



**Course Title:** Probability and Statistics

**Content Area:** Mathematics

**Grade Level:** 11-12

## Scope and Sequence

**Course Text:** McGraw Hill, Elementary Statistics, A Step by Step Approach

**Course Introduction:** Probability and Statistics is an introductory course designed to provide students with the preparation for a college statistics course and is available for students who have successfully completed Algebra 1.

Units of Study:	Student Learning Objectives:	PA Common Core Standards/Anchors:	Length	Assessment	Scaffolding	Materials
<b>The Nature of Probability and Statistics</b>						
<ul style="list-style-type: none"> <li>• Descriptive and Inferential Statistics</li> <li>• Variables and Types of Data</li> <li>• Data Collection and Sampling Techniques</li> <li>• Observational and Experimental Studies</li> <li>• Uses and Misuses of Statistics</li> <li>• Computers and Calculators</li> </ul>	Students will be able to <ul style="list-style-type: none"> <li>• Demonstrate knowledge of terms and the two branches of statistics</li> <li>• Identify types of data, measurement levels for variables, and the four sampling techniques</li> <li>• Explain the difference between observational and experimental, how statistics can be used or misused, and the importance of technology</li> </ul>	<u><b>Standards</b></u> <ul style="list-style-type: none"> <li>• CC.2.4.HS.B.1</li> <li>• CC.2.4.HS.B.2</li> <li>• CC.2.4.HS.B.3</li> <li>• CC.2.4.HS.B.4</li> <li>• CC.2.4.HS.B.5</li> <li>• CC.2.4.HS.B.6</li> <li>• CC.2.4.HS.B.7</li> </ul>	<b>2 weeks</b>	Teacher created assessments	Re-take tests/quizzes below 55% or according to SDI's	Text, Calculators, Guided notes, Review sheets, Blackboard
<b>Frequency Distributions and Graphs</b>						
<ul style="list-style-type: none"> <li>• Organizing Data</li> <li>• Histograms, Frequency Polygons, and Ogives</li> <li>• Other Types of Graphs</li> </ul>	Students will be able to <ul style="list-style-type: none"> <li>• Organize data using frequency distributions</li> <li>• Represent data using Histograms, Frequency Polygons, and Ogives</li> <li>• Represent data using Pareto charts, time series graphs, pie graphs, and stem and leaf plots</li> </ul>	<u><b>Standards</b></u> <ul style="list-style-type: none"> <li>• CC.2.4.HS.B.1</li> <li>• CC.2.4.HS.B.2</li> <li>• CC.2.4.HS.B.3</li> <li>• CC.2.4.HS.B.4</li> <li>• CC.2.4.HS.B.5</li> <li>• CC.2.4.HS.B.6</li> <li>• CC.2.4.HS.B.7</li> </ul>	<b>3 weeks</b>	Teacher created assessments	Re-take tests/quizzes below 55% or according to SDI's	Text, Calculators, Guided notes, Review sheets, Blackboard

Data Description						
<ul style="list-style-type: none"> <li>Measures of Central Tendency</li> <li>Measures of Variation</li> <li>Measures of Position</li> <li>Exploratory Data Analysis</li> </ul>	Students will be able to <ul style="list-style-type: none"> <li>Summarize data using the mean, median, mode, and midrange</li> <li>Describe data using measures of variation such as <i>range, variance, and standard deviation</i></li> <li>Identify the position of a data value in a set using measures of position such as <i>percentiles, deciles, and quartiles</i></li> <li>Use the techniques of EDA including boxplots and five-number summaries</li> </ul>	<u>Standards</u> <ul style="list-style-type: none"> <li>CC.2.4.HS.B.1</li> <li>CC.2.4.HS.B.2</li> <li>CC.2.4.HS.B.3</li> <li>CC.2.4.HS.B.4</li> <li>CC.2.4.HS.B.5</li> <li>CC.2.4.HS.B.6</li> <li>CC.2.4.HS.B.7</li> </ul>	3 weeks	Teacher created assessments	Re-take tests/quizzes below 55% or according to SDI's	Text, Calculators, Guided notes, Review sheets, Blackboard
Probability and Counting Rules						
<ul style="list-style-type: none"> <li>Sample Spaces and Probability</li> <li>The Addition Rules for Probability</li> <li>The Multiplication Rules and Conditional Probability</li> <li>Counting Rules</li> <li>Probability and Counting Rules</li> </ul>	Students will be able to <ul style="list-style-type: none"> <li>Determine sample spaces and find the probability of an event using classical or experimental probability</li> <li>Find the probability of compound events using the addition rules</li> <li>Find the probability of compound events using the multiplication rules</li> <li>Find the total number of outcomes in a sequence of events, using the fundamental counting rule</li> <li>Find the probability of an event using the counting rules</li> </ul>	<u>Standards</u> <ul style="list-style-type: none"> <li>CC.2.4.HS.B.1</li> <li>CC.2.4.HS.B.2</li> <li>CC.2.4.HS.B.3</li> <li>CC.2.4.HS.B.4</li> <li>CC.2.4.HS.B.5</li> <li>CC.2.4.HS.B.6</li> <li>CC.2.4.HS.B.7</li> </ul>	4 weeks	Teacher created assessments	Re-take tests/quizzes below 55% or according to SDI's	Text, Calculators, Guided notes, Review sheets, Blackboard

