AP Statistics Syllabus
Fall 2020 Block Schedule

Teacher: Kenneth Stott

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-84 graphing calculator, Fathom, output from 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.

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.

STUDENTS ARE EXPOSED TO FOUR BROAD CONCEPTUAL THEMES:

I. **Exploring Data**: Describing patterns and departures from patterns. (20-30%). Chapters 1-4

II. **Sampling and Experimentation**: Planning and conducting a study (10-15%). Chapter 5

III. **Anticipating Patterns**: Exploring random phenomena using probability & simulation (20-30%). Chapters 6-9

IV. **Statistical Inference**: Estimating population parameters & testing hypotheses (30-40%). Chapters 10-12

TEACHING STRATEGIES:

1. Students are expected to gain proficiency in using Fathom to present and analyze data. Students are also expected to analyze reports from statistical programs such as and Minitab.
2. Homework is assigned daily. Students are expected to justify all solutions with an appropriate analysis.
3. Students are expected to develop proficient use of the TI-84+ graphing calculator. A class set of TI-84 Calculators is available for use in class, however, students are required to have their own calculator for use outside of class.

4. Statistical Analysis Reports (SAR) will be assigned throughout the course. These may be taken from textbook material, or from current national and international studies that have available data.
5. Students are given activities throughout the course to encourage self-discovery of various statistical concepts and to foster the development of questions for further discuss.

COURSE GRADE:

- ✓ Formative (Quizzes, Tasks, Homework) 29%
- ✓ Summative (Test, Portfolios, Projects) 71%
- ✓ Informal Assessments 0%
- ✓ Semester Grade 80% of Final Grade
- ✓ Final Exam 20% of Final Grade

ASSESSMENTS: THE FOLLOWING INFORMAL AND FORMAL ASSESSMENTS WILL BE GIVEN:

Formative Assessments	Mid-chapter 1, Chapter 1, Mid-chapter 2, Chapter 2, Mid- chapter 3, Chapter 3, Mid-chapter 4, Chapter 4, Mid-chapter 5, Chapter 5, Mid-chapter 6, Chapter 6, Mid-chapter 7, Chapter 7, Mid-chapter 8, Chapter 8, Mid-chapter 9, Chapter 9, Mid-chapter 10, Chapter 10, Mid-chapter 11, Chapter 11, Mid-chapter 12, Chapter 12
Summative Assessments	Chapters 1-4 Chapter 5 Correlation and Regression Group Project Chapters 6-9 Chapters 10-12 Final Exam Chapters 1-12 Cumulative Final Project

SEMESTER PROJECT:

Students will complete a semester project, alone or in pairs, on a topic of their choosing. Students must demonstrate understanding of the four major themes of statistics. Students will be graded on a rubric developed on the following tasks:

Study Design Proposal – Detailed research question, rationale for the study, proposed design, and method of data analysis.

Progress Report – Detailed summary of progress of study after one week.

Record of Participation – A time log detailing use of class time, daily effort on completing project (by individual)

Written Report – A final report which includes: written descriptions of the research questions, rationale for the study, study design, raw data summary, exploratory data analysis, inferential procedure, interpretation, conclusion, obstacles encountered during process, and suggestions for further analysis.

Oral Presentation – Class presentation of project 10-15 minutes in length, utilizing visual aids such as power point slides, posters, etc.

MATERIALS:

- A class set of TI-84 Silver Edition calculators is available for use in class; however, students are required to have their own calculator for use outside of class. I recommend you purchase the TI84 plus CE if you do not already have one as this is the latest version.
- 3 ring binder with 6 dividers, paper, graph paper, pencil, and colored pens or pencils.
- Students will be given ample notice upon the need for additional supplies.

PRIMARY TEXTBOOK:

Yates, Daniel S., Moore, David S., Starnes, and Daren. *The Practice of Statistics. 4th edition*. New York: W.H. Freeman and Company, 2010.

REFERENCE AND RESOURCE MATERIALS:

Bock, David E., Paul F, Velleman, and Richard D. DeVeaux. *Stats Modeling the World. 3rd edition.* Boston: Pearson Education, 2010.

