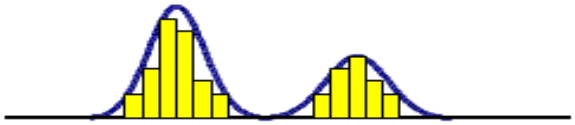
AP Statistics Course Syllabus 2016-2017



Mr. Hanson
Email:neil.hanson@evergreenps.org

Room: 209 **Website:** www.scubamoose.weebly.com

Textbook:
The Practice of Statistics (5th edition), by Starnes, Tabor, Yates, and Moore, W. H. Freeman & Co., 2015

Remind™: code available on scubamoose website.

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. Students use a TI-83/84 graphing calculator, Fathom and Minitab statistical software, and Web-based java applets to investigate statistical concepts. To develop effective statistical communication skills, students are required to prepare frequent written and oral analyses of real data. All our students are strongly encouraged to take the AP exam in May. Students on free/reduced lunch can take the exam for a reduced fee.

Course Goals

In AP Statistics, students are expected to learn:

Skills	***Knowledge***	***Habits of Mind***
● 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.	● 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)	● 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.

Technology

All students are expected to have a TI-83, 83+, 84, or 84+ for their use in class and for homework assignments. For students that cannot afford a calculator, HeLa will provide a loaner calculator for that student for the duration of the course. Students will be instructed daily on how to use the graphing calculator to help them in understanding statistical concepts.

All students have access to Google Chromebooks during class. Students are required to use computer software for their projects during the year. Additionally, during the course students will be exposed to “generic software” outputs and become proficient at reading these outputs. A computer and LCD projector in my classroom will be used to introduce students to numerous applets and simulations.

Grading, Evaluation, and Assessment

Grading Philosophy

All classes at HeLa are graded using Standards Based Grading (SBG). SBG is an assessment and feedback method that establishes the learning goals of the class, aligns all parts of the curriculum to the course goals, and gives students actionable feedback about their strengths and weaknesses. For each standard, everyone will be given a rubric with a checklist that will help you track your level of mastery, to be kept in your Interactive Notebooks.

Each standard will be given a grade based on the student's demonstration of the skills assessed in the standard. Below is a table that shows the possible scores and their general meaning.

Score	***4.0***	***3.0***	***2.0***	***1.0***	***0.0***
What it Means	I can perform calculations that are appropriate in new situations, and almost never have errors in interpretation.	I can perform all calculations that were learned in class, and rarely make mistakes when interpreting my results.	I can perform all calculations that were learned in class, but often make mistakes when interpreting my results.	With help, I can do some of the calculations and interpretations we have learned in class.	I don't know (can't do) any of it.

Grade Breakdown

100%	*0%*
*100% of a student's grade will be based on their performance on the **standards, or units,** that we cover during class. These **content standards** are made up of **content-area skills** that are linked together by major concepts.*	**Habits-of-work standard** *is not assessed in class...though these habits will provide a much higher likelyhood of success on the AP exam & will also be used for 'retake' or 'correction' purposes on quizzes and tests***.**

All of the standard grades will be averaged to form the final grade. The letter grade that goes on the report card will be determined by the following scale. No rounding will occur.

A	3.20 – 4.00	**B +**	2.90 – 2.99	**C +**	2.40 – 2.49	**D +**	1.90 – 1.99	**F**	1.49 and below
A –	3.00 – 3.19	**B**	2.60 – 2.89	**C**	2.10 – 2.39	**D**	1.50 – 1.89		
		B –	2.50 – 2.59	**C –**	2.00 – 2.09				

Habits-of-work standard assessment

Your habits of work will be evaluated based off of out-of-class work and notes completion. You will be provided with notes and work to complete in-class, as well as practice problems to work on outside of class. You are expected to complete practice problems as we reach the topics in class. **As this is a college level class, plan to spend about 10 hours per week outside of class working on and/or studying Statistics.** At the test for each unit, you are expected to hand in your unit notes and practice problems.

