Department: Mathematics
Course Name: Advanced Placement Statistics

Course Description:
AP Statistics is a fast-paced, one-year study of college-level introductory statistics. This course introduces students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. Students are exposed to five broad conceptual themes: exploring and collecting data, probability, statistical inference, and regression analysis. An emphasis on critical thinking, complex communication, collaboration, creativity, and risk-taking will prepare students for rigorous college work. Students should possess the desire and willingness to understand the topics presented and should be willing to seek extra help and to spend extra time studying for thorough comprehension. In addition to the numerical nature of statistics, the course is also reading and writing intensive. A TI-84 graphing calculator is required. All students are required to take the Advanced Placement Statistics Examination.

Content:
Exploring One-Variable Data and Collecting Data
Probability, Random Variables, and Probability Distributions
Inference for Categorical Data: Proportions
Inference for Quantitative Data: Means
Regression Analysis

Skills:
Identify components within a statistical study
Determine an investigative question within a statistical study
Identify observational units, variables, parameters, and statistics from a statistical study or data set
Identify types of variables
Identify types of quantitative variables
Construct categorical one-variable tabular representations
Describe categorical one-variable tabular representations with summary statistics
Construct categorical one-variable graphical representations
Justify a claim using categorical one-variable graphical representations
Compare multiple categorical one-variable tabular and graphical representations
Construct quantitative one-variable graphical representations
Describe distributions of quantitative one-variable graphical representations
Justify a claim using distributions of quantitative one-variable graphical representations
Calculate measures of center and position for quantitative data
Calculate measures of variability for quantitative data
Calculate different units of measurement for summary statistics
Calculate outliers for quantitative data
Justify the selection of a summary statistic for describing quantitative data
Construct quantitative one-variable graphical representations of summary statistics
Describe quantitative one-variable graphical representations of summary statistics based on the relationship of the mean and the median
Compare multiple quantitative one-variable graphical representations
Compare multiple quantitative one-variable graphical representations of summary statistics
Justify a claim using multiple quantitative one-variable graphical representations
Calculate z-scores with population parameters
Compare z-scores as measures of relative position for distributions

Determine the components of an investigative question within a statistical study
Identify a census
Identify an experiment
Identify an observational study
Justify the appropriateness of generalizations for a statistical study
Identify a sampling method given a description of a study
Justify the appropriateness of a sampling method
Identify potential sources of bias in sampling methods
Identify elements of a well-designed experiment
Identify experimental designs
Justify the appropriateness of a particular experimental design
Justify the appropriateness of the conclusions based on a well-designed experiment
Compare tabular and graphical representations for the relationship between two categorical variables
Justify a claim using tabular and graphical representations for the distributions of two categorical variables
Calculate summary statistics from two-way tables.
Compare summary statistics for two categorical variables
Justify a claim using summary statistics for two categorical variables
Estimate probabilities using simulations
Calculate probabilities for events and their complements
Justify why two events are mutually exclusive (or disjoint) using joint probability
Calculate conditional probabilities
Calculate probabilities for independent events and for the union of two events
Construct a probability distribution for a discrete random variable
Calculate the parameter, mean, and standard deviation for a discrete random variable
Interpret the parameter, mean, and standard deviation for a discrete random variable
Justify why a random variable is or is not a binomial random variable
Calculate the mean and standard deviation for a binomial distribution
Interpret the mean, standard deviation, and probabilities for a binomial distribution
Estimate probabilities of binomial random variables using data from a simulation
Calculate probabilities for a binomial distribution
Describe the standard normal distribution
Calculate the mean and standard deviation for a normal distribution
Calculate percentages from a normal distribution using the empirical rule
Calculate the probability that a particular value lies within a given interval of a normal distribution
Calculate the associated intervals and areas of a normal distribution
Compare measures of relative position for distributions
Describe sampling distributions with simulations
Justify why an estimator is or is not unbiased
Calculate estimates for a population parameter
Calculate the mean and standard deviation of a sampling distribution for a sample proportion
Justify the appropriateness of conditions for the sampling distribution of a sample proportion
Interpret the mean, standard deviation, and probabilities for a sampling distribution of a sample proportion
Identify an appropriate confidence interval procedure including the parameter for a population proportion
Justify the appropriateness of constructing a confidence interval for a population proportion by verifying conditions
Calculate an appropriate confidence interval for a population proportion
Calculate the standard error and margin of error of a sample statistic for a confidence interval for a

