**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:** [x] Yes [ ] No

**WCSD STUDENT DATA SYSTEM INFORMATION**

**Course Level:** Academic

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

[x] F – Final Average [x] MP – Marking Period [x] EXM – Final Exam

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

[x]  UGPA-Non-Weighted Grade Point Average [x]  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 | SeptemberChoose an item. |
| Distinguish between population and a sample between parameter and a statistics | S-IC.1., S-IC.2, S-IC.3 | SeptemberChoose an item. |
| Distinguish between descriptive statistics and inferential statistics | S-IC.1., S-IC.2, S-IC.3 | SeptemberChoose an item. |
| Distinguish between qualitative data and quantitative data | S-IC.1., S-IC.2, S-IC.3 | SeptemberChoose 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 | SeptemberChoose 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 | SeptemberChoose an item. |
| Collect data by using a survey or a simulation | S-IC.1., S-IC.2, S-IC.3 | SeptemberChoose an item. |
| Design an experiment | S-IC.1., S-IC.2, S-IC.3 | SeptemberChoose 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | SeptemberOctober |
| 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 | OctoberNovember |
| 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 | OctoberNovember |
| 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 | OctoberNovember |
| 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 | OctoberNovember |
| 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 | OctoberNovember |
| Distinguish between independent and dependent events | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | OctoberNovember |
| 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 | OctoberNovember |
| 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 | OctoberNovember |
|  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 | OctoberNovember |
| 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 | OctoberNovember |
| Use counting principles to find probabilities | S-CP.0 , S-CP.5, S-CP.6, S-CP.7, S-CP.8, S-MD.5a | OctoberNovember |
| 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 | NovemberDecember |
| 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 | NovemberDecember |
| 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 | NovemberDecember |
| 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 | NovemberDecember |
| 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 | NovemberDecember |
| 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 | NovemberDecember |
| 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 | NovemberDecember |
| 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 | NovemberDecember |
| Construct and graph a binomial distribution | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | NovemberDecember |
| 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 | NovemberDecember |
| Find the probabilities using geometric distribution | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | NovemberDecember |
| Find the probabilities using Poisson distribution | S-CP.2, S-CP.3, S-CP.4, S-MD.6, S-MD.7, S-MD.5b | NovemberDecember |
| Interpret graphs of normal probability distributions | S-ID.4  | JanuaryFebruary |
| Find areas under the standard normal curve | S-ID.4  | JanuaryFebruary |
| Find probabilities for normally distributed variables using a table and technology | S-ID.4  | JanuaryFebruary |
| Find a z score given the area under the normal curve | S-ID.4  | JanuaryFebruary |
| Transform a z score to an x value  | S-ID.4  | JanuaryFebruary |
| Find a specific data value of a normal distribution given the probability | S-ID.4  | JanuaryFebruary |
| Find sampling distributions and verify their properties  | S-ID.4  | JanuaryFebruary |
| How to interpret the Central Limit Theorem | S-ID.4  | JanuaryFebruary |
| Apply the Central Limit Theorem | S-ID.4  | JanuaryFebruary |
| Determine when a normal distribution can approximate a binomial distribution | S-ID.4  | JanuaryFebruary |
| Find the continuity correction | S-ID.4  | JanuaryFebruary |
| Use a normal distribution to approximate binomial probabilities | S-ID.4  | JanuaryFebruary |
| Find a point estimate and margin of error | S-IC.1, S-IC.4 | FebruaryMarch |
| Construct an interpret confidence intervals for a population mean when standard deviation is known | S-IC.1, S-IC.4 | FebruaryMarch |
| Determine the minimum sample size requirement when estimating a population mean | S-IC.1, S-IC.4 | FebruaryMarch |
| Interpret the t distribution and use a t distribution table | S-IC.1, S-IC.4 | FebruaryMarch |
| Construct and interpret confidence intervals for population mean when standard deviation is not known | S-IC.1, S-IC.4 | FebruaryMarch |
| Find a point estimate for a population proportion | S-IC.1, S-IC.4 | FebruaryMarch |
| Construct and interpret confidence intervals for a population proportion | S-IC.1, S-IC.4 | FebruaryMarch |
| Determine the minimum sample size required when estimating a population proportion | S-IC.1, S-IC.4 | FebruaryMarch |
| Interpret the chi-square distribution and use a chi-square distribution table | S-IC.1, S-IC.4 | FebruaryMarch |
| Construct interpret confidence intervals for population variance and standard deviation | S-IC.1, S-IC.4 | FebruaryMarch |
| State a null hypothesis and alternative hypothesis | S-IC.5, S-IC.6, S-IC.4  | MarchApril |
| Identify type I and type II errors | S-IC.5, S-IC.6, S-IC.4  | MarchApril |
| 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  | MarchApril |
| Use P values for a z test for a mean when standard deviation is known | S-IC.5, S-IC.6, S-IC.4  | MarchApril |
| Find critical values and rejection and rejection regions in the standard normal distribution | S-IC.5, S-IC.6, S-IC.4  | MarchApril |
| Use rejection regions for a z test for a mean when standard deviation is known | S-IC.5, S-IC.6, S-IC.4  | MarchApril |
| Find critical values in a t distribution | S-IC.5, S-IC.6, S-IC.4  | MarchApril |
| Use the t test to test a mean when standard deviation is not known | S-IC.5, S-IC.6, S-IC.4  | MarchApril |
| 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  | MarchApril |
| Use the z test to test a population proportion p | S-IC.5, S-IC.6, S-IC.4  | MarchApril |
| Find the critical values of a chi-square test | S-IC.5, S-IC.6, S-IC.4  | MarchApril |
| Use the chi-square test to test a variance or a standard deviation | S-IC.5, S-IC.6, S-IC.4  | MarchApril |
| Determine whether two samples are independent or dependent | S-IC.3, S-IC.4, S-IC.5  | AprilMay |
| 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  | AprilMay |
| 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  | AprilMay |
| 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  | AprilMay |
| Perform a two-sample z-test for the difference between two population proportions. | S-IC.3, S-IC.4, S-IC.5  | AprilMay |
| Construct a scatter plot and find a correlation coefficient | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | MayChoose 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 | MayChoose an item. |
| Find the equation of a regression line | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | MayChoose an item. |
| Predict y-values using the regression equation | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | MayChoose an item. |
| Find and interpret the coefficient of determination | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | MayChoose 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 | MayChoose an item. |
| Construct and interpret a prediction interval for y | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | MayChoose 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 | MayChoose an item. |
| Use a multiple regression equation to predict y-values | S-ID.6, S-ID.8, S-ID.9, S-ID.7 | MayChoose 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.