Brase, Charles H. and Corrinne Brase. *Understanding Basic Statistics. 2nd edition.* New York: Houghton Mifflin, 2001.

Peck, Roxy, Chris Olsen, and Jay L. Devore. *Introduction to Statistics and Data Analysis. 4th edition*. Boston, MA: Cengage Learning, 2012.

Tabor, Josh, and Tim Brown. *The Practice of Statistics Teacher's "Titanium" Resource Binder. 4th edition.* New York: W.H. Freeman and Company, 2011.

Free response questions from past AP Exams will be used throughout the course as classwork, homework, and assessments.

UNITS COVERED:

Unit I. Exploring Data: Describing patterns and departures from patterns

Exploratory analysis of data makes use of graphical and numerical techniques to study patterns and departures from patterns. Emphasis should be placed on interpreting information from graphical and numerical displays and summaries.

A. Constructing and interpreting graphical displays of distributions of univariate data (dotplot, stemplot, histogram, cumulative frequency plot)
   1. Center and spread
   2. Clusters and gaps
   3. Outliers and other unusual features
   4. Shape

B. Summarizing distributions of univariate data
   1. Measuring center: median, mean
   2. Measuring spread: range, interquartile range, standard deviation
   3. Measuring position: quartiles, percentiles, standardized scores (z-scores)
   4. Using boxplots
   5. The effect of changing units on summary measures

C. Comparing distributions of univariate data (dotplots, back-to-back stemplots, parallel boxplots)

1. Comparing center and spread: within group, between group variation
2. Comparing clusters and gaps
3. Comparing outliers and other unusual features
4. Comparing shapes

D. Exploring bivariate data
1. Analyzing patterns in scatterplots
2. Correlation and linearity
3. Least-squares regression line
4. Residual plots, outliers, and influential points
5. Transformations to achieve linearity: logarithmic and power transformations

E. Exploring categorical data
1. Frequency tables and bar charts
2. Marginal and joint frequencies for two-way tables
3. Conditional relative frequencies and association
4. Comparing distributions using bar charts

Unit II. Sampling and Experimentation: Planning and conducting a study

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.

A. Overview of methods of data collection
1. Census
2. Sample survey
3. Experiment
4. Observational study

B. Planning and conducting surveys
1. Characteristics of a well-designed and well-conducted survey
2. Populations, samples, and random selection
3. Sources of bias in sampling and surveys
4. Sampling methods, including simple random sampling, stratified random sampling, and cluster sampling

C. Planning and conducting experiments
1. Characteristics of a well-designed and well-conducted experiment
2. Treatments, control groups, experimental units, random assignments, and replication
3. Sources of bias and confounding, including placebo effect and blinding
4. Completely randomized design
5. Randomized block design, including matched pairs design

D. Generalizability of results and types of conclusions that can be drawn from observational studies, experiments, and surveys

Unit III. Anticipating Patterns: Exploring random phenomena using probability and simulation

Probability is the tool used for anticipating what the distribution of data should look like under a given model.

A. Probability
1. Interpreting probability, including long-run relative frequency interpretation
2. “Law of Large Numbers” concept
3. Addition rule, multiplication rule, conditional probability, and independence
4. Discrete random variables and their probability distributions, including binomial and geometric
5. Simulation of random behavior and probability distributions

6. Mean (expected value) and standard deviation of a random variable, and linear transformation of a random variable.

B. Combining independent random variables
1. Notion of independence versus dependence
2. Mean and standard deviation for sums and differences of independent random variables

C. The normal distribution
1. Properties of the normal distribution
2. Using tables of the normal distribution
3. The normal distribution as a model for measurements

D. Sampling distributions
1. Sampling distribution of a sample proportion
2. Sampling distribution of a sample mean
3. Central Limit Theorem
4. Sampling distribution of a difference between two independent sample proportions
5. Sampling distribution of a difference between two independent sample means
6. Simulation of sampling distributions
7. t-distribution
8. Chi-square distribution

Unit IV. Statistical Inference: Estimating population parameters and testing hypotheses

Statistical inference guides the selection of appropriate models.