population proportion, and estimate a given sample size from the margin of error
Interpret a confidence interval in context for a population proportion
Justify a claim based on a confidence interval for a population proportion
Identify the relationships among sample size, confidence interval width, confidence level, and margin of error for a population proportion
Identify an appropriate testing method for a population proportion including the parameter for the population proportion
Identify the null and alternative hypotheses for a population proportion
Justify the appropriateness of a hypothesis test for a population proportion by verifying conditions
Interpret the p-value of a hypothesis test for a population proportion
Calculate an appropriate test statistic and p-value for testing a hypothesis about a population proportion
Justify a claim about the population based on the results of a hypothesis test for a population proportion
Identify Type I and Type II errors
Calculate the probability of Type I and Type II errors
Identify the factors that affect the probability of errors in hypothesis testing
Interpret Type I and Type II errors
Calculate the mean and standard deviation of the sampling distribution for the difference between two sample proportions
Justify the appropriateness of conditions for the sampling distribution for the difference between two sample proportions
Interpret the mean, standard deviation, and probabilities for the sampling distribution for the difference between two sample proportions
Identify an appropriate confidence interval procedure including the parameters for the difference between two population proportions
Justify the appropriateness of constructing a confidence interval for the difference between two population proportions by verifying conditions
Calculate an appropriate confidence interval for the difference between two population proportions
Calculate the standard error and margin of error for estimating the difference between two population proportions
Interpret a confidence interval in context for the difference between two population proportions
Justify a claim based on a confidence interval for the difference between two population proportions
Identify an appropriate testing method for the difference between population proportions including the parameters
Identify the null and alternative hypotheses for the difference between population proportions
Justify the appropriateness of a hypothesis test for the difference between two population proportions by verifying conditions
Calculate an appropriate test statistic and p-valuefor testing a hypothesis for the difference between two population proportions
Interpret the p-value of a hypothesis test for the difference between two population proportions
Justify a claim about the populations based on the results of a hypothesis test for the difference between two population proportions
Describe chi-square distributions
Identify an appropriate testing method for comparing distributions in two-way tables of categorical data including the populations and variables
Identify the null and alternative hypotheses for a chi-square test for homogeneity or independence
Justify the appropriateness of a hypothesis test for a chi-square distribution for independence or homogeneity by verifying conditions
Calculate expected counts for two-way tables of categorical data
Calculate the appropriate test statistic and p-value for a chi-square test for homogeneity or

independence
Interpret the p-value for the chi-square test for homogeneity or independence
Justify a claim about the population based on the results of a chi-square test for homogeneity or independence
Calculate the mean and standard deviation of a sampling distribution of a sample mean
Justify the appropriateness of conditions for the sampling distribution of a sample mean
Interpret the mean, standard deviation, and probabilities for the sampling distribution of a sample mean
Describe t-distributions
Identify an appropriate confidence interval procedure including the parameter for a population mean or population mean difference
Justify the appropriateness of constructing a confidence interval for a population mean or population mean difference by verifying conditions
Calculate an appropriate confidence interval for a population mean or population mean difference
Calculate the standard error and margin of error for a sample size for a one-sample t-interval
Interpret a confidence interval in context for a population mean or population mean difference
Justify a claim based on a confidence interval for a population mean or population mean difference
Identify the relationships among sample size, confidence interval width, confidence level, and margin of error for a population mean or population mean difference
Identify an appropriate testing method and parameter for a population mean or population mean difference with unknown σ
Identify the null and alternative hypotheses for a population mean or population mean difference with unknown σ
Justify the appropriateness of a hypothesis test for a population mean or population mean difference by verifying conditions
Calculate an appropriate test statistic and p-value for testing a hypothesis about a population mean or population mean difference
Interpret the p-value of a hypothesis test for a population mean or population mean difference
Justify a claim about the population based on the results of a hypothesis test for a population mean or population mean difference
Calculate the mean and standard deviation of a sampling distribution for the difference between two sample means
Justify the appropriateness of conditions for the sampling distribution of the difference between two sample means
Identify an appropriate confidence interval procedure including the parameter for the difference between two population means
Justify the appropriateness of constructing a confidence interval for the difference between two population means by verifying conditions
Calculate an appropriate confidence interval for the difference between two population means
Calculate the standard error and margin of error for estimating the difference between two population means
Interpret a confidence interval in context for the difference between two population means
Justify a claim based on a confidence interval for the difference between two population means
Identify an appropriate testing method for the difference between two population means including the parameters for the difference between the two population means
Identify the null and alternative hypotheses for the difference between two population means
Justify the appropriateness of a hypothesis test for the difference between two population means by verifying conditions
Calculate an appropriate test statistic and p-valuefor testing a hypothesis for the difference between two population means
Interpret the p-value of a hypothesis test for the difference between two population means

Justify a claim about the populations based on the results of a hypothesis test for the difference between two population means
Construct scatterplots depicting the relationship between two quantitative variables
Describe the characteristics of a scatterplot
Justify a claim using scatterplots depicting the distribution of two quantitative variables
Interpret the correlation for a linear relationship
Calculate a predicted response value using a linear regression model
Calculate the differences between the observed and predicted values
Interpret the differences between the observed and predicted values
Describe the form of association of bivariate data using residual plots
Calculate the coefficients for the least-squares regression line mode
Interpret coefficients for the least-squares regression line model

Text and Materials:
MathMedic AP Statistics Curriculum
Statistics in Action: Understanding a World of Data 2nd Edition by Watkins, Scheaffer & Cobb Key Curriculum Press 2008

Methods of Instruction:
Group Projects and Activities
Lecture
Experiments
Surveys
EFFL format
Desmos
Khan Academy
AP Classroom

Methods of Evaluation:
Assessments
Practice Problems
Khan Academy
AP Classroom
Projects
Informal questioning
Observation