FREEHOLD REGIONAL HIGH SCHOOL DISTRICT

OFFICE OF CURRICULUM AND INSTRUCTION

MATHEMATICS DEPARTMENT

AP STATISTICS

Grade Level: 10-12

Credits: 5

BOARD OF EDUCATION ADOPTION DATE:

AUGUST 31, 2009

SUPPORTING RESOURCES AVAILABLE IN DISTRICT RESOURCE SHARING
APPENDIX A: ACCOMMODATIONS AND MODIFICATIONS
APPENDIX B: ASSESSMENT EVIDENCE
APPENDIX C: INTERDISCIPLINARY CONNECTIONS

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Course Philosophy

The purpose of the AP Statistics course is to introduce students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. Modern technology provides a mechanism for the simulation and analysis of data.

Through the study of statistics, students will expand their understanding of mathematics and acquire tools that will help them to be effective problem solvers in a variety of fields. Given that statistics is used in myriad disciplines, an understanding of introductory concepts is vital for success at the university level and beyond. In addition, this statistics curriculum will cover all topics suggested by the College Board and provide students the background and preparation necessary to be successful on the AP Exam.

Course Description

The AP Statistics course will introduce students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. Students are exposed to four broad conceptual themes: exploring data, sampling and experimentation, probability and simulation, and statistical inference. Students will 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. In addition to the preparation for the AP Exam, students will be required to complete research-based projects using the skills that they have acquired throughout the year.

Freehold Regional High School District
Curriculum Map

Advanced Placement Statistics

Relevant Standards[1]	Enduring Understandings	Essential Questions	Assessments		
			Diagnostic (before)	Formative (during)	Summative (after)
4.5 B1-4 4.5 A1-5 4.5 E1, 3	Data can be represented using a variety of numerical and graphical methods.	What is data? Are there different types of data? What are the numerical methods for data representation? What are the graphical methods for data representation?	Pretest Oral Questions/ Discussion Anticipatory Set Questions	Math Journals Quizzes Oral Presentations Observations Participatory Rubrics Assignments Closure Questions Investigative Activities Sample AP Exam Questions	Portfolios Projects Chapter Test Mid Terms AP Exam Final Exam
4.3 B4 4.3 C1, 2 4.4 A4, 5 4.5 A1-5 4.5 B1-4; C1; E2	Regression is an instrument used to generalize relationships for bivariate data.	What is regression? What is bivariate data? How well does data fit a regression model? What are the properties of a linear regression model? How can non-linear data be linearized for regression?			
4.2 A1 4.4 A5; B5 4.5 A1-5; B1-4	A density curve is used to mimic probability.	What is a density curve? How do density curves relate to probability? How are measures of central tendency relevant to density curves? How can density curves be used to express relative standing?			
4.2 A1 4.4 A5; B5 4.5 A1-5; B1-4	The normal distribution is used to model the spread of data.	What is a normal distribution? How does one assess normality? What does a normal distribution imply about the spread of data? Why is the normal distribution essential to the study of statistics?			
4.4 A1-3 4.5 A1-5 4.5 B1-4	Proper collection of data is essential for good experimental design.	What is an experiment? What are the different sampling methods? How can causation be established? How does bias affect experimental design?			
4.4 B1-6; C1, 2 4.5 A1-5; B1-4	Probability is a tool for measuring long-term behavior.	What is probability? How can probability be simulated? What is a probability distribution? How does one determine probability for a given event?			
4.4 A2 4.5 A1-5; B1-4; D1-6	Inference is a tool for estimating an unknown population parameter.	What does it mean to make an inference? What is a confidence interval? How does one distinguish among the various confidence intervals?			
4.4 A2 4.5 A1-5; B1-4; D1-6	Inference is a tool for validating a claim about a population parameter.	What is a test of significance? How is a test of significance done? How does one distinguish among the various tests of significance?			

Relevant Standards[1]	Enduring Understandings	Essential Questions	Assessments		
			Diagnostic (before)	Formative (during)	Summative (after)
4.5 A1-5; B1-4; C1-6	Statistics can be applied to many different disciplines and fields.	How is statistics used in your current courses? What are some examples of statistics used in real life? How can one apply various statistical techniques to analyze results when working on a novel research project?			
4.4 A5 4.5 A1-5; B1-4; F1-4	Technology is instrumental to the study of statistics in an interactive classroom.	What types of technology can be used to study statistics? Why is technology useful to the study of statistics?			

