COURSE SYLLABUS

AP STATISTICS
TIMES² STEM ACADEMY
INSTRUCTOR: Mrs. Childress
2017-2018

EMAIL:	nchildress@times2.org
ROOM:	202
OFFICE HOURS:	TBD

COURSE DESCRIPTION/OVERVIEW:

AP Statistics is designed to provide students with the opportunity to study and learn material that would be equivalent to a college level statistics course. The purpose of this course is to introduce students to the major concepts and tools for collecting, organizing, analyzing, and drawing conclusions from data. This course fulfills the requirements of the College Board Advanced Placement Course in Mathematic for AP Statistics.

As outlined by the College Board, students are exposed to four broad conceptual themes:

1. Exploring Data: Describing patterns and departures from patterns
2. Sampling and Experimentation: Planning and conducting a study
3. Anticipating Patterns: Exploring random phenomena using probability and simulation
4. Statistical Inference: Estimating population parameters and testing hypotheses

Upon successful completion of the course, students will be expected to:

- Produce convincing oral and written statistical arguments, using appropriate terminology, in a variety of applied settings;
- Use various techniques for producing data through surveys, experiments, and simulations;
- Analyze data using graphical and numerical summaries;
- Model data using probability, random variables, and sampling distributions;
- Draw conclusions from data using confidence intervals and significance tests;
- Use technology to aid in solving statistical problems.

TEXTBOOK/MATERIAL:

Text: Elementary Statistics: Picturing the World 6th Edition, Larson and Farber, 2015, Pearson
Handbook: AP Statistics Workshop Handbook 2015, the College Board

TECHNOLOGY:

Graphics Calculator (TI-84 or TI-83+)
Minitab
Numerous websites including, but not limited to:

http://apcentral.collegeboard.com
https://www.learner.org/courses/againstallodds/
http://stattrek.com/tutorials/ap-statistics-tutorial.aspx

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COURSE REQUIREMENTS:

Students are required to have successfully completed Geometry and Algebra II.

As this is a college level course, students are expected to be academically mature and strictly follow the guidelines in the student handbook.

Students are required to keep a notebook/binder which should include all class notes, examples, handouts, and all assignments. Students should know how to use a graphing calculator. Students are responsible for all assignments, tests, quizzes, group activities, projects and performance assessments. Make up procedures outlined below will be strictly enforced. Students in this class are strongly advised to be present for all classes.

In class, as students participate in class discussions and make presentations in order to meet course learning targets, students will work independently, collaboratively, and as an entire class. Students will need to be able to explain concepts mathematically, as well as demonstrate understanding of the fundamental concepts of statistics, through homework problems, in class activities, tests, and extended projects. These projects will allow students to demonstrate and integrate understanding of all aspects of the statistical process and vocabulary. Review of practice AP problems throughout the year will help assess student progress and provide a means to prepare for the AP Exam. Students will take at least one practice AP Statistics exam and correct it; this is another means by which students will prepare for the AP Exam and understand the scoring process.

HOMEWORK:

Homework is a major component of this class. When doing homework, it is best to focus on the process of getting the answer more than just getting the answer. Please seek extra help as soon as it is needed. Forming study groups that meet regularly is strongly encouraged.

Homework will not be collected unless stated beforehand. Therefore, it is imperative for students to check answers as will be discussed on the first day of class.

Make-Up Work – due to absences:
It is the student's responsibility to acquire and make up any missing work within three days of an absence. Tests and quizzes are to be made up the day of return to class with a written excuse. Assignments due to no completion will receive a grade of zero.

GRADING POLICY:

- Homework 25% (Includes classwork.)
- Quizzes 25%
- Tests 40%
- Projects 10%
- Exams (Midterm and Final) 20% (grades listed above count as 80% of overall grade)

(Q1 = 20%) + (Q2 = 20%) + (Q3 = 20%) + (Q4 = 20%) +(Mid-Term Exam = 10%) + (Final Exam = 10%) = 100

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TENTATIVE COURSE CALENDAR (Organized by units in textbook.)

