



**Northern York County School District
Curriculum Overview**

Course: AP Statistics	
Grade Level: 11 - 12	
Approval Date:	Length of Time: 180 Days
Course Description: This course is designed to follow the AP statistics curriculum. A complete course description can be found at the AP Central content hub. The course will introduce statistical methods and data analyses that are common to a first level collegiate course. It will address topics in both descriptive and inferential statistics. Topics will fall under one of four major headings: (1) Exploring Data – Observing patterns and departures from patterns; (2) Planning a Study – Deciding what and how to measure; (3) Anticipating patterns – Producing models using probability theory and simulation; and (4) Statistical Inference – Confirming models. Prerequisite: A teacher's recommendation is required along with the completion of a Trigonometry/Advanced Mathematics course.	
Course Objectives: <ul style="list-style-type: none">• Use statistical terminology appropriately.• Explore methods of data collection.• Construct and interpret various graphical displays used to represent a data set.• Calculate and interpret the meaning of various parameters and statistics used to describe and represent a data set.• Perform linear regression analyses and use the results to make predictions.• Use the ladder of transformations to linearize a data set.• Use probability rules to calculate various probabilities.• Construct discrete probability distributions (including the binomial distribution and the geometric distribution) and determine the mean and standard deviation of the distribution.• Construct the standard normal curve. Use the standard normal distribution and the student's t distribution to find various probabilities.• Use transformations to normalize a data set.• Describe the sampling distribution for various sample statistics. Use sampling distributions to find various probabilities.• Construct confidence intervals for population parameters.• Perform hypothesis tests using the standard normal distribution, the student's t distribution and the chi-square distribution.• Calculate the probability of a type II error and the power of a test.	
Related Standards: <ul style="list-style-type: none">• CC.2.1.HS.F.3 - Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.	

- CC.2.3.HS.B.1 - Summarize, represent, and interpret data on a single count or measurement variable.
- CC.2.4.HS.B.2 - Summarize, represent, and interpret data on two categorical and quantitative variables.
- CC.2.4.HS.B.3 - Analyze linear models to make interpretations based on the data.
- CC.2.4.HS.B.4 - Recognize and evaluate random processes underlying statistical experiments.
- CC.2.4.HS.B.5 - Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.
- CC.2.4.HS.B.6 - Use the concepts of independence and conditional probability to interpret data.
- CC.2.4.HS.B.7 - Apply the rules of probability to compute probabilities of compound events in a uniform probability model.

Units:

- The Role of Statistics and the Data Analysis Process
- Collecting Data Sensibly
- Graphical Methods for Describing Data
- Numerical Methods for Describing Data
- Summarizing Bivariate Data
- Probability
- Random Variables and Probability Distributions
- Sampling Variability and Sampling Distributions
- Estimation Using a Single Sample
- Hypothesis Testing Using a Single Sample
- Comparing Two Populations or Treatments
- The Analysis of Categorical Data and Goodness-of-Fit Tests
- Simple Linear Regression and Correlation: Inferential Methods

Concepts:

- **Use Statistical Terminology** – Appropriate use of statistical terminology is foundational to a clear understanding of methods used to analyze data.
- **Explore Methods of Data Collection** – There are different ways to collect data. Data must be collected using appropriate methods to obtain useful information.
- **Use Graphical Methods to Represent Data and Outcomes** – There are a variety of ways to display data graphically. Appropriate construction of graphical displays aids in the

Competencies:

- Use statistical terminology appropriately.
- Construct and interpret graphical displays of distributions of univariate data. Use them to describe patterns and departures from patterns.
- Summarize distributions of univariate data with numerical summaries and boxplots. Analyze the effect of changing units on summary measures.
- Use graphical methods to compare distributions (dot plots, back-to-back stem plots, parallel box plots).
- Perform the process of linear regression, analyze residual plots, locate outliers and influential points

<p>interpretation and analysis of data sets and probability outcomes.</p> <ul style="list-style-type: none"> • Use Numerical Methods to Summarize Data Sets – There are multiple statistics that can be generated from a data set that give a picture of what the data set looks like. Correct calculation and presentation of these statistics is important for correctly analyzing a data set. • Perform Linear Regression- The process of linear regression provides a means for assessing whether a linear relationship exists between two variables and can be used to make predictions within the range of a data set. • Use Transformation to Linearize a Data Set – Students must be able to decide how to linearize a data set using the ladder of transformations in order to apply linear regression techniques to a non-linear data set. • Calculate Probabilities and Construct Probability Distributions – There are various rules for calculating probabilities and how the construction of probability distributions can aid in the calculation of various probabilities. • Use the Normal Distribution and the Student's T Distribution – The normal distribution and the student's t distribution both have many practical real-world applications. Use of these distributions allows for the calculation of multiple probabilities. • Use Transformations to Normalize a Data Set – When a data set has a distinctly nonnormal shape, it is common to use a transformation of the data that produces a distribution of transformed values that is more closely approximated by a normal distribution. 	<p>in a scatterplot, and use transformations to achieve linearity.</p> <ul style="list-style-type: none"> • Explore categorical data using frequency tables, bar charts, and two-way tables. • Explore methods of data collection, including how to plan and conduct surveys and how to plan and conduct experiments. • Use probability and simulation to explore random phenomena. • Construct various probability distributions and their graphs including the binomial distribution and the geometric distribution. Use probability distributions to calculate various probabilities. • Understand the properties of the normal curve and use the standard normal distribution to calculate various probabilities. • Use the Student's t-distribution and the Chi-square distribution to calculate various probabilities. • Estimate population parameters with point estimates and confidence intervals. Interpret the meaning of a confidence interval. • Perform tests of significance (hypothesis tests) and state appropriate conclusions. • Calculate the probability of a type II error in a hypothesis test and the power of a test.
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<ul style="list-style-type: none"> • Describe and Use Sampling Distributions – Using samples to generate statistics allows for the construction of sampling distributions of sample statistics. These are powerful tools for predicting population parameters. • Construct Confidence Intervals– Using sample data, confidence intervals allow prediction of population parameters within a range of values with a specified level of confidence. • Perform Hypotheses Tests – Hypotheses tests are a powerful tool for making significant decisions based on sample data. 	
Learning Activities: <ul style="list-style-type: none"> • Warm Up Problems • Direct Instruction • Class Discussions • Collaboration Activities • Technology Activities • Guided Practice • Independent Practice 	Performance Tasks: <ul style="list-style-type: none"> • Quizzes • Unit Test • Unit Activities • Unit Projects
Other Assessment Measures: <ul style="list-style-type: none"> • Homework • Classwork • Presentations • AP exam 	
Textbook/Primary Resource: Peck, Short, Olsen. AP Edition Introduction to Statistics and Data Analysis Sixth Edition	
Supplemental Resource Materials: <ul style="list-style-type: none"> • District / Teacher Created Resources • Online Resources 	