**COURSE DESCRIPTION**

**Course Title:** Statistics

**Course Number:** 00282

**Course Prerequisites:** Completion of Algebra 1 CP, Algebra 2 CP, and Geometry CP with an average of 75%.

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| **Course Description:** | This is an introductory statistics course and covers methods of summarizing data, descriptive statistics, probability and probability distributions, sampling distributions, the central limit theorem, hypothesis testing, analysis of variance, and regression analysis. |

**Suggested Grade Level**: Grades 11-12

**Length of Course:** Two Semesters

**Units of Credit:** 1

**PDE Certification and Staffing Policies and Guidelines (CSPG) Required Teacher Certifications:**

CSPG #50 Mathematics

To find the CSPG information, go to [CSPG](https://www.education.pa.gov/Educators/Certification/Staffing%20Guidelines/Pages/default.aspx)

**Certification verified by the WCSD Human Resources Department:** Yes No

**WCSD STUDENT DATA SYSTEM INFORMATION**

**Course Level:** Academic

**Mark Types:** Check all that apply.

F – Final Average MP – Marking Period EXM – Final Exam

**GPA Type**:  GPAEL-GPA Elementary  GPAML-GPA for Middle Level  NHS-National Honor Society

UGPA-Non-Weighted Grade Point Average  GPA-Weighted Grade Point Average

**State Course Code**: 02205

To find the State Course Code, go to [State Course Code](https://nces.ed.gov/forum/sced.asp), download the Excel file for *SCED*, click on SCED 6.0 tab, and chose the correct code that corresponds with the course.

**TEXTBOOKS AND SUPPLEMENTAL MATERIALS**

**Board Approved Textbooks, Software, and Materials:**

**Title:**  Elementary Statistics-Picturing the World, 7th edition

**Publisher:** Pearson

**ISBN #:**  978-0-13-468341-6

**Copyright Date:** 2019

**WCSD Board Approval Date:** 6/29/2020

**Supplemental Materials:** Click or tap here to enter text.

**Curriculum Document**

**WCSD Board Approval:**

**Date Finalized:** 6/5/2020

**Date Approved:**  6/29/2020

**Implementation Year:** 2020-2021

**SPECIAL EDUCATION, 504, and GIFTED REQUIREMENTS**

The teacher shall make appropriate modifications to instruction and assessment based on a student’s Individual Education Plan (IEP), Chapter 15 Section 504 Plan (504), and/or Gifted Individual Education Plan (GIEP).