Content Standard Assessment

Every standard may be assessed through these types of assessments:

- **Quizzes** on parts of a standard
  - May be unannounced
  - Some short-answer and some free response designed to assess vocabulary and skills
  - Free response questions will be assessed on an AP-like rubric.
- **Unit exams** for every unit
  - Some multiple choice (~10-15 questions) and some free response (2-3 questions) designed to provide an AP-like experience.
  - The overall score for the test will be split into multiple choice and free response much like the AP exam.
- **Projects** that may cover multiple standards
  - Individual project expectations will be handed out at the beginning of each project.
  - Every project's rubric will include, as appropriate, evaluation on calculations, data visualization, statistical language, appropriate conclusions, and overall presentation and organization. Additional categories may be added as appropriate for the project's scope.
- **Final** (cumulative) exams that cover all standards
  - Primarily multiple choice, with free response questions for specific units.

All standards will be assessed using quizzes, unit exams, and the final. Some, but not necessarily all, standards will be associated with a project. Your final grade for the standard will be calculated using an average.

Retake and Score Improvement Policy

All quizzes and exams are eligible to be retaken. However, while there will be about 20 quizzes and tests total during the semester, you may retake assessments a total of 8 times, or about once every two weeks.

In order to be eligible to retake an assessment, you must have a habits-of-work score of at least a 3 (that is, 75% of notes and homework complete). Correct all mistakes on the assessment and have them checked by the teacher at least 24 hours before you plan to retake the assessment. Retaken assessments will not be handed back.

If a second retake is desired, schedule a 20-minute conference with the teacher during SOAR or after school to discuss your previous exams. You will be allowed a very limited number of 2nd retakes during the semester.

To improve your score on a project, you must individually submit typed corrections to your project within 1 week.

Absences and Make-Up Work

If you are absent, it is your responsibility to get notes from a classmate. ***Links to concept videos will be posted on the class website to help you learn the material you have missed.*** This syllabus has all problems that will be assigned, and you are expected to complete them in a timely manner (1 extra weekday per class period missed will be permitted).

If you are absent on a quiz or test day, you have one week after you return to take the assessment. After that period of time, taking the assessment will count as a retake.

How your grade will be computed:

Content Standards	Quizzes covering new material. Will be short answer format and composed of questions of varying complexities and problem solving requirements. Content of questions will be known and questions clearly grouped by standard. No assessment of previous units / standards.	2 to 3 per unit Lasting 20 to 30 minutes and will encompass 1 to 3 skills (scored and recorded separately)
Problem Solving Standard (FRQ's)	The Free Response Questions (FRQ's) are multipart questions which, besides requiring deep understanding of the content, will also assess a student's ability to reason, think critically and to justify their responses. The FRQ's taken in class will be close facsimile's to the FRQ's you will be required to take on this year's AP test and will be graded as if they were being graded by the AP test scorers (students will not see the rubric prior but will have seen numerous rubrics for similar styled questions)	FRQ's are given once per unit at the end of the unit. (Each unit test typically has 2 Free Response Questions: 1 new topic and 1 previous topic. Each FRQ is allotted 15-20 minutes*) *The AP test only allows 15 minutes (on average) for each FRQ.
Mastery of Skills	Mastery assessments are provided at the end of each Unit. They will be short answer questions of varying complexities from the current unit and any previous units.	Mastery Assessments are once per unit and usually 10 - 12 questions with 3ish minutes allotted per question (30 minutes total).

Units

(see the syllabus posted on www.scubamoose.weebly.com for the extended version with the units and assignment breakdown)

Reassessments (Retakes)?

It is recognized that life happens and is not always able to be scripted to our liking. With this recognition, it is understood that sometimes a student will be unhappy with their performance on a quiz or test and seek an opportunity to further demonstrate their learning after a quiz or test is complete.

