Statistics

Course Description
This course is a full year college preparatory course focused on statistics concepts. The course teaches and requires students to demonstrate fluent understanding of concepts and procedures, reason abstractly and quantitatively, model with mathematics, solve problems, and analyze data. Students who successfully complete this course, will have mastered Statistics standards and will be ready to take college statistics. In alignment with the skills detailed in the **Portrait of the Crusader**, students practice solving problems with innovation and imagination, and they are taught to think critically about the synthesis of data and respond with defendable, original work.

Throughout the course, teachers strive to include varied assessments, including traditional quizzes and tests to measure skills; problem/solution/explanation opportunities where students solve a complex problem and communicate their reasoning; and real-world scenarios where students define the problem, develop a plan, and solve the problem, adjusting as necessary and communicating their reasoning.

Essential Questions
1. How do we represent patterns and operations using statistics?
2. How do we interpret and analyze real life situations using statistics?
3. How do we use technology to solve and/or visualize mathematical sentences?

Curriculum Framework:

FIrst Quarter:
Data Analysis
- Identify qualitative and quantitative numbers
- Define and identify populations vs. samples
- Calculate mean, median and mode
- Calculate quartiles
- Interpret and create pie charts, histograms, line graphs, and stem-and-leaf plots
- Evaluate and analyze data from the displays

Sampling & Surveys
- Recognize the different types of sampling methods
- Determine which sampling method to use in specific situations
- Determine what variable can affect data and justify choice

Variance and Standard Deviation
- Explain what standard deviation represents
- Calculate variance and standard deviation
- Identify the difference in calculations between populations and samples.

Density Curves
- Describe density curves
- Identify mean and median from the density curves
- Define and determine normal distribution
  - Empirical Rule
  - Properties of the Standard Normal Distribution
  - Calculating z-scores and z-lookups

Second Quarter:
Probability
- Explain the probability number line
- Understand the Law of Large Numbers
- Determine probabilities with cards & dice
- Describe probability events
- Calculate the complement of an event
- Determine probability intersections and unions
- Identify dependent and independent probability situations
- Identify mutually exclusive probability situations
- Apply the Multiplication Rule
- Determine permutations, combinations, and the fundamental counting principle
- Identify types of probability (Classical, Empirical, and Subjective)
- Construct tree diagrams

Correlation
- Identify response variables and explanatory variables
- Interpret and construct scatterplots
- Describe the strength of correlation
- Describe correlation based on scatter plots
- Calculate correlation
- Calculate least squares regression line (LSRL)
- Graph the LSRL

Discrete and Continuous Random Variables
- Apply probability distributions
- Identify a success and a failure
- Calculate expected value of a discrete random variable
- Define and identify binomial settings
- Determine binomial and geometric probability

Third Quarter:
Sampling Distributions
- Identify a statistic and parameter
- Write AP appropriate responses to sampling distributions
- Describe the shape, center, and variability of a sampling distribution
- Identify specific notation of variables for sampling distributions
- Explain the Central Limit Theorem

Confidence Intervals
- Identify and Interpret confidence intervals
- Describe and calculate the margin of error
- Identify & find critical values
- Use one sample z intervals for a population proportion
- Use one sample t intervals for a population mean
- Calculate the standard error
- Find the sample size for desired margin of error

Fourth Quarter:
Hypothesis Testing
- Identify and write the Null and Alternative Hypothesis
- Describe the tails (left, right and two) from the alternative hypothesis
- Describe and identify P-values
- Use significance values
- Identify when a Type I Error and Type II Error occurs
- Explain conditions for performing a significance test
- Calculate the standardized test statistic
- Determine when to reject or fail to reject the null hypothesis

Comparing Two Proportions/Means
- Use confidence intervals for two proportions
- Use two-sample z intervals for difference between two proportions
- Use two-sample t intervals for difference between two means
- Compare and analyze paired data

Chi-Square Tests
- Calculating the chi-square test statistic
- Find P-values for chi-square tests.
- Perform a Chi-Squared Goodness of Fit Test

Resources
- Stats Modeling The World 5th Edition AP Edition
- MyMathLab. (mymathlabforschool.com)
- Graphing Calculator (Necessary TI-84+)
- Desmos application (ISO/Android or web)

Grading Policy
- 20 % MyMathLab,
- 25% Quizzes
- 25% Student Work
- 30 % Tests