



**Northern York County School District
Curriculum Overview**

Course: Academic Statistics	
Grade Level: 11 - 12	
Approval Date:	Length of Time: 180 days
Course Description: Academic Statistics is a year-long course designed to provide students with a basic knowledge of important statistical concepts and applications which are addressed in the Pennsylvania Core Standards for mathematics. This course is for students who have an interest in developing skills in statistics but are not interested in studying statistics at the Advanced Placement (AP) level. However, the course provides in-depth enough material to prepare students for introductory college courses in statistics or general math. This course will address topics in both descriptive and inferential statistics. Topics will include types of sampling, organizing data, measures of center and variation, correlation and regression, probability and probability distributions, sampling distributions, estimation, and confidence intervals.	
Prerequisite: Students must have an Algebra II grade of 77% or higher and a Geometry credit.	
Course Objectives: <ul style="list-style-type: none">• Use statistical terminology appropriately.• Construct and interpret various tables and 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 probability rules to calculate various probabilities.• Construct discrete probability distributions (including the binomial 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.• Describe the sampling distribution for various sample statistics.• Construct confidence intervals for population parameters.	
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.	

<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Getting Started • Organizing Data • Averages and Variation • Correlation and Regression • Elementary Probability Theory • The Binomial Probability Distribution and Related Topics • Normal Curves and Sampling Distributions • Estimation 	
Concepts: <ul style="list-style-type: none"> • Use Statistical Terminology – Appropriate use of statistical terminology is foundational to a clear understanding of methods used to analyze data. • 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 interpretation and analysis of data sets and probability outcomes. • 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 Regressions - The process of linear regression provides a means for assessing whether a linear relationship exists between two variables and can be used to 	Competencies: <ul style="list-style-type: none"> • Define, explain, and correctly use various statistical terms. • Distinguish between various sampling methods used to obtain a sample. • Use various graphical methods to display data and outcomes including frequency tables, histograms, ogives, bar graphs, pareto charts, circle graphs, time-series graphs, stem-and-leaf displays, box-and-whisker plots, scatter diagrams (scatter plots), Venn diagrams, tree diagrams and normal curves. • Calculate various parameters and statistics for a data set including the mean, median, mode, variance, standard deviation, first quartile, third quartile, interquartile range, sample proportion, trimmed mean, weighted average, the sample correlation coefficient, the coefficient of determination, the maximal margin of error, and z-scores. Explain or interpret their meaning.

<p>make predictions within the range of a data set.</p> <ul style="list-style-type: none"> • 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. Using a normal curve and standard normal curve to describe the distribution or using a student's t distribution allows for the calculation of multiple probabilities. • Describe and Use Sampling Distribution – 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. 	<ul style="list-style-type: none"> • Perform the process of linear regression. Describe the fit of the regression line to the data set. Explain the meaning of interpolation and extrapolation. Use linear regression to make predictions. • Find probabilities using the various rules for calculating probabilities. • Construct various probability distributions and their graphs, including the binomial distribution. Use probability distributions to calculate various probabilities. • Understand the properties of the normal curve and use the standard normal distribution and the student's t distribution to calculate various probabilities. • Use sampling distributions to calculate various probabilities. • Construct confidence intervals and interpret their meaning.
<p>Learning Activities:</p> <ul style="list-style-type: none"> • Warm Up Problems • Direct Instruction • Class Discussions • Collaboration Activities • Technology Activities • Guided Practice • Independent Practice 	<p>Performance Tasks:</p> <ul style="list-style-type: none"> • Quizzes • Unit Test • Unit Activities • Unit Projects
<p>Other Assessment Measures:</p> <ul style="list-style-type: none"> • Homework • Classwork • Presentations 	
<p>Textbook/Primary Resource: Brase, Brase, Dolor, Seibert – Understanding Basic Statistics, Ninth Edition</p>	

Supplemental Resource Materials:

- District / Teacher Created Resources
- Online Resources