Following (on the next page) is the comprehensive guide for reassessment for each type of student work:

Reassessment (Retake) Policies, requirements and timefram

Component	Reassessment (Retake) Policy	Additional requirements for reassessments	Timeframe for reassessment
Content Standards	Students can retake any Content Skill one time. *The retake grade will replace the original grade regardless of result. **Students will be allowed a total of 2 second retake possibilities per semester	Home-practice-work will be checked and scored for effort/completion. Though home-practice-work will not affect the student's grade, home-practice-work will affect the ability to retake. Home-practice-work completed at a level of 100% (a packet for each content quiz) will allow for 1 retake for that Content quiz. **each second retake will require an assignment and/or a student/teacher tutorial/conference.**	Within one week of the Content Quiz being returned. Must be scheduled a minimum of 1 day prior and taken outside of class time. (The same is true for a second retake if/when you opt to use one of your 2 second retake options.)
Project(s)	None – It is up to students to schedule time for feedback prior to turning in finished projects (a rubric will be provided for each project)	Project grades are final	None
Problem Solving Standard (FRQ's)	For each unit, the FRQ grade will be comprised of 2 FRQ's on the content topic. One will be taken at the end of the unit. The second will be taken at the end of the *next* unit. The two scores will be averaged. *Two retake options will be possible for each unit's FRQ scores. -The first retake replaces the lower of the 2 FRQ scores for the unit. -The second retake *averages* with the lowest of the 2 FRQ scores of record.	None – though scheduling a teacher conference prior to retake to ensure understanding is recommended.	The 1st and 2nd retakes will be given at predetermined times (typically spanning a two day period) If the retake window is missed, the retake option evaporates.
Mastery	None – Though if a student can demonstrate (at the end of the year) that a score on any unit's mastery assessment is an *outlier* when compared with the others, that specific mastery assessment will be dropped for the student.	Student must demonstrate with statistical analysis that a score for a mastery assessment is an outlier. (by definition, an outlier is an unlikely occurrence and is guaranteed to happen a maximum of one time)	Analysis must be complete (and correct) and turned in prior to the sitting for the final.

AP Statistics

Signature page

I have read and understand the previous pages policies and definitions. I understand that if something is unclear it is upon the student to seek clarification prior to the occurrence of an issue during the school year.

I understand the following supplies will be needed daily:

- A pencil (student work completed in pen will not be graded)
- Lined paper free of torn spiral edges. (graph paper may be useful)
- A Ti-83+ calculator at a minimum (recommended students obtain a Ti-84+, the Ti-84+ will be the calculator used by the instructor for demonstrations and is the calculator heavily recommended for the A.P. Tests (Calculus AB, Calculus BC and/or Statistics)
- A different colored 'grading' pen is recommended for students to identify clearly which practice questions were missed and, thus, which type of questions may need further study.
- It is recommended students have a separate 3 ring binder with 10 to 12 dividers for their math class. At a minimum a separate section in their binder for math, though it is felt this will be insufficient and impossibly difficult to organize as a reference for the final and for mastery assessments.
- A Positive attitude
- A willingness to make mistakes...and learn from them! (these are the best learning opportunities)

Students, please sign and date the following and have your parent/guardian do the same.

Student Name (printed neatly)_____

Student Signature _____

Parent/Guardian Name (please print neatly)_____

Parent/Guardian Signature_____

Date_____

Course Outline

Itemized below is a detailed summary of the major topics and concepts covered, as well as learning objectives. Students are expected to begin working on assigned problems as soon as the topics are covered in class.