**SCOPE AND SEQUENCE OF CONTENT, CONCEPTS, AND SKILLS**

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| --- | --- | --- |
| **Performance Indicator** | **PA Core Standard and/or Eligible Content** | **Month Taught and Assessed for Mastery** |
| Define statistics | S-IC.1., S-IC.2, S-IC.3 | September  Choose an item. |
| Distinguish between population and a sample between parameter and a statistics | S-IC.1., S-IC.2, S-IC.3 | September  Choose an item. |
| Distinguish between descriptive statistics and inferential statistics | S-IC.1., S-IC.2, S-IC.3 | September  Choose an item. |
| Distinguish between qualitative data and quantitative data | S-IC.1., S-IC.2, S-IC.3 | September  Choose an item. |
| Classify data with respect to four levels of measurement: nominal, ordinal, interval, and ratio. | S-IC.1., S-IC.2, S-IC.3 | September  Choose an item. |
| Design a statistical study and how to distinguish between an observational study and an experiment | S-IC.1., S-IC.2, S-IC.3 | September  Choose an item. |
| Collect data by using a survey or a simulation | S-IC.1., S-IC.2, S-IC.3 | September  Choose an item. |
| Design an experiment | S-IC.1., S-IC.2, S-IC.3 | September  Choose an item. |
| Create a sample using random sampling, simple random sampling, stratified sampling, cluster sampling, and systematic sampling and how to identify a biased sample | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Construct a frequency distribution including limits, midpoints, relative frequencies, cumulative frequencies and boundaries | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Construct frequency histograms, frequency polygons, relative frequency histograms, and ogives | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Graph and interpret quantitative data sets using stem-and-leaf plots and dot plots | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Graph and interpret qualitative data sets using pie charts and Pareto charts | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Graph and interpret paired data sets using scatter plots and time series charts | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Find the mean, median, and mode of a population of a sample. | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Find a weighted mean of a data set, and how to estimate the sample of mean grouped data | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Describe the shape of a distribution as symmetric, uniform, or skewed and how to compare the mean and median for each | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Find the range of a data set, and how to find the variance and standard deviation of a population of a sample | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Use the Empirical Rule and Chebyshev’s Theorem to interpret standard deviation | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Estimate the sample standard deviation for grouped data | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Find the first, second and third quartiles of a data set, how to find the interquartile range of a data set, and how to represent a data set graphically using a box-and-whisker plot | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Interpret other fractals such as percentiles and how to find percentiles for a specific data entry | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Find and interpret the standard score (z score) | S-IC.4, S-IC.6, S-ID.2, S-ID.3, S-ID.5, S-ID.6 | September  October |
| Identify the sample space of a probability experiment and how to identify simple events | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | October  November |
| Use the Fundamental Counting Principle to find the number of ways two or more events can occur | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | October  November |
| Distinguish among classical probability, empirical probability and subjective probability | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | October  November |
| Find the probability of the complement of an event and how to use a tree diagram and the Fundamental Counting Principle to find probabilities | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | October  November |
| Find the probability of an event given that another event has occurred | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | October  November |
| Distinguish between independent and dependent events | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | October  November |
| Use the Multiplication Rule to find the probability of two or more events occurring in sequence and to find conditional probabilities | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | October  November |
| Determine whether two events are mutually exclusive | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | October  November |
| Use the Addition Rule to find the probability of two events | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | October  November |
| Find the number of ways a group of objects can be arranged in order and the number of ways to choose several objects from a group without regard to order | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | October  November |
| Use counting principles to find probabilities | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | October  November |
| Distinguish between discrete random variables and continuous random variables | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | November  December |
| Construct and graph a discrete probability distribution | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | November  December |
| Determine whether a distribution is a probability distribution | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | November  December |
| Find the mean, variance, and standard deviation of a discrete probability distribution | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | November  December |
| Find the expected value of a discrete probability distribution | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | November  December |
| Determine whether a probability experiment is a binomial experiment | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | November  December |
| Find binomial probability experiment is a binomial experiment | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | November  December |
| Find the binomial probabilities using the binomial probability formula, a binomial probability table and technology | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | November  December |
| Construct and graph a binomial distribution | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | November  December |
| Find the mean, variance and standard deviation of a binomial probability distribution | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | November  December |