Discrete Probability Distributions						
<ul style="list-style-type: none"> <li>• Probability Distributions</li> <li>• Mean, Variance, and Expectation</li> <li>• The Binomial Distribution</li> <li>• Other Types of Distributions</li> </ul>	Students will be able to <ul style="list-style-type: none"> <li>• Construct a probability distribution for a random variable</li> <li>• Find the mean, variance, and expected value for a discrete random variable</li> <li>• Find the exact probability for X successes in n trials of a binomial experiment</li> <li>• Find probabilities for outcomes of variables using the Poisson, Multinomial, and Hypergeometric Distributions</li> </ul>	<u>Standards</u> <ul style="list-style-type: none"> <li>• CC.2.4.HS.B.1</li> <li>• CC.2.4.HS.B.2</li> <li>• CC.2.4.HS.B.3</li> <li>• CC.2.4.HS.B.4</li> <li>• CC.2.4.HS.B.5</li> <li>• CC.2.4.HS.B.6</li> <li>• CC.2.4.HS.B.7</li> </ul>	3 weeks	Teacher created assessments	Re-take tests/quizzes below 55% or according to SDI's	Text, Calculators, Guided notes, Review sheets, Blackboard
The Normal Distribution						
<ul style="list-style-type: none"> <li>• Properties of the Normal Distribution</li> <li>• The Standard Normal Distribution</li> <li>• Applications of the Normal Distribution</li> <li>• The Central Limit Theorem</li> <li>• The Normal Approximation to the Binomial Distribution</li> </ul>	Students will be able to <ul style="list-style-type: none"> <li>• Identify properties of the normal distribution</li> <li>• Find the area under the snd, given various z values</li> <li>• Find probabilities for a normally distributed variable by transforming it into a snd</li> <li>• Use the central limit theorem to solve problems involving sample means for large samples</li> <li>• Use the normal approximation to compute probabilities for a binomial variable</li> </ul>	<u>Standards</u> <ul style="list-style-type: none"> <li>• CC.2.4.HS.B.1</li> <li>• CC.2.4.HS.B.2</li> <li>• CC.2.4.HS.B.3</li> <li>• CC.2.4.HS.B.4</li> <li>• CC.2.4.HS.B.5</li> <li>• CC.2.4.HS.B.6</li> <li>• CC.2.4.HS.B.7</li> </ul>	4 weeks	Teacher created assessments	Re-take tests/quizzes below 55% or according to SDI's	Text, Calculators, Guided notes, Review sheets, Blackboard