Chapter 1: Exploring Data Numerically and Graphically (3 weeks)			
Section	**Topics**	**Learning Objectives** students will be able to …	**Practice Problems**
Chapter 1 Intro.	Variables in Data	● Identify the individuals and variables in a set of data. ● Classify variables as categorical or quantitative.	1, 3, 5, 7, 8
1.1	Bar Graphs and Pie Charts Graphs: Good and Bad Two-Way Tables and Marginal Distributions Relationships between Categorical Variables: Conditional Distributions	● Display categorical data with a bar graph. Decide if it would be appropriate to make a pie chart. ● Identify what makes some graphs of categorical data deceptive. ● Calculate and display the marginal distribution of a categorical variable from a two-way table. ● Calculate and display the conditional distribution of a categorical variable for a particular value of the other categorical variable in a two-way table. ● Describe the association between two categorical variables by comparing appropriate conditional distributions.	11, 13, 15, 17 19, 21, 23, 25, 27–32
1.2	Dotplots Describing Shape Comparing Distributions Stemplots Histograms Using Histograms Wisely	● Make and interpret dotplots and stemplots of quantitative data. ● Describe the overall pattern (shape, center, and spread) of a distribution and identify any major departures from the pattern (outliers). ● Identify the shape of a distribution from a graph as roughly symmetric or skewed. ● Compare distributions of quantitative data using dotplots and stemplots. ● Make and interpret histograms of quantitative data. ● Compare distributions of quantitative data using histograms.	37, 39, 41, 43, 45, 47, 53, 55 59, 60, 65, 69–74
1.3	Measuring Center: Mean and Median Comparing the Mean and Median Measuring Spread: Range and IQR Identifying Outliers Five-Number Summary and Boxplot Measuring Spread: Standard Deviation Choosing Measures of Center and Spread Organizing a Statistics Problem	● Calculate measures of center (mean, median). ● Calculate and interpret measures of spread (range, IQR, standard deviation). ● Choose the most appropriate measure of center and spread in a given setting. ● Identify outliers using the 1.5×IQR rule. ● Make and interpret boxplots of quantitative data. ● Calculate and interpret measures of spread (range, IQR, standard deviation). ● Choose the most appropriate measure of center and spread in a given setting. ● Use appropriate graphs and numerical summaries to compare distributions of quantitative variables.	79, 81, 83, 87, 89, 91, 93, 95 97, 99, 103, 105, 107–110

Chapter 2: Modeling Distributions of Data (2 weeks)			
Section	**Topics**	**Learning Objectives** Students will be able to …	**Practice Problems**
2.1	Measuring Position: Percentiles Cumulative Relative Frequency Graphs Measuring Position: z-scores Transforming Data	● 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. ● Describe the effect of adding, subtracting, multiplying by, or dividing by a constant on the shape, center, and spread of a distribution of data.	1, 3, 5, 9, 11, 13, 15, 17, 19, 21, 23, 25–30
2.2	Density Curves The 68–95–99.7 Rule The Standard Normal Distribution Normal Distribution Calculations Assessing Normality	● Estimate the relative locations of the median and mean on a density curve. ● Use the 68–95–99.7 rule to estimate areas (proportions of values) in a Normal distribution. ● Use Table A or technology to find (i) the proportion of z-values in a specified interval, or (ii) a z-score from a percentile in the standard Normal distribution. ● Use Table A or technology to find (i) the proportion of values in a specified interval, or (ii) the value that corresponds to a given percentile in any Normal distribution. ● Determine if a distribution of data is approximately Normal from graphical and numerical evidence.	33, 35, 39, 41, 43, 45, 47, 49, 51 53, 55, 57, 59 54, 63, 65, 66, 67, 69–74

Chapter 3: Describing Relationships (3 weeks)			
Section	**Topics**	**Learning Objectives** Students will be able to …	**Practice Problems**
3.1	Explanatory and response variables Displaying relationships: scatterplots Describing scatterplots Measuring linear association: correlation Facts about correlation	● 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 a relationship displayed in a scatterplot and recognize outliers in a scatterplot. ● Interpret the correlation. ● Understand the basic properties of correlation, including how the correlation is influenced by outliers. ● Use technology to calculate correlation. ● Explain why association does not imply causation.	1, 5, 7, 11, 13 14–18, 21
3.2	Least-squares regression Interpreting a regression line Prediction Residuals Calculating the equation of the least-squares regression line Determining whether a linear model is appropriate: residual plots. How well the line fits the data: the role of s and r^2 in regression Interpreting computer regression output Regression to the mean Correlation and regression wisdom	● Interpret the slope and y intercept of a least-squares regression line. ● Use the least-squares regression line to predict y for a given x. Explain the dangers of extrapolation. ● Calculate and interpret residuals. ● Explain the concept of least squares. ● Determine the equation of a least-squares regression line using technology. ● Construct and interpret residual plots to assess if a linear model is appropriate. ● Interpret the standard deviation of the residuals and and use these values to assess how well the least-squares regression line models the relationship between two variables. ● Determine the equation of a least-squares regression line using computer output. ● Describe how the slope, y intercept, standard deviation of the residuals, and are influenced by outliers. ● Find the slope and y intercept of the least-squares regression line from the means and standard deviations of x and y and their correlation.	27–32, 35, 37, 39, 41, 45 43, 47, 49, 51 48, 50, 55, 58 59, 61, 63, 65, 69, 71–78