Freehold Regional High School District
Course Proficiencies and Pacing

Advanced Placement Statistics

Unit Title	Unit Understandings and Goals	Recommended Duration
Unit #1: Exploring Data:	Data can be represented using a variety of numerical and graphical methods. Technology is instrumental to the study of statistics in an interactive classroom. Statistics can be applied to many different disciplines and fields. 1. Students will describe the distribution for any given data set of one variable. 2. Students will interpret numerical and graphical summaries in the context of the situation	2 weeks
Unit #2: Describing Location in a Distribution	A density curve is used to mimic probability. The normal distribution is used to model the spread of data. 1. Students will compute measures of relative standing for individual values in a distribution 2. Students will demonstrate an understanding of a density curve and Normal distributions.	2 weeks
Unit #3: Examining Relationships	Regression is an instrument used to generalize relationships for bivariate data. 1. Given a bivariate data set, students will construct and interpret a regression line. 2. Students will demonstrate an understanding of the quality of the regression line as the model for bivariate data. 3. Students will use transformations to linearize curved relationships for regression.	4 weeks
Unit #4: Producing Data	Proper collection of data is essential for good experimental design. 1. Students will identify and implement appropriate types of sampling methods. 2. Students will identify and give examples of sources of bias. 3. Students will be able to recognize and construct a well-designed experiment.	2 weeks
Unit #5: Probability and Simulations	Probability is a tool for measuring long-term behavior. 1. Students will use simulation to calculate probabilities. 2. Students will understand and apply the laws of probability	2 weeks
Unit #6: Random Variables	Probability is a tool for measuring long-term behavior. 1. Students will differentiate between discrete and continuous random variables. 2. Students will explain the probability distribution for random variables, including binomial and geometric distributions	3 weeks

Unit #7: Sampling Distributions	The normal distribution is used to model the spread of data. A density curve is used to mimic probability. 1. Students will be able to interpret a sampling distribution for means. 2. Students will be able to interpret a sampling distribution for proportions.	3 weeks
Unit #8: Estimating with Confidence	Inference is a tool for estimating an unknown population parameter. 1. Students will be able to determine a confidence interval for means. 2. Students will be able to determine a confidence interval for proportions.	3 weeks
Unit #9: Significance Testing for One Population	Inference is a tool for validating a claim about a population parameter. 1. Students will be able to carry out a test of significance for a population mean. 2. Students will be able to carry out a test of significance for a population proportion.	3 weeks
Unit #10: Comparing Two Population Parameters	Inference is a tool for validating a claim about a population parameter. Inference is a tool for estimating an unknown population parameter. 1. Students will be able to compare two population means and proportions using confidence intervals. 2. Students will be able to compare two population means and proportions using tests of significance.	2 weeks
Unit #11: Inference for Distributions of Categorical Variables	Inference is a tool for validating a claim about a population parameter. 1. Students will be able to perform a test for goodness of fit using a two-way table. 2. Students will be able to perform a chi-square test of significance.	1 week
Unit #12: Inference for Regressions	Regression is an instrument used to generalize relationships for bivariate data. Inference is a tool for validating a claim about a population parameter. 1. Students will be able to create a confidence interval for the slope of a regression line. 2. Students will be able to test the hypothesis of a linear relationship of the regression line.	2 week
Unit #13: Post Advanced Placement Exam	Statistics can be applied to many different disciplines and fields. Technology is instrumental to the study of statistics in an interactive classroom. 1. Students will demonstrate understanding of concepts covered throughout the year via a year end project. 2. Students will incorporate appropriate technology to augment and facilitate calculations necessary for statistical summaries.	5 weeks

Freehold Regional High School District
Advanced Placement Statistics

Unit #1: Exploring Data

Enduring Understandings:

Data can be represented using a variety of numerical and graphical methods.
Technology is instrumental to the study of statistics in an interactive classroom.
Statistics can be applied to many different disciplines and fields.

Essential Questions:

What is data?
Are there different types of data?
What are the numerical and graphical methods for data representation?
What types of technology can be used to study statistics?
Why is technology useful to the study of statistics?
How is statistics used in your current courses?
What are some examples of statistics used in real life?

