Probability & Statistics – Crosswalk (Summary of Revisions): 2016 *Mathematics Standards of Learning and Curriculum Framework*

Additions (2016 SOL)	Deletions from Probability and Statistics (2009 SOL)
- PS.1 – create and interpret graphical displays of boxplots and cumulative frequency graphs - PS.5 EKS – interpret the coefficient of determination in a contextual framework - PS.5 EKS – interpret slope and *y*-intercept of the least squares regression line in a contextual framework - PS.10 – design an experiment that addresses replication and blinding - PS.15 - determine the mean (expected value) for sums and differences of random variables - PS.17 – determine the slope of a least-squares regression line - PS.17 EKS – explain the relationship of confidence level and sample size effect confidence intervals and margin of error - PS.18 – determine the slope of a least-squares regression line for required tests	None
Parameter Changes/Clarifications (2016 SOL)	**Moves within Probability and Statistics (2009 SOL to 2016 SOL)**
- PS.3 – Clarified that comparisons of distribution includes numerical and graphical approaches - PS.7 EKS – graphical displays of categorical data include bar charts	None

EKS = Essential Knowledge and Skills, referring to the column on the far right of the Curriculum Framework
EU = Essential Understandings, referring to the column on the far left of the Curriculum Framework

Comparison of the Mathematics Standards of Learning – 2009 to 2016

2009 SOL	2016 SOL † indicates that the standard should be included in the local curriculum for a semester course
Descriptive Statistics	
*PS.1 The student will analyze graphical displays of univariate data, including dotplots, stemplots, and histograms, to identify and describe patterns and departures from patterns, using central tendency, spread, clusters, gaps, and outliers. Appropriate technology will be used to create graphical displays.	†PS.1 The student will analyze graphical displays of univariate data, including dotplots, stemplots, boxplots, cumulative frequency graphs, and histograms, to identify and describe patterns and departures from patterns, using central tendency, spread, clusters, gaps, and outliers.
*PS.2 The student will analyze numerical characteristics of univariate data sets to describe patterns and departures from patterns, using mean, median, mode, variance, standard deviation, interquartile range, range, and outliers.	†PS.2 The student will analyze numerical characteristics of univariate data sets to describe patterns and departures from patterns, using mean, median, mode, variance, standard deviation, interquartile range, range, and outliers.
*PS.3 The student will compare distributions of two or more univariate data sets, analyzing center and spread (within group and between group variations), clusters and gaps, shapes, outliers, or other unusual features.	†PS.3 The student will compare distributions of two or more univariate data sets, numerically and graphically, analyzing center and spread (within group and between group variations), clusters and gaps, shapes, outliers, or other unusual features.
*PS.4 The student will analyze scatterplots to identify and describe the relationship between two variables, using shape; strength of relationship; clusters; positive, negative, or no association; outliers; and influential points.	†PS.4 The student will analyze scatterplots to identify and describe the relationship between two variables, using shape; strength of relationship; clusters; positive, negative, or no association; outliers; and influential points.
PS.5 The student will find and interpret linear correlation, use the method of least squares regression to model the linear relationship between two variables, and use the residual plots to assess linearity.	PS.5 The student will determine and interpret linear correlation, use the method of least squares regression to model the linear relationship between two variables, and use the residual plot to assess linearity.
PS.6 The student will make logarithmic and power transformations to achieve linearity.	PS.6 The student will make logarithmic and power transformations to achieve linearity.
PS.7 The student, using two-way tables, will analyze categorical data to describe patterns and departure from patterns and to find marginal frequency and relative frequencies, including conditional frequencies.	†PS.7 The student, using two-way tables and other graphical displays, will analyze categorical data to describe patterns and departures from patterns and to determine marginal frequency and relative frequencies, including conditional frequencies.
Data Collection	
*PS.8 The student will describe the methods of data collection in a census, sample survey, experiment, and observational study and identify an appropriate method of solution for a given problem setting.	†PS.8 The student will describe the methods of data collection in a census, sample survey, experiment, and observational study and identify an appropriate method of solution for a given problem setting.
*PS.9 The student will plan and conduct a survey. The plan will address sampling techniques (e.g., simple random, stratified) and methods to reduce bias.	†PS.9 The student will plan and conduct a survey. The plan will address sampling techniques and methods to reduce bias.

