ADVANCED PLACEMENT STATISTICS

Description

AP Statistics is a rigorous course that offers advanced students an opportunity to do college level work in high school. Students will explore four broad conceptual themes: exploring data, planning a study, probability, and statistical inference. The content of the course requires students to use high level problem solving skills to analyze, describe and make conclusions about sets of data. AP Statistics is an excellent option for all students meeting the prerequisites, regardless of their intended college major. It is expected that students in this course will take the AP exam. Beginning in the 2007-2008 school year, by virtue of our affiliation with the University of Connecticut's ECE program, students can apply for 4 college credits of Math 110 at the University of Connecticut.

Course Overview

Course Goals

Students should:

- observe and describe patterns and departures from patterns.
- plan and conduct a study using samples, experiments, and simulations.
- explore random phenomenon using probability and simulation.
- use statistical inference to make conclusions with confidence.
- estimate population parameter and test hypotheses.

Essential Question

- How can collecting, organizing and displaying data help us analyze information and make reasonable predictions and informed decisions?

Assessments

Common Assessments

Skill Assessments

Content Outline

I. Unit 1 - Exploring Data
II. Unit 2 - Planning a Study
III. Unit 3 – Probability
IV. Unit 4 - Inference

Standards

State of Connecticut Mathematics Curriculum Frameworks

Connecticut State Standards are met in the following areas:

- ***Working with Data: Probability and Statistics***

Grade Level Skills

Students will:

- Skills Matrix

Pacing Guide										
1st Marking Period			2nd Marking Period			3rd Marking Period			4th Marking Period	
September	October	November	December	January	February	March	April	May	June	
Unit 1 **Exploring Data** 9 weeks			Unit 2 **Planning a Study** 4 weeks		Unit 3 **Probability** 9 weeks		Unit 4 **Inference** 12 weeks			

Unit 1 - Exploring Data, 9 weeks top

Standards

Working with Data: Probability and Statistics – Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.

4.1 Students should collect, organize and display data using appropriate statistical and graphical methods.

Core 4.1a Students will create the appropriate visual or graphical representation of real data.

Extended 4.1a Students will model real data graphically using appropriate tools, technology and strategies.

4.2 Students should analyze data sets to form hypotheses and make predictions.

Core 4.2a Students will analyze real world problems using statistical techniques.

Extended 4.2a Students will describe and analyze sets of data using statistical models.

4.3 Students should understand and apply basic concepts of probability.

Extended 4.3a Students will solve problems using the methods of discrete mathematics

4.3b Students will make statistical inferences through the use of probability.

Unit Objectives

Students will be able to:

- observe and describe patterns and departures from patterns.

Essential Question

- How can collecting, organizing and displaying data help us analyze information and make reasonable predictions and informed decisions?

Focus Questions

- What is Statistics and what role does it play as a tool in science, business, and other areas of study?
- How does Statistics model the real world?
- How are appropriate techniques, tools, and formulas used in Statistics to draw conclusions?
- How can the language of Statistics be used to communicate mathematical ideas coherently and precisely?
- How can technology be applied to create and interpret models?
- What is the structure of the Advanced Placement exam?
- How can students maximize their

Assessment

- Linear Regression – "What's Your Best Offer" (Special Problem 3B)

Skill Objectives

Students will:

- collect real data and create meaningful graphical representations of the data.
- develop, use and explain applications and limitations of linear and nonlinear models and regression in a variety of contexts.
- investigate and solve relevant problems by designing statistical experiments and collecting, organizing, displaying and analyzing data in tabular, graphical and symbolic forms.
- apply and defend regression models for bivariate data and use them to formulate predictions.
- recognize the limitations of mathematical models based on sample data as representations of real-world situations.
- estimate an unknown value between data points on a graph (interpolation) and make predictions by extending the graph (extrapolation).

	efforts to be successful on the exam, in addition to having knowledge of the course content? • How do you describe a distribution of data numerically and graphically? • How do you create a model for bivariate data and how do you describe, interpret and analyze the model?	• use the data from samples to make inferences about a population and determine whether claims are reasonable or false. • determine and use measures of spread and central tendency to describe and compare sets of data. • determine statistical measures to describe univariate data. • use relative frequency and expected values to represent and solve problems involving uncertainty. • differentiate between association and causation when studying the relationship between one variable and another.

Unit 2 – Planning a Study, 4 weeks top

Standards

Working with Data: Probability and Statistics – Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.

4.1 Students should collect, organize and display data using appropriate statistical and graphical methods.

Core 4.1a Students will create the appropriate visual or graphical representation of real data.

Extended 4.1a Students will model real data graphically using appropriate tools, technology and strategies.

4.2 Students should analyze data sets to form hypotheses and make predictions.

Core 4.2a Students will analyze real world problems using statistical techniques.

Extended 4.2a Students will describe and analyze sets of data using statistical models.

Unit Objectives

Students will be able to:

- plan and conduct a study using samples, experiments, and simulations.

Essential Question

- How can collecting, organizing and displaying data help us analyze information and make reasonable predictions and informed decisions?