Unit Goals:

Students will describe the distribution for any given data set of one variable.
Students will interpret numerical and graphical summaries in the context of the situation

Duration of Unit: 2 weeks

NJCCCS: 4.4 A5; 4.5 A1-5; 4.5 B1-4; 4.5 C1-6; 4.5 E1, 3; 4.5 F1-4

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What is the difference between categorical and quantitative variables?	Categorical variables place an individuals into one of several groups Quantitative variables take numerical values	Current textbook and resource binders Statistical websites - see attachment Magazine articles Newspapers Videos (Against all odds) Previous AP Exam questions Statistical Applets Graphing Calculator SMART Board Power Point Reviews	Lecture and class discussion Complete the chapter study guides Complete the online quizzes from the text's website. M&M activities "Water Water Everywhere" Activity Case Closed Projects Alternative Assessment Previous AP Exam questions Jigsaw Review Relay	Written tests and quizzes Worksheets Project assessments Article summaries Anticipatory sets Classroom discussion Closure questions
How can categorical and quantitative variables be represented graphically?	Categorical variables can be represented by bar graphs and pie charts. Quantitative variables can be represented by histograms, stemplots, box plots, relative frequency histograms, and ogives			
How can data be represented numerically?	Data can be described through measures of central tendency (mean and median), spread (standard deviation and variance), IQR, and outliers.			
How are distributions described?	Distributions are described by shape, center, and spread. Use mean and standard deviation for data sets that are symmetrical. Use median and IQR for data sets that are skewed.			
How are distributions compared?	Use numerical and graphical summaries to compare data sets.			
What is the effect of linear transformations on a data set?	When adding a constant to all values of a data set, the mean and median increase by that value, but spread is not affected. When multiplying all values of data set by a constant, the mean, median, IQR and standard deviation are all multiplied by that constant.			
How can data be analyzed using technology?	Data can be imputed and manipulated using the LIST feature. Numerical representations can be found using 1-var stats. Graphical representations can be found using stat-plot.			

Suggestions on how to differentiate in this unit:

- Teaching methods will be diversified to appeal to visual, auditory and kinesthetic learners
- Students will be given copies of data sets and other important notes
- Students will be assessed by traditional and alternative methods
- Students will work individually, with partners and in small groups on certain activities

Freehold Regional High School District
Advanced Placement Statistics

Unit #2: Describing Location within a Distribution

Enduring Understandings:

A density curve is used to mimic probability.
The normal distribution is used to model the spread of data.

Essential Questions:

What is a density curve?
How do density curves relate to probability?
How are measures of central tendency relevant to density curves?
How can density curves be used to express relative standing?
What is a normal distribution?
How does one assess normality?
What does a normal distribution imply about the spread of data?

Unit Goals:

Students will compute measures of relative standing for individual values in a distribution
Students will demonstrate an understanding of a density curve and Normal distributions.

Duration of Unit: 2 weeks

NJCCCS: 4.2 A1; 4.4 A5; 4.4 B5; 4.5 A1-5; 4.5 B1-4

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
How do you measure relative standing?	Relative standing can be found by computing the standardized value (z-score)	Current textbook and resource binders Statistical websites - see attachment Magazine articles Newspapers Videos (Against all odds) Previous AP Exam questions Statistical Applets Graphing Calculator SMART Board Power Point Reviews	Lecture and class discussion Complete the chapter study guides Complete the online quizzes from the text's website. M&M activities Case Closed Projects Alternative Assessment Previous AP Exam questions Jigsaw Review Relay	Written tests and quizzes Worksheets Project assessments Article summaries Anticipatory sets Classroom discussion Closure questions
	Relative standing can also be discussed as a percentile.			
What is a density curve?	A density curve is an approximation of the overall shape of a distribution.			
	The area underneath a density is exactly 1.			
How can the mean and median be approximated on a density curve?	The median of a density curve is the "equal-areas" point that divides the area under the curve in half.			
	The mean of a density curve is the "balance point," at which the curve would balance if made of solid material.			
What is a Normal distribution?	A Normal distribution is a density curve that is symmetric, single-peaked, and bell-shaped.			
	All Normal distributions follow 68-95-99.7 Rule.			
What is a standard Normal distribution?	A standard Normal distribution has a mean of zero and a standard deviation of one. N(0, 1)			
	The proportion of observations can be found using the z-table and the graphing calculator (normalcdf)			
For a Normal distribution, what is the value associated with a specific roportion?	The value for a given proportion can be found using the z-table or the graphing calculator (invNorm)			
How can Normality be assessed?	Normality can be assessed by comparing the count of observations in each interval with the 68-95-99.7 Rule			
	Normal probability plots can also be used to assess Normality.			