<b>Confidence Intervals and Sample Size</b>						
<ul style="list-style-type: none"> <li>Confidence Intervals for the Mean</li> <li>Confidence Intervals and Sample Size for Proportions</li> <li>Confidence Intervals for Variances and Standard Deviations</li> </ul>	Students will be able to <ul style="list-style-type: none"> <li>Find the confidence interval for the mean when <math>\sigma</math> is known or <math>n \geq 30</math></li> <li>Find the confidence interval for the mean when <math>\sigma</math> is unknown or <math>n &lt; 30</math></li> <li>Find the confidence interval for a proportion</li> <li>Find the confidence interval for a variance and standard deviation</li> </ul>	<u>Standards</u> <ul style="list-style-type: none"> <li>CC.2.4.HS.B.1</li> <li>CC.2.4.HS.B.2</li> <li>CC.2.4.HS.B.3</li> <li>CC.2.4.HS.B.4</li> <li>CC.2.4.HS.B.5</li> <li>CC.2.4.HS.B.6</li> <li>CC.2.4.HS.B.7</li> </ul>	<b>3 weeks</b>	Teacher created assessments	Re-take tests/quizzes below 55% or according to SDI's	Text, Calculators, Guided notes, Review sheets, Blackboard
<b>Hypothesis Testing</b>						
<ul style="list-style-type: none"> <li>Steps in Hypothesis Testing</li> </ul>	Students will be able to <ul style="list-style-type: none"> <li>Understand definitions in hypothesis testing</li> <li>Test means for large samples using the z test (P-Value Method)</li> </ul>	<u>Standards</u> <ul style="list-style-type: none"> <li>CC.2.4.HS.B.1</li> <li>CC.2.4.HS.B.2</li> <li>CC.2.4.HS.B.3</li> <li>CC.2.4.HS.B.4</li> <li>CC.2.4.HS.B.5</li> <li>CC.2.4.HS.B.6</li> <li>CC.2.4.HS.B.7</li> </ul>	<b>1 week</b>	Teacher created assessments	Re-take tests/quizzes below 55% or according to SDI's	Text, Calculators, Guided notes, Review sheets, Blackboard
<b>Correlation and Regression</b>						
<ul style="list-style-type: none"> <li>Scatter Plots</li> <li>Correlation</li> <li>Regression</li> <li>Coefficient of Determination and Standard Error of the Estimate</li> </ul>	Students will be able to <ul style="list-style-type: none"> <li>Draw a scatter plot for a set of ordered pairs</li> <li>Compute the correlation coefficient</li> <li>Compute the equation of the regression line</li> <li>Compute the coefficient of determination</li> <li>Compute the standard error of the estimate</li> <li>Find a prediction interval</li> </ul>	<u>Standards</u> <ul style="list-style-type: none"> <li>CC.2.4.HS.B.1</li> <li>CC.2.4.HS.B.2</li> <li>CC.2.4.HS.B.3</li> <li>CC.2.4.HS.B.4</li> <li>CC.2.4.HS.B.5</li> <li>CC.2.4.HS.B.6</li> <li>CC.2.4.HS.B.7</li> </ul>	<b>2 weeks</b>	Teacher created assessments	Re-take tests/quizzes below 55% or according to SDI's	Text, Calculators, Guided notes, Review sheets, Blackboard

<b>Other Chi-Square Tests</b>						
<ul style="list-style-type: none"> <li>• Test for Goodness of Fit</li> <li>• Tests Using Contingency Tables</li> </ul>	Students will be able to <ul style="list-style-type: none"> <li>• Test a distribution for goodness of fit using chi-square</li> <li>• Test two variables for independence</li> </ul>	<u><b>Standards</b></u> <ul style="list-style-type: none"> <li>• CC.2.4.HS.B.1</li> <li>• CC.2.4.HS.B.2</li> <li>• CC.2.4.HS.B.3</li> <li>• CC.2.4.HS.B.4</li> <li>• CC.2.4.HS.B.5</li> <li>• CC.2.4.HS.B.6</li> <li>• CC.2.4.HS.B.7</li> </ul>	<b>1 week</b>	Teacher created assessments	Re-take tests/quizzes below 55% or according to SDI's	Text, Calculators, Guided notes, Review sheets, Blackboard
<b>Sampling and Simulation</b>						
<ul style="list-style-type: none"> <li>• Common Sampling Techniques</li> <li>• Surveys and Questionnaire Design</li> <li>• Simulation Techniques</li> <li>• The Monte Carlo Method</li> </ul>	Students will be able to <ul style="list-style-type: none"> <li>• Demonstrate a knowledge of the 4 basic sampling methods</li> <li>• Recognize faulty questions on a survey and other factors that can bias responses</li> <li>• Solve real-life problems employing simulation techniques</li> </ul>	<u><b>Standards</b></u> <ul style="list-style-type: none"> <li>• CC.2.4.HS.B.1</li> <li>• CC.2.4.HS.B.2</li> <li>• CC.2.4.HS.B.3</li> <li>• CC.2.4.HS.B.4</li> <li>• CC.2.4.HS.B.5</li> <li>• CC.2.4.HS.B.6</li> <li>• CC.2.4.HS.B.7</li> </ul>	<b>2 weeks</b>	Teacher created assessments	Re-take tests/quizzes below 55% or according to SDI's	Text, Calculators, Guided notes, Review sheets, Blackboard