Chapter 4: Study Design (3 weeks)			
Section	**Topics**	**Learning Objectives** Students will be able to …	**Practice Problems**
4.1	The Idea of a Sample Survey How to Sample Badly How to Sample Well: Simple Random Sampling Other Random Sampling Methods Inference for Sampling Sample Surveys: What Can Go Wrong?	● Identify the population and sample in a statistical study. ● Identify voluntary response samples and convenience samples. Explain how these sampling methods can lead to bias. ● Describe how to obtain a random sample using slips of paper, technology, or a table of random digits. ● Distinguish a simple random sample from a stratified random sample or cluster sample. Give the advantages and disadvantages of each sampling method. ● Explain how undercoverage, nonresponse, question wording, and other aspects of a sample survey can lead to bias.	1, 3, 5, 7, 9, 11 13, 17, 19, 21, 23, 25 27, 29, 31, 33, 35
4.2	Observational Study versus Experiment The Language of Experiments How to Experiment Badly How to Experiment Well Completely Randomized Designs Experiments: What Can Go Wrong? Inference for Experiments Blocking	● Distinguish between an observational study and an experiment. ● Explain the concept of confounding and how it limits the ability to make cause-and-effect conclusions. ● Identify the experimental units, explanatory and response variables, and treatments. ● Explain the purpose of comparison, random assignment, control, and replication in an experiment. ● Describe a completely randomized design for an experiment, including how to randomly assign treatments using slips of paper, technology, or a table of random digits. ● Describe the placebo effect and the purpose of blinding in an experiment. ● Interpret the meaning of statistically significant in the context of an experiment. ● Explain the purpose of blocking in an experiment. ● Describe a randomized block design or a matched pairs design for an experiment.	37–42, 45, 47, 49, 51, 53, 55 57, 59, 61, 63, 65 67, 69, 71, 73 75, 77, 79, 81, 85 83, 87–94
4.3	Scope of Inference The Challenges of Establishing Causation Data Ethics (optional topic)	● Describe the scope of inference that is appropriate in a statistical study. ● Evaluate whether a statistical study has been carried out in an ethical manner.	97–104

Chapter 5: Probability (2 weeks)			
Section	**Topics**	**Learning Objectives** Students will be able to …	**Practice Problems**
5.1	The Idea of Probability Myths about Randomness Simulation	● Interpret probability as a long-run relative frequency. ● Use simulation to model chance behavior.	1, 3, 7, 9, 11 15, 17, 19, 23, 25
5.2	Probability Models Basic Rules of Probability Two-Way Tables, Probability, and the General Addition Rule Venn Diagrams and Probability	● Determine a probability model for a chance process. ● Use basic probability rules, including the complement rule and the addition rule for mutually exclusive events. ● Use a two-way table or Venn diagram to model a chance process and calculate probabilities involving two events. ● Use the general addition rule to calculate probabilities.	27, 31, 32, 39, 41, 43, 45, 47 29, 33–36, 49, 51, 53, 55
5.3	What Is Conditional Probability? The General Multiplication Rule and Tree Diagrams Conditional Probability and Independence: A Special Multiplication Rule	● Calculate and interpret conditional probabilities. ● Use the general multiplication rule to calculate probabilities. ● Use tree diagrams to model a chance process and calculate probabilities involving two or more events. ● Determine whether two events are independent. ● When appropriate, use the multiplication rule for independent events to compute probabilities.	57–60, 63, 65, 67, 71, 73, 77, 79 81, 83, 85, 89, 91, 93, 95, 97–99