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Freehold Regional High School District
Advanced Placement Statistics

Unit #3: Examining Relationships

Enduring Understanding:

Regression is an instrument used to generalize relationships for bivariate data.

Essential Questions:

What is regression?
What is bivariate data?
How well does data fit a regression model?
What are the properties of a linear regression model?
How can non-linear data be linearized for regression?

Unit Goals:

Students will construct and interpret a regression line given a bivariate data set.
Students will demonstrate an understanding of the quality of the regression line as the model for bivariate data.
Students will use transformations to linearize curved relationships for regression.

Duration of Unit: 4 weeks

NJCCCS: 4.3 B4; 4.3 C1, 2; 4.4 A4, 5; 4.5 A1-5; 4.5 B1-4; 4.5 C1; 4.5 E2

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What is the difference between response and explanatory variables?	A response variable measures an outcome of a study.	Current textbook and resource binders Statistical websites - see attachment Magazine articles Newspapers Videos (Against all odds) Previous AP Exam questions Statistical Applets Graphing Calculator SMART Board Power Point Reviews	Lecture and class discussion Complete the chapter study guides Complete the online quizzes from the text's website. M&M activities Case Closed Projects Alternative Assessment Previous AP Exam questions Jigsaw Review Relay	Written tests and quizzes Worksheets Project assessments Article summaries Anticipatory sets Classroom discussion Closure questions
	An explanatory variable helps explain or influences changes in a response variable.			
How do you graphically represent and interpret bivariate data?	Scatterplots can be used to find the overall pattern and striking deviations of bivariate data.			
How is a linear association measured?	Correlation measures the direction and strength of a linear relationship.			
How can a regression line be used as a mathematical model?	The Least Squares Regression Line (LSRL) describes how a response variable changes as an explanatory variable changes.			
How well does data fit a linear regression model?	A residual plot and the coefficient of determination are used to assess the appropriateness of the regression model.			
What are the cautions regarding regression?	Extrapolation may not be accurate for values outside of the given data set.			
	Lurking variables may influence the interpretation of the relationship between the two variables.			
How do you transform data to achieve linearity?	Powers and Logarithms can be employed to one or both variable to linearize the relationship between the variables.			
How are the relationships between categorical variables described?	Marginal and conditional distributions are used to describe relationships between categorical variables.			
How is an associated between two variables explained?	Causation, common response, and confounding are three ways that can explain the association.			

Suggestions on how to differentiate in this unit:

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Freehold Regional High School District
Advanced Placement Statistics

Unit #4: Producing Data

Enduring Understanding:

Proper collection of data is essential for good experimental design.

Essential Questions:

What is an experiment?
What are the different sampling methods?
How can causation be established?
How does bias affect experimental design?

Unit Goals:

Students will identify and implement appropriate types of sampling methods.
Students will identify and give examples of sources of bias.
Students will be able to recognize and construct a well-designed experiment.

Duration of Unit: 2 weeks

NJCCCS: 4.4 A1-3; 4.5 A1-5; 4.5 B1-4

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What is the difference between an observational study and an experiment?	An observation study observes individuals and measures variables of interest.	Current textbook and resource binders Statistical websites - see attachment Magazine articles Newspapers Videos (Against all odds) Previous AP Exam questions Statistical Applets Graphing Calculator SMART Board Power Point Reviews	Lecture and class discussion Complete the chapter study guides Complete the online quizzes from the text's website. M&M activities Jigsaw Case Closed Projects Alternative Assessment Previous AP Exam questions Turkey-trot Olympics Review Relay	Written tests and quizzes Worksheets Project assessments Article summaries Anticipatory sets Classroom discussion Closure questions
	An experiment deliberately imposes a treatment on individuals.			
What are the different sampling methods?	Voluntary response, convenience, simple-random (SRS), probability, stratified random, and cluster are several different sampling methods.			
What cautions about sample surveys exist?	Some cautions include response bias, undercoverage, nonresponse, and question wording.			
What are the parts of a well-designed experiment?	The components include experimental units, treatment, factors, levels, and conclusions.			
	The basic principles of experimental design are control, replicate, and randomize.			
What are some different types of experimental design?	Blocking, matched-pairs, and completely randomized are types of experimental design.			
What cautions about experimentation exist?	Lack of realism and the placebo effect can prevent generalizations of the results.			
	Double-blind experiments help avoid unconscious bias, such as the placebo effect.			