A. Estimation (point estimators and confidence intervals)
1. Estimating population parameters and margins of error
2. Properties of point estimators, including unbiasedness and variability
3. Logic of confidence intervals, meaning of confidence level and confidence intervals, and properties of confidence intervals
4. Large sample confidence interval for a proportion
5. Large sample confidence interval for a difference between two proportions
6. Confidence interval for a mean
7. Confidence interval for a difference between two means (unpaired and paired)
8. Confidence interval for the slope of a least-squares regression line

B. Tests of significance
1. Logic of significance testing, null and alternative hypotheses; p-values; one- and two-sided tests; concepts of Type I and Type II errors; concept of power
2. Large sample test for a proportion
3. Large sample test for a difference between two proportions
4. Test for a mean
5. Test for a difference between two means (unpaired and paired)
6. Chi-square test for goodness of fit, homogeneity of proportions, and independence (one- and two-way tables)
7. Test for the slope of a least-squares regression line

TENTATIVE SCHEDULE:

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, *Technology: Choosing an SRS using an Applet or Calculator* 4.1 Other Sampling Methods	• 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). • Distinguish a simple random sample from a stratified random sample or cluster sample. Give advantages and disadvantages of each sampling method.	1, 3, 5, 7, 9, 11 17, 19, 21, 23, 25
2	4.1 Inference for Sampling, Sample Surveys: What Can Go Wrong? 4.2 Observational Studies vs. Experiments, The Language of Experiments, How to Experiment Badly	• Explain how undercoverage, nonresponse, and question wording can lead to bias in a sample survey. • 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.	27, 28, 29, 31, 33, 35 37-42, 45, 47, 49, 51, 53
3	4.2 How to Experiment Well, Three Principles of Experimental Design 4.2 Experiments: What Can Go Wrong? Inference for Experiments	• Describe a completely randomized design for an experiment. • Explain why random assignment is an important experimental design principle. • 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.	57, 63, 65, 67 69, 71, 73, 75* (*We will analyze this data again in an Activity in chapter 10)
4	4.2 Blocking, Matched Pairs Design 4.3 Scope of Inference, the Challenges of Establishing Causation	• 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. • Determine the scope of inference for a statistical study.	77, 79, 81, 85, 91-98, 102-108
5	4.3 Establishing Causation/Data Ethics*	• Decide whether a given study/experiment establishes causation. • 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		Part 1: Cumulative AP Review Exercises

Chapter 1

Day	Topics	Objectives: Students will be able to…	Homework
1	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 1.1 Bar Graphs and Pie Charts, Graphs: Good and Bad	• Identify the individuals and variables in a set of data. • Classify variables as categorical or quantitative. Identify units of measurement for a quantitative variable. • 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.	1, 3, 5, 7, 8 11, 13, 15, 17
2	1.1 Two-Way Tables and Marginal Distributions, Relationships Between Categorical Variables: Conditional Distributions, Organizing a Statistical Problem, *Technology: Analyzing Two-Way Tables with Minitab* 1.2 Dotplots, Describing Shape, Comparing Distributions, Stemplots	• 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. • 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.	19, 21, 23, 25, 27-32 37, 39, 41, 43, 45, 47
3	1.2 Histograms, Using Histograms Wisely, *Technology: Making Histograms on the Calculator* 1.3 Measuring Center: Mean and Median, Comparing Mean and Median, Measuring Spread: IQR, Identifying Outliers	• 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. • 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.	53, 55, 57, 59, 60, 69-74 79, 81, 83, 87, 89
4	1.3 Five Number Summary and Boxplots, Measuring Spread: Standard Deviation, Choosing Measures of Center and Spread, *Technology: Making Boxplots on the Calculator, Computing Numerical Summaries with Minitab and the Calculator* Chapter 1 Review	• 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 Chapter 1 Review Exercises
5	Chapter 1 Test		