Chapter 6: Random Variables (2 weeks)			
Section	**Topics**	**Learning Objectives** Students will be able to …	**Practice Problems**
6.1	Discrete Random Variables Mean (Expected Value) of a Discrete Random Variable Standard Deviation (and Variance) of a Discrete Random Variable Continuous Random Variables	● Compute probabilities using the probability distribution of a discrete random variable. ● Calculate and interpret the mean (expected value) of a discrete random variable. ● Calculate and interpret the standard deviation of a discrete random variable. ● Compute probabilities using the probability distribution of a continuous random variable.	1, 3, 5, 7, 9, 11, 13 14, 15, 17, 18, 21, 23, 25
6.2	Linear Transformations Combining Random Variables Combining Normal Random Variables	● Describe the effects of transforming a random variable by adding or subtracting a constant and multiplying or dividing by a constant. ● Find the mean and standard deviation of the sum or difference of independent random variables. ● Find probabilities involving the sum or difference of independent Normal random variables.	27–30, 35, 37, 39–41, 43, 45 47, 49, 51, 53, 55, 57–59, 61
6.3	Binomial Settings and Binomial Random Variables Binomial Probabilities Mean and Standard Deviation of a Binomial Distribution Binomial Distributions in Statistical Sampling Geometric Random Variables	● Determine whether the conditions for using a binomial random variable are met. ● Compute and interpret probabilities involving binomial distributions. ● Calculate the mean and standard deviation of a binomial random variable. Interpret these values in context. ● Find probabilities involving geometric random variables.	63, 65, 66, 69, 71, 73, 75, 77 79, 81, 83, 85, 87, 89 93, 95, 97, 99, 101–104

Chapter 7: Sampling Distributions (2 weeks)			
Section	**Topics**	**Learning Objectives** Students will be able to …	**Practice Problems**
7.1	Parameters and Statistics Sampling Variability Describing Sampling Distributions	● Distinguish between a parameter and a statistic. ● Distinguish among the distribution of a population, the distribution of a sample, and the sampling distribution of a statistic. ● Use the sampling distribution of a statistic to evaluate a claim about a parameter. ● Determine whether or not a statistic is an unbiased estimator of a population parameter. ● Describe the relationship between sample size and the variability of a statistic.	7, 9, 11, 13, 15, 17, 19
7.2	The Sampling Distribution of p̂ Using the Normal Approximation for p̂.	● Find the mean and standard deviation of the sampling distribution of a sample proportion $\hat{p}$. Check the 10% condition before calculating $\sigma_{\hat{p}}$. ● Determine if the sampling distribution of $\hat{p}$ is approximately Normal. ● If appropriate, use a Normal distribution to calculate probabilities involving $\hat{p}$.	21–24, 27, 29, 33, 35, 37, 39
7.3	The Sampling Distribution of $\bar{x}$: Mean and Standard Deviation Sampling from a Normal Population The Central Limit Theorem	● Find the mean and standard deviation of the sampling distribution of a sample mean $\bar{x}$. Check the 10% condition before calculating $\sigma_{\bar{x}}$. ● If appropriate, use a Normal distribution to calculate probabilities involving $\bar{x}$. ● Explain how the shape of the sampling distribution of $\bar{x}$ is affected by the shape of the population distribution and the sample size.	43–46, 49, 51, 53, 55 57, 59, 61, 63, 65–68