<u>Suggestions on how to differentiate in this unit</u>:

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Freehold Regional High School District
Advanced Placement Statistics

Unit #5: Probability and Simulations

Enduring Understanding:

Probability is a tool for measuring long-term behavior.

Essential Questions:

What is probability?
How can probability be simulated?
What is a probability distribution?
How does one determine probability for a given event?

Unit Goals:

Students will use simulation to calculate probabilities.
Students will understand and apply the laws of probability

Duration of Unit: 2 weeks

NJCCCS: 4.4 B1-6; 4.4 C1, 2; 4.5 A1-5; 4.5 B1-4

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
How can simulations be used to model probability?	Simulation is the imitation of chance behavior based on a model that accurately reflects the phenomenon.	Current textbook and resource binders Statistical websites - see attachment Magazine articles Newspapers Videos (Against all odds) Previous AP Exam questions Statistical Applets Graphing Calculator SMART Board Power Point Reviews	Lecture and class discussion Complete the chapter study guides Complete the online quizzes from the text's website. M&M activities Jigsaw Case Closed Projects Alternative Assessment Previous AP Exam questions Review Relay	Written tests and quizzes Worksheets Project assessments Article summaries Anticipatory sets Classroom discussion Closure questions
How are simulations conducted?	Simulations are conducted using the five-step process along with the random digits table or random number generator from the graphing calculator.			
What is probability?	Probability is the long-term relative frequency of a random event.			
What is a probability model?	A probability model consists of all possible outcomes of a random phenomenon and a way of assigning probabilities to those outcomes.			
What are the general probability rules?	Probability of any event is always a number between 0 and 1, and the sum of all the probabilities of a distribution equals 1.			
	For disjoint events, the probability of the sum of the events is the sum of the probabilities of each event.			
	The probability of the intersection of two events is the product of their conditional probabilities.			
	For any event, the probability of an event not occurring is 1 minus the probability of the event occurring.			

<u>Suggestions on how to differentiate in this unit</u>:

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Freehold Regional High School District
Advanced Placement Statistics

Unit #6: Random Variables

Enduring Understanding:

Probability is a tool for measuring long-term behavior.

Essential Questions:

What is a probability distribution?
How can probability be simulated?
How does one determine probability for a given event?

Unit Goals:

Students will differentiate between discrete and continuous random variables.
Students will explain the probability distribution for random variables, including binomial and geometric distributions.

Duration of Unit: 3 weeks

NJCCCS: 4.4 B1-6; 4.4 C1, 2; 4.5 A1-5; 4.5 B1-4

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What is a random variable?	Define both discrete and continuous random variables.	Current textbook and resource binders Statistical websites - see attachment Magazine articles Newspapers Videos (Against all odds) Previous AP Exam questions Statistical Applets Graphing Calculator	Lecture and class discussion Student investigation activities Complete the chapter study guides Create posters and/or power point presentations Use whiteboards to show immediate feedback. Use worksheets to reinforce concepts.	Written tests and quizzes Worksheets Project assessments Notebook assessments Responses to discussion questions Journal assessments
What is a probability distribution for a random variable?	Show the construction of a discrete probability distribution. Apply the formulas for mean and standard deviation.			
What is demonstrated by the law of large numbers?	Explain the law of large numbers in terms of long term expectations.			
What is a binomial distribution?	Establish the settings of a binomial experiment. Calculate binomial probabilities by applying relevant formulas.			
What is a geometric distribution?	Establish the settings of a geometric experiment. Calculate geometric probabilities by applying relevant formulas.			
How does one use known means and standard deviations to compute the mean and standard deviation for a combination of variables.	Apply the formulas for calculating combined means and standard deviation for both independent and dependent variables.			