DATE	SECTION	TOPIC(S)
Q1 (45 days)		
	UNIT 1	DESCRIPTIVE STATISTICS
9/5 1 day		Introduction/Collect Summer Math Packet/Pass out textbooks
9/6 – 9/15 8 days	Chapter 1: Introduction to Statistics 1.1 An Overview of Statistics 1.2 Data Classification 1.3 Data Collection and Experimental Design	Student will be able to: • Distinguish between a population and a sample. • Distinguish between a parameter and a statistic. • Distinguish between descriptive and inferential statistics. • Distinguish between qualitative data and quantitative data. • Classify data with respect to the four levels of measurement: nominal, ordinal, interval, and ratio. • Design a statistical study and how to distinguish between an observational study and an experiment. • Design an experiment. • Create a sample using random sampling, simple random sampling, stratified sampling, cluster sampling, and systematic sampling and how to identify a biased sample.
9/18 – 10/5 12 days	Chapter 2: Descriptive Statistics 2.1 Frequency Distributions and Their Graphs 2.2 More Graphs and Displays 2.3 Measures of Central Tendency 2.4 Measures of Variation 2.5 Measures of Position	Students will be able to: • Construct a frequency distribution, frequency .histograms, frequency polygons, relative frequency histograms, and ogives. • Graph and interpret quantitative sets using stem-and-leaf plots and dot plots. • Graph and interpret qualitative data sets using pie charts and Pareto charts. • Graph and interpret paired data sets using scatter plots and time series charts. • Find the mean, median, and mode of a population and of a sample. • Find a weighted mean of a data set and the mean of a frequency distribution. • Describe the shape of a distribution as symmetric, uniform, or skewed, and how to compare the mean and median for each. • Find the range of a data set and variance and standard deviation of a population and a sample. • Use the Empirical Rule and Chebychev' s Theorem to interpret standard deviation. • Approximate the sample standard deviation for grouped data. • Approximate the sample standard deviation for grouped data.

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		• Use the coefficient of variation to compare variation in different data sets. • Represent a data set graphically using a box-and-whisker plot. • Interpret percentiles and find percentiles for a specific data entry. • Find and interpret the standard score 9Z-SCORE)
10/6 – 10/13 5 days	**Review**	**Unit 1 Test**
	UNIT 2	**PROBABILITY AND PROBABILITY DISTRIBUTIONS**
10/16 – 10/27 10 days	**Chapter 3: Probability** **3.1** Basic Concepts of Probability and Counting **3.2** Conditional Probability and the Multiplication Rule **3.3** The Addition Rule **3.4** Additional Topics in Probability and Counting	**Students will be able to:** • Identify the sample space of a probability experiment and how to identify simple events. • Use the Fundamental Counting Principle to find the number of ways two or more events can occur. • Distinguish among classical probability, empirical probability, and subjective probability. • Find the probability of the complement of an event and how to use the Fundamental Counting Principle to find probabilities. • Find the probability of an event given that another event has occurred. • Distinguish between independent and dependent events. • Use the Multiplication Rule to find the probability of two or more events occurring in sequence and to find conditional probabilities. • Determine whether two events are mutually exclusive • Use the Addition Rule to find the probability of two events. • Find the number of ways a group of objects can be arranged in order and the number of ways to choose several from a group without regard to order. • Use the counting principles to find probabilities.
10/30 – 11/9 9 days	**Chapter 4: Discrete Probability Distributions** **4.1** Probability Distributions **4.2** Binomial Distributions **4.3** More Discrete Probability Distributions	**Students will be able to:** • Distinguish between discrete and continuous random variables. • Construct and graph a discrete probability distribution. • Determine whether a distribution is a probability distribution. • Find the mean, median, variance, and standard deviation of a discrete probability distribution. • Find the expected value of a discrete probability distribution. • Determine whether a probability experiment is a binomial experiment. • Find binomial probabilities using the binomial probability formula, a binomial probability table, and

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		technology. • Construct and graph a binomial distribution. • Find the mean, variance, and standard deviation of a binomial probability distribution. • Find probabilities using the geometric distribution. • Find probabilities using the Poisson distribution.
Q2 44 days		
11/13 – 11/29 11 days	**Chapter 5: Normal Probability Distributions** **5.1** Introduction to Norma Distributions and the Standard Normal Distribution **5.2** Normal Distributions: Finding Probabilities **5.3** Normal Distributions: Finding Values **5.4** Sampling Distributions and the Central Limit Theorem **5.5** Normal Approximations to Binomial Distributions	**Students will be able to:** • Interpret graphs of normal probability distributions. • Find the area under a standard normal curve. • Find probabilities for normally distributed variables using a table and using technology. • Find a z-score given the area under the normal curve. • Transform a z-score to an z-value • Find a specific data value of a normal distribution given the probability. • Find sampling distributions and verify their properties. • Interpret the Central Limit Theorem. • Apply the Central Limit Theorem to find the probability of a sample mean. • Determine when a normal distribution can approximate a binomial distribution. • Find the continuity correction. • Use a normal distribution to approximate binomial probabilities.
11/30 – 12/6 5 days	**Review**	**Unit 2 Test**
12/7 – 12/13 5 days	**Review**	**Mid-Term Exam:** Units 1 and 2
	Unit 3	**STATISTICAL INFERENCE**
12/14 – 1/9 11 days	**Chapter 6: Confidence Intervals** **6.1** Confidence Intervals for the Mean (σ Known) **6.2** Confidence Intervals for the Mean (σ Unknown) **6.3** Confidence Intervals for Population Proportions **6.4** Confidence Intervals for Variance and Standard Deviation	**Students will be able to:** • Find a point estimate and a margin of error. • Construct and interpret confidence intervals for a population mean when σ is known. • Determine the minimum sample size required when estimating a population mean. • Interpret the t-distribution and use a t-distribution table. • Construct and interpret confidence intervals for a population mean when σ is not known. • Find a point estimate for a population proportion. • Construct and interpret confidence intervals for a population proportion. • Determine the minimum sample size required when estimating a population proportion. • Interpret the chi-square distribution and use a chi-