Chapter 8: Confidence Intervals (3 weeks)			
Section	**Topics**	**Learning Objectives** Students will be able to …	**Practice Problems**
8.1	The Idea of a Confidence Interval Interpreting Confidence Intervals and Confidence Levels Constructing a Confidence Interval Using Confidence Intervals Wisely	● Interpret a confidence interval in context. ● Interpret a confidence level in context. ● Determine the point estimate and margin of error from a confidence interval. ● Describe how the sample size and confidence level affect the length of a confidence interval. ● Explain how practical issues like nonresponse, undercoverage, and response bias can affect the interpretation of a confidence interval.	1, 3, 5, 7, 9 10, 11, 13, 15, 17, 19
8.2	Conditions for Estimating p Constructing a Confidence Interval for p Putting It All Together: The Four-Step Process Choosing a Sample Size	● State and check the Random, 10%, and Large Counts conditions for constructing a confidence interval for a population proportion. ● Determine critical values for calculating a C% confidence interval for a population proportion using a table or technology. ● Construct and interpret a confidence interval for a population proportion. ● Determine the sample size required to obtain a C% confidence interval for a population proportion with a specified margin of error.	20–24, 31, 33, 35, 37 39, 41, 43, 45, 47
8.3	The Problem of unknown σ When σ Is Unknown: The t Distributions Conditions for Estimating μ Constructing a Confidence Interval for μ Choosing a Sample Size	● Explain how the t distributions are different from the standard Normal distribution and why it is necessary to use a t distribution when calculating a confidence interval for a population mean. ● Determine critical values for calculating a C% confidence interval for a population mean using a table or technology. ● State and check the Random, 10%, and Normal/Large Sample conditions for constructing a confidence interval for a population mean. ● Construct and interpret a confidence interval for a population mean. ● Determine the sample size required to obtain a C% confidence interval for a population mean with a specified margin of error.	49–52, 55, 57, 59 61, 65, 69, 71, 73, 75–78

Chapter 9: Testing a Claim (3 weeks)			
Section	**Topics**	**Learning Objectives** Students will be able to …	**Practice Problems**
9.1	Stating Hypotheses The Reasoning of Significance Tests Interpreting P-values Statistical Significance Type I and Type II Errors	● State the null and alternative hypotheses for a significance test about a population parameter. ● Interpret a P-value in context. ● Determine if the results of a study are statistically significant and draw an appropriate conclusion using a significance level. ● Interpret a Type I and a Type II error in context, and give a consequence of each.	1, 3, 5, 7, 9, 11, 15 13, 17, 19, 21, 23
9.2	2 Carrying Out a Significance Test The One-Sample z Test for a Proportion Two-Sided Tests Why Confidence Intervals Give More Information Type II Error and the Power of a Test	● State and check the Random, 10%, and Large Counts conditions for performing a significance test about a population proportion. ● Perform a significance test about a population proportion. ● Use a confidence interval to draw a conclusion for a two-sided test about a population parameter. ● Interpret the power of a test and describe what factors affect the power of a test. ● Describe the relationship among the probability of a Type I error (significance level), the probability of a Type II error, and the power of a test.	25–28, 31, 35, 39, 41 43, 45, 47, 51, 53, 55, 57
9.3	Carrying Out a Significance Test for μ The One Sample t Test Two-Sided Tests and Confidence Intervals Inference for Means: Paired Data Using Tests Wisely	● State and check the Random, 10%, and Normal/Large Sample conditions for performing a significance test about a population mean. ● Perform a significance test about a population mean. ● Use a confidence interval to draw a conclusion for a two-sided test about a population parameter. ● Perform a significance test about a mean difference using paired data.	59–62, 65, 69, 73, 77, 79 83, 85, 87, 89–91, 93, 95–102