<u>Suggestions on how to differentiate in this unit</u>:

- Teaching methods will be diversified to appeal to visual, auditory and kinesthetic learners
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Freehold Regional High School District
Advanced Placement Statistics

Unit #7: Sampling Distributions

Enduring Understandings:

The normal distribution is used to model the spread of data.
A density curve is used to mimic probability.

Essential Questions:

Why is the normal distribution important to the study of statistics?
How does one assess normality?
What does the normal distribution imply about the spread of data?

Unit Goals:

Students will be able to interpret a sampling distribution for means.
Students will be able to interpret a sampling distribution for proportions.

Duration of Unit: 3 weeks

NJCCCS: 4.2 A1; 4.4 A5; 4.4 B5; 4.5 A1-5; 4.5 B1-4

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What is a sampling distribution?	Understand the properties of a sampling distribution.	Current textbook and resource binders Statistical websites - see attachment Magazine articles Newspapers Videos (Against all odds) Previous AP Exam questions Statistical Applets Graphing Calculator	Lecture and class discussion Student investigation activities Complete the chapter study guides Create posters and/or power point presentations Use whiteboards to show immediate feedback. Use worksheets to reinforce concepts.	Written tests and quizzes Worksheets Project assessments Notebook assessments Responses to discussion questions Journal assessments
How does one compute the mean and standard deviation for a sample proportion?	Apply appropriate formulas for sample proportions.			
When does one use a normal approximation to the sampling proportion?	Establish conditions for normal approximation to the sampling proportion.			
How does one compute the mean and standard deviation for a sampling distribution of means?	Apply appropriate formulas for sampling distribution of means.			
What is the Central Limit Theorem?	Define Central Limit Theorem.			
How is the Central Limit Theorem applied to sampling distributions?	Establish conditions for the application of the Central Limit Theorem.			

<u>Suggestions on how to differentiate in this unit</u>:

- Teaching methods will be diversified to appeal to visual, auditory and kinesthetic learners
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Freehold Regional High School District
Advanced Placement Statistics

Unit #8: Estimating with Confidence

Enduring Understanding:

Inference is a tool for estimating an unknown population parameter.

Essential Questions:

What does it mean to make an inference?
What is a confidence interval?
How does one distinguish among the various confidence intervals?

Unit Goals:

Students will be able to determine a confidence interval for means.
Students will be able to determine a confidence interval for proportions.

Duration of Unit: 3 weeks

NJCCCS: 4.4 A2; 4.5 A1-5; 4.5 B1-4; 4.5 D1-6

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What is a confidence interval?	Define a confidence interval.	Current textbook and resource binders Statistical websites - see attachment Magazine articles Newspapers Videos (Against all odds) Previous AP Exam questions Statistical Applets Graphing Calculator	Lecture and class discussion Student investigation activities Complete the chapter study guides Create posters and/or power point presentations Use whiteboards to show immediate feedback. Use worksheets to reinforce concepts.	Written tests and quizzes Worksheets Project assessments Notebook assessments Responses to discussion questions Journal assessments
How does one construct a confidence interval?	Distinguish between a point estimate and an interval estimate			
What is a margin of error?	Calculate margin or error using appropriate formula.			
How does one distinguish between using the normal or the t distribution?	Establish conditions necessary for each distribution.			
What conditions must be present to construct a confidence interval for a population mean or proportion?	Identify the conditions necessary to distinguish each type of confidence interval.			

<u>Suggestions on how to differentiate in this unit</u>:

- Teaching methods will be diversified to appeal to visual, auditory and kinesthetic learners
- Students will be given copies of data sets and other important notes
- Students will be assessed by traditional and alternative methods
- Students will work individually, with partners and in small groups on certain activities

Freehold Regional High School District
Advanced Placement Statistics

Unit #9: Significance Testing for One Population

Enduring Understanding:

Inference is a tool for validating a claim about a population parameter.

Essential Questions:

What is a test of significance?
How is a test of significance done?
How does one distinguish among the various tests of significance?

Unit Goals:

Students will be able to carry out a test of significance for a population mean.
Students will be able to carry out a test of significance for a population proportion.