Chapter 2

Day	Topics	Objectives: Students will be able to…	Homework
1	2.1 Introduction, Measuring Position: Percentiles, Cumulative Relative Frequency Graphs, Measuring Position: z-scores Transforming Data, Density Curves	• 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. • 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.	5, 7, 9, 11, 13, 15 19, 21, 23, 31, 33-38
2	2.2 Normal Distributions, The 68-95-99.7 Rule, The Standard Normal Distribution, *Technology: Standard Normal Curve Calculations with the Calculator and with an Applet* 2.2 Normal Distribution Calculations, *Technology: Normal Curve Calculations with the Calculator and with an Applet*	• 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. • Use Table A to find the percentile of a value from any Normal distribution and the value that corresponds to a given percentile.	41, 43, 45, 47, 49, 51 53, 55, 57, 59
3	2.2 Assessing Normality, *Normal Probability Plots on the Calculator* Chapter 2 Review	• 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 Chapter 2 Review Exercises
4	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, *Technology: Scatterplots on the Calculator* 3.1 Measuring linear association: correlation, 3.1 Facts about correlation, *Technology: Correlation and Regression Applet*	• 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. • Know the basic properties of correlation. • Calculate and interpret correlation in context. • Explain how the correlation r is influenced by extreme observations.	1, 5, 7, 11, 13 14–18, 21, 26
2	3.2 Least-squares regression, 3.2 Interpreting a regression line, 3.2 Prediction, *Technology: Least-Squares Regression Lines on the Calculator* 3.2 Residuals and the least-squares regression line, 3.2 Calculating the equation of the least-squares regression line, *Technology: Residual Plots and s on the Calculator*	• 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. • 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.	27–32, 35, 37, 39, 41 43, 45, 47, 53
3	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 3.2 Interpreting computer regression output, 3.2 Correlation and regression wisdom, *Technology: Least-Squares Regression using Minitab and JMP*	• 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. • 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.	49, 54, 56, 58–61 63, 65, 68, 69, 71–78
4	Chapter 3 Review		Chapter Review Exercises
5	Chapter 3 Test		

Chapter 5

Day	Topics	Objectives: Students will be able to…	Homework
1	5.1 Introduction, The Idea of Probability, Myths about Randomness 5.1 Simulation, *Technology: Random Numbers with Calculators*	• Interpret probability as a long-run relative frequency in context. • Use simulation to model chance behavior.	1, 3, 7, 9, 11 15, 17, 19, 23, 25
2	5.2 Probability Models, Basic Rules of Probability 5.2 Two-Way Tables and Probability, Venn Diagrams and 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. • Use a Venn diagram to model a chance process involving two events. • Use the general addition rule to calculate P(A $\cup$ B)	27, 31, 32, 43, 45, 47 29, 33-36, 49, 51, 53, 55
3	5.3 What is Conditional Probability?, Conditional Probability and Independence, Tree Diagrams and the General Multiplication Rule 5.3 Independence: A Special Multiplication Rule, Calculating Conditional Probabilities	• 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. • When appropriate, use the multiplication rule for independent events to compute probabilities. • Compute conditional probabilities.	57-60, 63, 65, 67, 69, 73, 77, 79 83, 85, 87, 91, 93, 95, 97, 99
4	Review		Chapter 5 Review Problems
5	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 6.1 Standard Deviation (and Variance) of a Discrete Random Variable, Continuous Random Variables, *Technology: Analyzing Random Variables on the Calculator*	• 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. • Calculate the standard deviation of a discrete random variable. • Interpret the standard deviation of a random variable in context.	1, 5, 7, 9, 13 14, 18, 19, 23, 25
2	6.2 Linear Transformations 6.2 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. • Determine whether two random variables are independent. • Find probabilities involving the sum or difference of independent Normal random variables.	27-30, 37, 39-41, 43, 45 49, 51, 57-59, 63
3	6.3 Binomial Settings and Binomial Random Variables, Binomial Probabilities, *Technology: Binomial Probabilities on the Calculator* 6.3 Mean and Standard Deviation of a Binomial Distribution, Binomial Distributions in Statistical Sampling	• Determine whether the conditions for 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.	61, 65, 66, 69, 71, 73, 75, 77 79, 81, 83, 85, 87, 89
4	6.3 Geometric Random Variables, *Technology: Geometric Probabilities on the Calculator*	• 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* 7.1 Sampling Variability, Describing Sampling Distributions	• Distinguish between a parameter and a statistic. • 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.	1, 3, 5, 7 9, 11, 13, 17-20
2	7.2 The Sampling Distribution of p, Using the Normal Approximation for p, *Technology: Using an Applet to Simulate the distribution of* p. 7.3 The Sampling Distribution of $\bar{x}$: Mean and Standard Deviation, Sampling from a Normal Population, *Technology: Using an Applet to Simulate the distribution of* $\bar{x}$.	• Find the mean and standard deviation of the sampling distribution of a sample proportion 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 p. • Use the sampling distribution of p to evaluate a claim about a population proportion. • 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.	21-24, 27, 29, 33, 35, 37, 41 43-46, 49, 51, 53, 55
3	7.3 The Central Limit Theorem	• 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
4	Chapter 7 Review		Chapter 7 Review Exercises
5	Chapter 7 Test		