Chapter 10: Comparing Two Populations or Groups (3 weeks)			
Section	**Topics**	**Learning Objectives** Students will be able to …	**Practice Problems**
10.1	The Sampling Distribution of a Difference between Two Proportions Confidence Intervals for $p_1 - p_2$ Significance Tests for $p_1 - p_2$ Inference for Experiments	● Describe the shape, center, and spread of the sampling distribution of $\hat{p}_1 - \hat{p}_2$. ● Determine whether the conditions are met for doing inference about $\hat{p}_1 - \hat{p}_2$. ● Construct and interpret a confidence interval to compare two proportions. ● Perform a significance test to compare two proportions.	1, 3 5, 7, 9, 11 13, 15, 17, 21, 23
10.2	The Sampling Distribution of a Difference between Two Means The Two-Sample t Statistic Confidence Intervals for $\mu_1 - \mu_2$ Significance Tests for $\mu_1 - \mu_2$ Using Two-Sample t Procedures Wisely	● Describe the shape, center, and spread of the sampling distribution of ● Determine whether the conditions are met for doing inference about ● Construct and interpret a confidence interval to compare two means. ● Perform a significance test to compare two means. ● Determine when it is appropriate to use two-sample t procedures versus paired t procedures.	31, 33, 35, 51 25–28, 37, 39 41, 43, 45, 47, 53, 57–60

Chapter 11: Inference using Chi-Square (3 weeks)			
Section	**Topics**	**Learning Objectives** Students will be able to …	**Practice Problems**
11.1	Comparing Observed and Expected Counts: The Chi-Square Statistic The Chi-Square Distributions and P-values Carrying Out a Test Follow-Up Analysis	● State appropriate hypotheses and compute expected counts for a chi-square test for goodness of fit. ● Calculate the chi-square statistic, degrees of freedom, and P-value for a chi-square test for goodness of fit. ● Perform a chi-square test for goodness of fit. ● Conduct a follow-up analysis when the results of a chi-square test are statistically significant.	1, 3, 5 7, 9, 11, 15, 17
11.2	Comparing Distributions of a Categorical Variable Expected Counts and the Chi-Square Statistic The Chi-Square Test for Homogeneity Relationships between Two Categorical Variables The Chi-Square Test for Independence	● Compare conditional distributions for data in a two-way table. ● State appropriate hypotheses and compute expected counts for a chi-square test based on data in a two-way table. ● Calculate the chi-square statistic, degrees of freedom, and P-value for a chi-square test based on data in a two-way table. ● Perform a chi-square test for homogeneity. ● Perform a chi-square test for independence. ● Choose the appropriate chi-square test.	19–22, 27, 29, 31, 33, 35, 37, 39 41, 43, 45, 47, 49, 51–55

	Using Chi-Square Tests Wisely		
Chapter 12: More about Regression (2 weeks)			
Section	**Topics**	**Learning Objectives** Students will be able to …	**Practice Problems**
12.1	Sampling Distribution of b Conditions for Regression Inference Estimating the Parameters Constructing a Confidence Interval for the Slope Performing a Significance Test for the Slope	● Check the conditions for performing inference about the slope β of the population (true) regression line. ● Interpret the values of a, b, s, SE_b, and r^2 in context, and determine these values from computer output. ● Construct and interpret a confidence interval for the slope β of the population (true) regression line. ● Perform a significance test about the slope β of the population (true) regression line.	1, 3 5, 7, 9, 11 13, 15, 17
12.2	Transforming with Powers and Roots Transforming with Logarithms Putting it all Together: Which Transformation Should We Choose?	● Use transformations involving powers and roots to find a power model that describes the relationship between two variables, and use the model to make predictions. ● Use transformations involving logarithms to find a power model or an exponential model that describes the relationship between two variables, and use the model to make predictions. ● Determine which of several transformations does a better job of producing a linear relationship.	19–24, 31, 33 35, 37, 39, 41, 43, 45, 47–50

AP Exam Review – (2-3 weeks or as schedule permits)

Unit Topics:

- Practice AP Free Response Questions under time constraints in class
- Review major concepts/themes of the course
- Review calculator usage
- Exam strategies/tips
- Choosing the correct inference procedure
- Mock Grading Sessions
- Rubric development by student teams
- Practice multiple choice questions

AP Statistics Exam: Thursday, May 17, 2018

After the AP exam: Final project

Students work on their final, year-end inclusive project, which ties in the different major themes of the course after the AP exam. Emphasis on this final project includes connecting the four major themes of the course as well as using statistical software. Depending on time constraints, we may continue with ANOVA and/or multiple regression.