

Course Code	1210300
Course Category	6-12
Subject Area	Mathematics
Course Type	Core
Course Title	Probability and Statistics
Course Level	3
Course Length	Full Year
Credit Description	1
Abbreviated Title	Probability and Statistics

RELATED BENCHMARKS (39) :

Scheme	Descriptor
LA.1112.1.6.1	The student will use new vocabulary that is introduced and taught directly;
LA.1112.1.6.9	The student will determine the correct meaning of words with multiple meanings in context;
LA.1112.6.2.3	The student will write an informational report that integrates information and makes distinctions between the relative value and significance of specific data, facts, and ideas; and
MA.912.P.1.1	Use counting principles, including the addition and the multiplication principles, to determine size of finite sample spaces and probabilities of events in those spaces.
MA.912.P.1.2	Use formulas for permutations and combinations to count outcomes and determine probabilities of events.
MA.912.P.2.1	Determine probabilities of complementary events, and calculate odds for and against the occurrence of events.
MA.912.P.2.2	Determine probabilities of independent events.
MA.912.P.2.3	Understand and use the concept of conditional probability, including: understanding how conditioning affects the probability of events; finding conditional probabilities from a two-way frequency table.
	Determine probabilities of events from distributions, including:
MA.912.P.3.1	<ul style="list-style-type: none"> • discrete uniform (all outcomes in a finite set equally likely) • binomial • normal • exponential
	Determine the mean and variance of distributions, including:
MA.912.P.3.2	<ul style="list-style-type: none"> • discrete uniform (all outcomes in a finite set equally likely) • binomial • normal • exponential
MA.912.P.3.3	Apply the properties of the normal distribution.
MA.912.P.3.4	Apply the Central Limit Theorem to determine the probability that a sample mean will be in

a certain interval.

- MA.912.S.1.1 Formulate an appropriate research question to be answered by collecting data or performing an experiment.
- MA.912.S.1.2 Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment.
- MA.912.S.2.1 Compare the difference between surveys, experiments, and observational studies, and what types of questions can and cannot be answered by a particular design.
- MA.912.S.2.2 Apply the definition of random sample and basic types of sampling, including representative samples, stratified samples, censuses.
- MA.912.S.2.3 Identify sources of bias, including sampling and nonsampling errors.
- MA.912.S.3.1 Read and interpret data presented in various formats. Determine whether data is presented in appropriate format, and identify possible corrections. Formats to include:
- bar graphs
 - line graphs
 - stem and leaf plots
 - circle graphs
 - histograms
 - box and whiskers plots
 - scatter plots
 - cumulative frequency (ogive) graphs
- MA.912.S.3.2 Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries from the following:
- bar graphs
 - line graphs
 - stem and leaf plots
 - circle graphs
 - histograms
 - box and whisker plots
 - scatter plots
 - cumulative frequency (ogive) graphs
- MA.912.S.3.3 Calculate and interpret measures of the center of a set of data, including mean, median, and weighted mean, and use these measures to make comparisons among sets of data.
- MA.912.S.3.4 Calculate and interpret measures of variance and standard deviation. Use these measures to make comparisons among sets of data.
- MA.912.S.3.5 Calculate and interpret the range and quartiles of a set of data.
- MA.912.S.3.6 Use empirical rules (e.g. 68-95-99.7 rule) to estimate spread of distributions and to make comparisons among sets of data.
- MA.912.S.3.7 Calculate the correlation coefficient of a set of paired data, and interpret the coefficient as a measure of the strength and direction of the relationship between the variables.
- MA.912.S.3.8 Determine whether a data distribution is symmetric or skewed based on an appropriate graphical presentation of the data.

- MA.912.S.3.9 Identify outliers in a set of data based on an appropriate graphical presentation of the data, and describe the effect of outliers on the mean, median, and range of the data.
- MA.912.S.4.1 Explain and interpret the concepts of confidence level and "margin of error".
- MA.912.S.4.2 Use a simulation to approximate sampling distributions for the mean, using repeated sampling simulations from a given population.
- MA.912.S.4.3 Apply the Central Limit Theorem to solve problems.
- MA.912.S.4.4 Approximate confidence intervals for means using simulations of the distribution of the sample mean.
- MA.912.S.4.5 Find the equation of the least squares regression line for a set of data.
- MA.912.S.5.1 Analyze the relationship between confidence level, margin of error and sample size.
- MA.912.S.5.2 Apply the general principles of hypothesis testing.
- MA.912.S.5.3 Explain and identify the following: null hypothesis, alternative hypotheses, Type I error, and Type II error.
- MA.912.S.5.4 Explain the meaning of p-value and its role in hypothesis testing.
- MA.912.S.5.5 Perform hypothesis tests of means and proportions for large samples, using simulations to determine whether a sample mean (proportion) has a low likelihood of occurring.
- MA.912.S.5.6 Interpret the results of hypothesis tests of means and proportions, and make decisions based on p-values of test.
- MA.912.S.5.8 Use a regression line equation to make predictions.
- MA.912.S.5.9 Interpret the coefficient of determination, r^2 , for a least-squares regression.