression Inference using Computer Software and Calculators*	• 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
2	12.1 Performing a Significance Test for the Slope	• Perform a significance test about the slope β of a population regression line.	13, 15, 17, 19
3	Chapter 12 Review		Chapter 12 Review Exercises
4	Chapter 12 Test		

*Homework subject to change.

AP EXAM REVIEW (9 days)

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

AFTER THE AP EXAM: FINAL PROJECT *(See rubric on page 16)*

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 labeled well, 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.
- 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	• 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	• Introduces the context of the research and has a specific question of interest • Has correct parameter/ hypotheses OR has appropriate difficulty	• Introduces the context of the research and has a specific question of interest OR has question of interest and hypotheses	• Briefly describes the context of the research
Data Collection	• Method of data collection is clearly described • Includes appropriate randomization • Describes efforts to reduce bias, variability, confounding • Quantity of data collected is appropriate	• Method of data collection is clearly described • Some effort is made to incorporate principles of good data collection • Quantity of data is appropriate	• Method of data collection is described • Some effort is made to incorporate principles of good data collection	• Some evidence of data collection
Graphs and Summary Statistics	• 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	• 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	• Graphs and summary statistics are included	• Graphs or summary statistics are included
Analysis	• 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	• Correct inference procedure is chosen • Lacks justification, lacks interpretation, or makes a calculation error	• Correct inference procedure is chosen • Test statistic/*p*-value or confidence interval is calculated correctly	• Inference procedure is attempted
Conclusions	• 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.)	• Makes a correct conclusion • Discusses what inferences are appropriate • Shows some evidence of critical reflection	• Makes a partially correct conclusion (such as accepting null). • Shows some evidence of critical reflection	• Makes a conclusion
Overall Presentation/ Communication	• Clear, holistic understanding of the project • Poster is well organized, neat and easy to read • Statistical vocabulary is used correctly • Poster is visually appealing	• Clear, holistic understanding of the project • Statistical vocabulary is used correctly • Poster is unorganized or isn't visually appealing,	• Poster is not well done or communication is poor	• Communi-cation and organi-zation are very poor