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, *Technology: Simulating Confidence Intervals with the Confidence Interval Applet* 8.1 Using Confidence Intervals Wisely, 8.2 Conditions for Estimating p, Constructing a Confidence Interval for p	• 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. • 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.	5, 7, 9, 11, 13 17, 19–24, 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* 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*	• 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. • 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.	35, 37, 41, 43, 47 49–52, 55, 57, 59, 63
3	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, 75–78
4	Chapter 8 Review	• Determine sample statistics from a confidence interval.	Chapter 8 Review Exercises
5	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 9.1 Type I and Type II Errors, Planning Studies: The Power of a Statistical Test, *Technology: Investigating Power with an Applet*	• State correct hypotheses for a significance test about a population proportion or mean. • Interpret *P*-values in context. • 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.	1, 3, 5, 7, 9, 11, 13 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* 9.2 Two-Sided Tests, Why Confidence Intervals Give More Information, *Technology: Tests and Confidence Intervals using Minitab*	• Check conditions for carrying out a test about a population proportion. • If conditions are met, conduct a significance test about a population proportion. • Use a confidence interval to draw a conclusion for a two-sided test about a population proportion.	27–30, 41, 43, 45 47, 49, 51, 53, 55
3	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.	57–60, 71, 73
4	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
5	Chapter 9 Review		Chapter 9 Review Exercises
6	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 $p_1 - p_2$ • Calculate probabilities using the sampling distribution of $p_1 - p_2$	1, 3, 5
	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
	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
	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, 67-70
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* 11.1 The Chi-Square Goodness-of-Fit Test, Follow-Up Analysis, *Technology: Chi-Square Goodness-of-Fit Tests on the Calculator*	• Know how to compute expected counts, conditional distributions, and contributions to the chi-square statistic. • 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.	1, 3, 5 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.	19-22, 27, 29, 31, 33, 35, 43
3	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
4	Chapter 11 Review	• Distinguish between the three types of chi-square tests.	Chapter 11 Review Exercises
5	Chapter 11 Test		59^{R}, 60^{R}

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 12.1 Estimating Parameters, Constructing a Confidence Interval for the Slope, *Technology: Regression Inference using Computer Software and Calculators*	• Check conditions for performing inference about the slope β of the population regression line. • Interpret computer output from a least-squares regression analysis. • Construct and interpret a confidence interval for the slope β of the population regression line.	1, 3 5, 7, 9, 11
2	12.1 Performing a Significance Test for the Slope 12.2 Transforming with Powers and Roots, *Technology: Transforming to Achieve Linearity on the Calculator*	• Perform a significance test about the slope β of a population regression line. • 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.	13, 15, 17, 19 21-26, 33, 35
3	12.2 Transforming with Logarithms	• 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
4	Chapter 12 Review		Chapter 12 Review Exercises
5	Chapter 12 Test		Cumulative AP Practice Test 4

AP/FINAL EXAM REVIEW (5 days)

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

This syllabus is a revised version of a syllabus provided by a colleague as used during the 2015-2016 school year. The tentative schedule, with assignments was taken from *The practice of Statistics for AP*, 4th edition and is subject to revision as the course progresses