| Find the probabilities using geometric distribution | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | November  December |
| Find the probabilities using Poisson distribution | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | November  December |
| Interpret graphs of normal probability distributions | S-ID.4 | January  February |
| Find areas under the standard normal curve | S-ID.4 | January  February |
| Find probabilities for normally distributed variables using a table and technology | S-ID.4 | January  February |
| Find a z score given the area under the normal curve | S-ID.4 | January  February |
| Transform a z score to an x value | S-ID.4 | January  February |
| Find a specific data value of a normal distribution given the probability | S-ID.4 | January  February |
| Find sampling distributions and verify their properties | S-ID.4 | January  February |
| How to interpret the Central Limit Theorem | S-ID.4 | January  February |
| Apply the Central Limit Theorem | S-ID.4 | January  February |
| Determine when a normal distribution can approximate a binomial distribution | S-ID.4 | January  February |
| Find the continuity correction | S-ID.4 | January  February |
| Use a normal distribution to approximate binomial probabilities | S-ID.4 | January  February |
| Find a point estimate and margin of error | S-IC.1, S-IC.4 | February  March |
| Construct an interpret confidence intervals for a population mean when standard deviation is known | S-IC.1, S-IC.4 | February  March |
| Determine the minimum sample size requirement when estimating a population mean | S-IC.1, S-IC.4 | February  March |
| Interpret the t distribution and use a t distribution table | S-IC.1, S-IC.4 | February  March |
| Construct and interpret confidence intervals for population mean when standard deviation is not known | S-IC.1, S-IC.4 | February  March |
| Find a point estimate for a population proportion | S-IC.1, S-IC.4 | February  March |
| Construct and interpret confidence intervals for a population proportion | S-IC.1, S-IC.4 | February  March |
| Determine the minimum sample size required when estimating a population proportion | S-IC.1, S-IC.4 | February  March |
| Interpret the chi-square distribution and use a chi-square distribution table | S-IC.1, S-IC.4 | February  March |
| Construct interpret confidence intervals for population variance and standard deviation | S-IC.1, S-IC.4 | February  March |
| State a null hypothesis and alternative hypothesis | S-IC.5, S-IC.6, S-IC.4 | March  April |
| Identify type I and type II errors | S-IC.5, S-IC.6, S-IC.4 | March  April |
| Know whether to use a one-tailed or a two tailed statistical test and find a P-value | S-IC.5, S-IC.6, S-IC.4 | March  April |
| Use P values for a z test for a mean when standard deviation is known | S-IC.5, S-IC.6, S-IC.4 | March  April |
| Find critical values and rejection and rejection regions in the standard normal distribution | S-IC.5, S-IC.6, S-IC.4 | March  April |
| Use rejection regions for a z test for a mean when standard deviation is known | S-IC.5, S-IC.6, S-IC.4 | March  April |
| Find critical values in a t distribution | S-IC.5, S-IC.6, S-IC.4 | March  April |
| Use the t test to test a mean when standard deviation is not known | S-IC.5, S-IC.6, S-IC.4 | March  April |
| Use technology to find P values and use them with a t test to test a mean when standard deviation is not known | S-IC.5, S-IC.6, S-IC.4 | March  April |
| Use the z test to test a population proportion p | S-IC.5, S-IC.6, S-IC.4 | March  April |
| Find the critical values of a chi-square test | S-IC.5, S-IC.6, S-IC.4 | March  April |
| Use the chi-square test to test a variance or a standard deviation | S-IC.5, S-IC.6, S-IC.4 | March  April |
| Determine whether two samples are independent or dependent | S-IC.3, S-IC.4, S-IC.5 | April  May |
| Perform a two-sample z-test for the difference between two means and using independent samples with standard deviations known | S-IC.3, S-IC.4, S-IC.5 | April  May |
| Perform a two-sample t-test for the difference between two means and using independent samples with standard deviations unknown | S-IC.3, S-IC.4, S-IC.5 | April  May |
| Perform a t-test to test the mean of the differences for a population of paired data | S-IC.3, S-IC.4, S-IC.5 | April  May |
| Perform a two-sample z-test for the difference between two population proportions. | S-IC.3, S-IC.4, S-IC.5 | April  May |
| Construct a scatter plot and find a correlation coefficient | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | May  Choose an item. |
| Test a population correlation coefficient using a table and perform a hypothesis test for a population correlation coefficient | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | May  Choose an item. |
| Find the equation of a regression line | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | May  Choose an item. |
| Predict y-values using the regression equation | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | May  Choose an item. |
| Find and interpret the coefficient of determination | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | May  Choose an item. |
| Find and interpret the standard of error of estimate for a regression line | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | May  Choose an item. |
| Construct and interpret a prediction interval for y | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | May  Choose an item. |
| Use technology to find and interpret a multiple regression equation, the standard error of estimate and the coefficient of determination | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | May  Choose an item. |
| Use a multiple regression equation to predict y-values | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | May  Choose an item. |

**ASSESSMENTS**

**PSSA Academic Standards, Assessment Anchors, and Eligible Content:** The teacher must be knowledgeable of the PDE Academic Standards, Assessment Anchors, and Eligible Content and incorporate them regularly into planned instruction.

**Formative Assessments:** The teacher will utilize a variety of assessment methods to conduct in-process evaluations of student learning.

**Effective formative assessments for this course include:** Suggested but not limited to: bell ringers, cooperative learning, exit tickets, observations, written work, oral response, self-evaluation homework, projects, and quizzes.

**Summative Assessments:** The teacher will utilize a variety of assessment methods to evaluate student learning at the end of an instructional task, lesson, and/or unit.

**Effective summative assessments for this course include:** Suggested but not limited to: Performance assessments, unit tests, chapter tests and projects.