Focus Questions

- What is Statistics and what role does it play as a tool in science, business, and other areas of study?
- How does Statistics model the real world?
- How are appropriate techniques, tools, and formulas used in Statistics to draw conclusions?
- How can the language of Statistics be used to communicate mathematical ideas coherently and precisely?
- How can technology be applied to create and interpret models?
- What is the structure of the Advanced Placement exam?
- How can students maximize their efforts to be successful on the exam, in addition to having knowledge of the course content?
- How do you develop sample and experiment to produce valid information?
- How do you use chance in random sampling and

Assessment

CSA - Analyzing Surveys (Chapter 5 – Golden Book)

Skill Objectives

Students will:

- collect real data and create meaningful graphical representations of the data.
- investigate and solve relevant problems by designing statistical experiments and collecting, organizing, displaying and analyzing data in tabular, graphical and symbolic forms.
- recognize the limitations of mathematical models based on sample data as representations of real-world situations.
- use data from samples to make inferences about a population and determine whether claims are reasonable or false.
- describe characteristics of sampling methods and analyze the effects of random versus biased sampling.

	randomized comparative experiments to simulate random behavior?	

Unit 3 - Probability, 9 weeks top

Standards

Working with Data: Probability and Statistics – Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.

4.1 Students should collect, organize and display data using appropriate statistical and graphical methods.

Core 4.1a Students will create the appropriate visual or graphical representation of real data.

Extended 4.1a Students will model real data graphically using appropriate tools, technology and strategies.

4.2 Students should analyze data sets to form hypotheses and make predictions.

Core 4.2a Students will analyze real world problems using statistical techniques.

Extended 4.2a Students will describe and analyze sets of data using statistical models.

4.3 Students should understand and apply basic concepts of probability.

Core 4.3a Students will understand and apply the principles of probability in a variety of situations.

Extended 4.3a Students will solve problems using the methods of discrete mathematics

4.3b Students will make statistical inferences through the use of probability.

Unit Objectives

Students will be able to:

- explore random phenomenon using probability and simulation.

Essential Question

- How can collecting, organizing and displaying data help us analyze information and make reasonable predictions and informed decisions?

Focus Questions

- What is Statistics and what role does it play as a tool in science, business, and other areas of study?
- How does Statistics model the real world?
- How are appropriate techniques, tools, and formulas used in Statistics to draw conclusions?
- How can the language of Statistics be used to communicate mathematical ideas coherently and precisely?
- How can technology be applied to create and interpret models?
- What is the structure of the Advanced Placement exam?

Assessment

- Probability "Airline Overbooking" (Special Problem 8A)

Skill Objectives

Students will:

- collect real data and create meaningful graphical representations of the data.
- investigate and solve relevant problems by designing statistical experiments and collecting, organizing, displaying and analyzing data in tabular, graphical and symbolic forms.
- recognize the limitations of mathematical models based on sample data as representations of real-world situations.
- use data from samples to make inferences about a population and determine whether claims are reasonable or false.
- determine and use measures of spread and central tendency to describe and compare sets of data.
- determine statistical measures to describe

	• How can students maximize their efforts to be successful on the exam, in addition to having knowledge of the course content? • How do you anticipate what a distribution of data should look like under a given model? • How do you use probability rules to evaluate chance behavior in real world contexts?	univariate data. • solve problems involving the probabilities of mutually exclusive events or complementary events. • explore the concepts of conditional probability and independent events in real-world contexts. • use theoretical probabilities to solve problems and predict experimental outcomes. • understand and use permutations, combinations, recursion and mathematical induction to solve problems. • solve problems using finite graphs. • explore the characteristics and applications of the normal distribution and standardized scores. • use relative frequency and expected values to represent and solve problems involving uncertainty.

Unit 4 - Inference, 12 weeks top

Standards

Working with Data: Probability and Statistics – Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.

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Core 4.1a Students will create the appropriate visual or graphical representation of real data.

Extended 4.1a Students will model real data graphically using appropriate tools, technology and strategies.

4.2 Students should analyze data sets to form hypotheses and make predictions.

Core 4.2a Students will analyze real world problems using statistical techniques.

Extended 4.2a Students will describe and analyze sets of data using statistical models.

4.3 Students should understand and apply basic concepts of probability.

Extended 4.3a Students will solve problems using the methods of discrete mathematics

4.3b Students will make statistical inferences through the use of probability.

Unit Objectives

Students will be able to:

- use statistical inference to make conclusions with confidence.
- estimate population parameter and test hypotheses.

Essential Question

- How can collecting, organizing and displaying data help us analyze information and make reasonable predictions and informed decisions?

Focus Questions

- What is Statistics and what role does it play as a tool in science, business, and other areas of study?
- How does Statistics model the real world?
- How are appropriate techniques, tools, and formulas used in Statistics to draw conclusions?
- How can the language of Statistics be used to communicate mathematical ideas coherently and precisely?
- How can technology be applied to create and interpret models?
- What is the structure of the Advanced Placement exam?
- How can students maximize their efforts

Assessment

- Poster Project

Skill Objectives

Students will:

- collect real data and create meaningful graphical representations of the data.
- develop, use and explain applications and limitations of linear and nonlinear models and regression in a variety of contexts.
- investigate and solve relevant problems by designing statistical experiments and collecting, organizing, displaying and analyzing data in tabular, graphical and symbolic forms.
- apply and defend regression models for bivariate data and use them to formulate predictions.
- recognize the limitations of mathematical models based on sample data as representations of real-world situations.
- use data from samples to make inferences about a population and determine whether claims are reasonable or false.

	to be successful on the exam, in addition to having knowledge of the course content? • How do you use inferential models to analyze experimental designs, draw statistically significant conclusions form data, and make inferences about populations?	• determine and use measures of spread and central tendency to describe and compare sets of data. • determine statistical measures to describe univariate data. • explore the characteristics and applications of the normal distribution and standardized scores. • construct and interpret confidence intervals. • explore a variety of statistical tests such as chi-squares and t-tests and understand the meaning of hypothesis testing. • use relative frequency and expected values to represent and solve problems involving uncertainty.