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		square distribution table. • Construct and interpret confidence intervals for a population variance and standard deviation.
1/10 – 1/26 12 days	**Chapter 7: Hypothesis Testing with One Sample** **7.1** Introduction to Hypothesis Testing **7.2** Hypothesis Testing for the Mean (σ Known) **7.3** Hypothesis Testing for the Mean (σ Unknown) **7.4** Hypothesis Testing for Proportions **7.5** Hypothesis Testing for Variance and Standard Deviation	**Students will be able to:** • State a null hypothesis and an alternative hypothesis. • Identify type I and type II errors. • Know whether to use a one-tailed or a two-tailed statistical test. • Interpret a decision based on the results of a statistical test. • Find and interpret P-values. • Use P-values for a z-test for a mean μ when σ is not known. • Use technology to find P-values and use them with a t-test to test a mean μ when σ is not known. • Use the z-test to test a population proportion p. • Find critical values for a chi-square test. • Use the chi-square test to test a variance σ^2 or a standard deviation σ.
Q3 47 days		
1/29 – 2/9 10 days	**Chapter 8: Hypothesis Testing with Two Samples** **8.1** Testing the Difference Between Means (Independent Samples, σ_1 and σ_2 Known) **8.2** Testing the Difference Between Means (Independent Samples, σ_1 and σ_2 Unknown) **8.3** Testing the Difference Between Means (Dependent Samples) **8.4** Testing the Difference Between Proportions	**Students will be able to:** • Determine whether two samples are independent or dependent. • Perform a two-sample z-test for the difference between two means μ_1 and μ_2 using independent samples with σ_1 and σ_2 known. • Perform a two-sample t-test for the difference between two means μ_1 and μ_2 using independent samples with σ_1 and σ_2 unknown. • Perform a t-test to test the mean of the differences for a population of paired data. • Perform a two-sample z-test for the difference between tow population proportions p_1 and p_2.
2/12 – 2/16 5 days	**Review**	**Unit 3 Test**
	Unit 4	**MORE STATISTICAL INFERENCE**
2/21 – 3/7 11 days	**Chapter 9: Correlation and Regression** **9.1** Correlation **9.2** Linear Regression **9.3** Measures of Regression and Prediction Intervals **9.4** Multiple Regression	**Students will be able to:** • Construct a scatter plot and how to find a correlation coefficient. • Test a population correlation coefficient ρ using a table and how to perform a hypothesis test for a population correlation coefficient ρ. • Find the equation of a regression line. • Predict y-values using a regression equation. • Find and interpret the coefficient of determination. • Find and interpret the standard error of estimate for a

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		regression line. • Construct and interpret a prediction interval for y. • Use technology to find and interpret a multiple regression equation, the standard error of estimate, and the coefficient of determination. • Use a multiple regression equation to predict y-values.
3/9 – 3/22 11 days	**Chapter 10: Chi-Square Tests and the F-Distribution** **10.1** Goodness-of-Fit Test **10.2** Independence **10.3** Comparing Two Variances **10.4** Analysis of Variance	**Students will be able to:** • Use the chi-square distribution to test whether a frequency distribution fits an expected distribution. • Use a contingency table to find expected frequencies. • Use a chi-square distribution to test whether two variables are independent. • Interpret the F-distribution and use an F-table to find critical values. • Perform a two-sample F-test to compare two variances. • Use one-way analysis of variance to test claims involving three or more means.
3/23 – 3/29 5 days	**Review**	**Unit 4 Exam**
4/2 – 4/6 5 days	**Review**	**Final Exam:** Units 3 and 4
Q4 44 days		
4/9 – 5/16 23 days	Final Project and Practice	Final Project Practice for AP Exam
May 17, 2018	12:00pm	AP Exam
5/18 – 6/8 15 days	Projects	Smaller Projects
6/11 – 6/15 5 days	TBD	End of Year