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PS.10 The student will plan and conduct an experiment. The plan will address control, randomization, and measurement of experimental error.	†PS.10 The student will plan and conduct a well-designed experiment. The plan will address control, randomization, replication, blinding, and measurement of experimental error.
Probability	
*PS.11 The student will identify and describe two or more events as complementary, dependent, independent, and/or mutually exclusive.	†PS.11 The student will identify and describe two or more events as complementary, dependent, independent, and/or mutually exclusive.
*PS.12 The student will find probabilities (relative frequency and theoretical), including conditional probabilities for events that are either dependent or independent, by applying the Law of Large Numbers concept, the addition rule, and the multiplication rule.	†PS.12 The student will determine probabilities (relative frequency and theoretical), including conditional probabilities for events that are either dependent or independent, by applying the Law of Large Numbers concept, the addition rule, and the multiplication rule.
*PS.13 The student will develop, interpret, and apply the binomial probability distribution for discrete random variables, including computing the mean and standard deviation for the binomial variable.	PS.13 The student will develop, interpret, and apply the binomial and geometric probability distributions for discrete random variables, including computing the mean and standard deviation for the binomial and geometric variables.
PS.14 The student will simulate probability distributions, including binomial and geometric.	PS.14 The student will simulate probability distributions, including binomial and geometric.
PS.15 The student will identify random variables as independent or dependent and find the mean and standard deviations for sums and differences of independent random variables.	PS.15 The student will identify random variables as independent or dependent and determine the mean and standard deviations for random variables and sums and differences of independent random variables.
*PS.16 The student will identify properties of a normal distribution and apply the normal distribution to determine probabilities, using a table or graphing calculator.	†PS.16 The student will identify properties of a normal distribution and apply the normal distribution to determine probabilities.
Inferential Statistics	
*PS.17 The student, given data from a large sample, will find and interpret point estimates and confidence intervals for parameters. The parameters will include proportion and mean, difference between two proportions, and difference between two means (independent and paired).	PS.17 The student, given data from a large sample, will determine and interpret point estimates and confidence intervals for parameters. The parameters will include proportion and mean, difference between two proportions, difference between two means (independent and paired), and slope of a least-squares regression line.
PS.18 The student will apply and interpret the logic of a hypothesis-testing procedure. Tests will include large sample tests for proportion, mean, difference between two proportions, and difference between two means (independent and paired) and Chi-squared tests for goodness of fit, homogeneity of proportions, and independence.	PS.18 The student will apply and interpret the logic of an appropriate hypothesis-testing procedure. Tests will include large sample tests for proportion, mean, difference between two proportions, difference between two means (independent and paired); chi-squared tests for goodness of fit, homogeneity of proportions, and independence; and slope of a least-squares regression line.

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PS.19 The student will identify the meaning of sampling distribution with reference to random variable, sampling statistic, and parameter and explain the Central Limit Theorem. This will include sampling distribution of a sample proportion, a sample mean, a difference between two sample proportions, and a difference between two sample means.	PS.19 The student will identify the meaning of sampling distribution with reference to random variable, sampling statistic, and parameter and explain the Central Limit Theorem. This will include sampling distribution of a sample proportion, a sample mean, a difference between two sample proportions, and a difference between two sample means.
PS.20 The student will identify properties of a t-distribution and apply t-distributions to single-sample and two-sample (independent and matched pairs) t-procedures, using tables or graphing calculators.	PS.20 The student will identify properties of a *t*-distribution and apply *t*-distributions to single-sample and two-sample (independent and matched pairs) *t*-procedures.