Duration of Unit: 3 weeks

NJCCCS: 4.4 A2; 4.5 A1-5; 4.5 B1-4; 4.5 D1-6

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What is a test of significance?	Define a test of significance.	Current textbook and resource binders Statistical websites - see attachment Magazine articles Newspapers Videos (Against all odds) Previous AP Exam questions Statistical Applets Graphing Calculator	Lecture and class discussion Student investigation activities Complete the chapter study guides Create posters and/or power point presentations Use whiteboards to show immediate feedback. Use worksheets to reinforce concepts.	Written tests and quizzes Worksheets Project assessments Notebook assessments Responses to discussion questions Journal assessments
How does one determine significance?	Define level of significance and use it to make a decision about the null hypothesis.			
What are the steps to execute a test of significance for a population mean?	Establish a systematic procedure for a test of significance for a population mean.			
What are the steps to execute a test of significance for a population proportion?	Establish a system procedure for a test of significance for a population proportion.			
What is the difference between a one-tailed and a two-tailed significance test?	Explain the different types of tests and the conditions necessary for each.			
	Establish a connection between a two-tailed test and a confidence interval.			
What are the different types of error?	Define Type I and Type II errors and the power of the test.			

<u>Suggestions on how to differentiate in this unit</u>:

- Teaching methods will be diversified to appeal to visual, auditory and kinesthetic learners
- Students will be given copies of data sets and other important notes
- Students will be assessed by traditional and alternative methods
- Students will work individually, with partners and in small groups on certain activities

Freehold Regional High School District
Advanced Placement Statistics

Unit #10: Comparing Two Population Parameters

Enduring Understandings:

Inference is a tool for validating a claim about a population parameter.
Inference is a tool for estimating an unknown population parameter.

Essential Questions:

How does one distinguish among the various confidence intervals?
How does one distinguish among the various tests of significance?

Unit Goals:

Students will be able to compare two population means and proportions using confidence intervals.
Students will be able to compare two population means and proportions using tests of significance.

Duration of Unit: 2 weeks

NJCCCS: 4.4 A2; 4.5 A1-5; 4.5 B1-4; 4.5 D1-6

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What is inference for comparing two populations?	Distinguish between inference using confidence intervals as opposed to tests of significance.	Current textbook and resource binders Statistical websites - see attachment Magazine articles Newspapers Videos (Against all odds) Previous AP Exam questions Statistical Applets Graphing Calculator	Lecture and class discussion Student investigation activities Complete the chapter study guides Create posters and/or power point presentations Use whiteboards to show immediate feedback. Use worksheets to reinforce concepts.	Written tests and quizzes Worksheets Project assessments Notebook assessments Responses to discussion questions Journal assessments
How does one compute a confidence interval for two population means?	Apply the appropriate formula for confidence intervals of population means using both the z statistic and the t statistic.			
How does one execute a test of significance for two population means?	Apply the appropriate formula for significance tests of population means using both the z statistic and the t statistic to find the p value.			
How does one compute a confidence interval for two population proportions?	Apply the appropriate formula for confidence intervals of population proportions using both the z statistic and the t statistic.			
How does one execute a test of significance for two population proportions?	Apply the appropriate formula for significance tests of population proportions using both the z statistic and the t statistic to find the p value.			

<u>Suggestions on how to differentiate in this unit</u>:

- Teaching methods will be diversified to appeal to visual, auditory and kinesthetic learners
- Students will be given copies of data sets and other important notes
- Students will be assessed by traditional and alternative methods
- Students will work individually, with partners and in small groups on certain activities

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Unit #11: Inference for Distributions of Categorical Variables

Enduring Understanding:

Inference is a tool for validating a claim about a population parameter.

Essential Questions:

How is a test of significance done?

How does one distinguish among the various tests of significance?

Unit Goals:

Students will be able to perform a test for goodness of fit using a two-way table.

Students will be able to perform a chi-square test of significance.

Duration of Unit: 1 week

NJCCCS: 4.4 A2; 4.5 A1-5; 4.5 B1-4; 4.5 D1-6

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What is a chi-square test?	Define what is meant by a chi-square test.	Current textbook and resource binders Statistical websites - see attachment Magazine articles Newspapers Videos (Against all odds) Previous AP Exam questions Statistical Applets Graphing Calculator	Lecture and class discussion Student investigation activities Complete the chapter study guides Create posters and/or power point presentations Use whiteboards to show immediate feedback. Use worksheets to reinforce concepts.	Written tests and quizzes Worksheets Project assessments Notebook assessments Responses to discussion questions Journal assessments
How does one conduct a chi-square goodness of fit test?	Define the steps necessary for carry out a chi-square goodness of fit test.			
What is a two-way table?	Draw and complete a two-way table.			
What is a chi-square test for homogeneity?	Use a two-way table to find the chi-square value and use it to generate a p value for a test of significance of homogeneity of a population proportion.			
What is a chi-square test for association/independence?	Use a two-way table to find the chi-square value and use it to generate a p value for a test of significance of association/independence for two population variables.			

<u>Suggestions on how to differentiate in this unit</u>:

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Unit #12: Inference for Regression

Enduring Understandings:

Regression is an instrument used to generalize relationships for bivariate data.
Inference is a tool for validating a claim about a population parameter.

Essential Questions:

How well does data fit a regression model?
What are the properties of a linear regression model?
How is a test of significance done?

Unit Goals:

Students will be able to create a confidence interval for the slope of a regression line.
Students will be able to test the hypothesis of a linear relationship of the regression line.

Duration of Unit: 2 weeks

NJCCCS: 4.3 C1, 2; 4.4 A2; 4.4 A4, 5; 4.5 A4, 5; 4.5 B1-4; 4.5 D1-6; 4.5 E2

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What conditions are necessary to do inference for regression?	Identify and list the conditions necessary for regression analysis.	Current textbook and resource binders Statistical websites - see attachment Magazine articles Newspapers Videos (Against all odds) Previous AP Exam questions Statistical Applets Graphing Calculator	Lecture and class discussion Student investigation activities Complete the chapter study guides Create posters and/or power point presentations Use whiteboards to show immediate feedback. Use worksheets to reinforce concepts.	Written tests and quizzes Worksheets Project assessments Notebook assessments Responses to discussion questions Journal assessments
What is meant by the standard error about the least-squares line?	Apply the formulas for calculating standard error.			
How does one compute a confidence interval for the slope of the least-squares line?	Establish and apply the formula for a confidence interval for the regression slope.			
How does one conduct a test of significance for the slope of the least-squares line?	Establish and apply the steps for a test of significance for the regression slope.			

<u>Suggestions on how to differentiate in this unit</u>:

- Teaching methods will be diversified to appeal to visual, auditory and kinesthetic learners
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Unit #13: Post Advanced Placement Exam

Enduring Understandings:

Statistics can be applied to many different disciplines and fields.

Technology is instrumental to the study of statistics in an interactive classroom

Essential Question:

How can one apply various statistical techniques to analyze results when working on a novel research project?

Unit Goals:

Students will demonstrate understanding of concepts covered throughout the year via a year end project.

Students will incorporate appropriate technology to augment and facilitate calculations necessary for statistical summaries.

Duration of Unit: 5 weeks

NJCCCS: 4.3 C1, 2; 4.4 A2; 4.4 A4, 5; 4.5 A4, 5; 4.5 B1-4; 4.5 D1-6; 4.5 E2

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
How does one collect and analyze real world data?	Use Scatterplots and apply correlations to analyze collected data	Platinum Resource Binder – Special Problem 3b "What's Your Best Offer?"	Class discussion Student investigation activities Create posters and/or power point presentations Use whiteboards to show immediate feedback.	Rubrics Project assessments Responses to discussion questions Journal assessments
How does one use probabilities to analyze games of chance?	Use a variety of probabilistic methods to deduce mathematical likelihood of success.	Platinum Resource Binder – "Casino Lab"		
How does one test a claim about a population parameter?	Use statistical principles and sample data to validate a claim.	Platinum Resource Binder – Special Problem 11b "The Pineapple Problem"		
		Movie – "A Civil Action" in conjunction with the attached handout listed in addendum.		
How does one compare a claim about two population parameters?	Use statistical principles and sample data to validate a claim.	Platinum Resource Binder – Special Problem 13a "Exercising to Lose Weight"		
How does one test a claim about two population proportions?	Use Chi-Square principles to assess relationships.	Platinum Resource Binder – Special Problem 14a "Do Dogs Resemble Their Owners?"		

<u>Suggestions on how to differentiate in this unit</u>:

- Teaching methods will be diversified to appeal to visual, auditory and kinesthetic learners
- Students will be given copies of data sets and other important notes
- Students will be assessed by traditional and alternative methods
- Students will work individually, with partners and in small groups on certain activities