

HISD | Secondary Curriculum and Development

ALIGN, ADVANCE, ENGAGE.
2016-2017 Scope and Sequence
Mathematics – Statistics

Statistics Course Design

In Statistics, students build on the knowledge and skills for mathematics in Kindergarten-Grade 8 and Algebra I. Students broaden their knowledge of variability and statistical processes. Students study sampling and experimentation, categorical and quantitative data, probability and random variables, inference, and bivariate data. Students connect data and statistical processes to real-world situations. In addition, students will extend their knowledge of data analysis.

Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

The prerequisite for enrollment in Statistics is Algebra I.

Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs)
		<p>The student will:</p> <p><i>The Mathematical Process Standards are integrate throughout the course in all activities and lessons. Teachers should refer to these standards for instructional strategies and depth of rigor. Specific process standards have been highlighted for each unit, but these process standards should not be the only process standards associated with the daily lessons.</i></p> <p>Mathematical Process Standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:</p> <ul style="list-style-type: none"> Ⓢ STAT.1A Apply mathematics to problems arising in everyday life, society, and the workplace. Ⓢ STAT.1B Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Ⓢ STAT.1C Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems. Ⓢ STAT.1D Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate. Ⓢ STAT.1E Create and use representations to organize, record, and communicate mathematical ideas. Ⓢ STAT.1F Analyze mathematical relationships to connect and communicate mathematical ideas. Ⓢ STAT.1G Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.



1 st Cycle	29 Days	The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.
	Aug. 22 – Sept. 30, 2016	
Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs)
The student will:		
Unit 1: Sampling Techniques Students design and conduct statistical studies, surveys, and experiments. They use graphical, numerical, and analytical techniques to communicate the results of the study.	5.5 class periods (90-minutes each) or 11 class periods (45-minutes each)	Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to: <ul style="list-style-type: none"> • STAT.2A Compare and contrast the benefits of different sampling techniques, including random sampling and convenience sampling methods. • STAT.2D Distinguish between sample statistics and population parameters. • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. • STAT.2F Communicate methods used, analyses conducted, and conclusions drawn for a data-analysis project through the use of one or more of the following: a written report, a visual display, an oral report, or a multi-media presentation.
Unit 2: Statistical Experimentation Students distinguish among observational studies, surveys, and experiments.	5.5 class periods (90-minutes each) or 11 class periods (45-minutes each)	Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to: <ul style="list-style-type: none"> • STAT.2B Distinguish among observational studies, surveys, and experiments. • STAT.2C Analyze generalizations made from observational studies, surveys, and experiments. • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. • STAT.2F Communicate methods used, analyses conducted, and conclusions drawn for a data-analysis project through the use of one or more of the following: a written report, a visual display, an oral report, or a multi-media presentation. • STAT.2G Critically analyze published findings for appropriateness of study design implemented, sampling methods used, or the statistics applied.

2 nd Cycle	24 Days	The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.
	Oct. 3 – Nov. 4, 2016	
Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
<p>Unit 3: Statistical and Mathematical Models</p> <p>Students construct statistical models to describe variability around the structure of a mathematical models.</p>	<p>5 class periods (90-minutes each) or 10 class periods (45-minutes each)</p>	<p>Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. <p>Variability. The student applies the mathematical process standards when describing and modeling variability. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.3A Distinguish between mathematical models and statistical models. • STAT.3B Construct a statistical model to describe variability around the structure of a mathematical model for a given situation.
<p>Unit 4: Variability and Sampling</p> <p>Students describe and model variability using population and sampling distributions.</p>	<p>5 class periods (90-minutes each) or 10 class periods (45-minutes each)</p>	<p>Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. <p>Variability. The student applies the mathematical process standards when describing and modeling variability. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.3C Distinguish among different sources of variability, including measurement, natural, induced, and sampling variability. • STAT.3D Describe and model variability using population and sampling distributions.

3 rd Cycle	27 Days	<i>The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.</i>
	Nov. 7 – Dec. 16, 2016	
Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
Unit 5: Identification of Categorical and Quantitative Data Students represent and analyze both categorical and quantitative data.	3.5 class periods (90-minutes each) or 7 class periods (45-minutes each)	<p>Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. <p>Categorical and Quantitative Data. The student applies the mathematical process standards to represent and analyze both categorical and quantitative data. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.4A Distinguish between categorical and quantitative data. • STAT.4D Compare and contrast different graphical or visual representations given the same data set. • STAT.4F Analyze categorical data, including determining marginal and conditional distributions, using two-way tables.
Unit 6: Data Analysis and Representation Students represent, analyze, and summarize data sets to determine marginal and conditional distributions.	7 class periods (90-minutes each) or 14 class periods (45-minutes each)	<p>Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. <p>Categorical and Quantitative Data. The student applies the mathematical process standards to represent and analyze both categorical and quantitative data. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.4B Represent and summarize data and justify the representation. • STAT.4C Analyze the distribution characteristics of quantitative data, including determining the possible existence and impact of outliers. • STAT.4E Compare and contrast meaningful information derived from summary statistics given a data set. • STAT.4F Analyze categorical data, including determining marginal and conditional distributions, using two-way tables.

4 th Cycle	27 Days	The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.
	Jan. 4 – Feb. 10, 2017	
Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
Unit 7: The Law of Large Numbers Students make connections between probability and statistics.	4 class periods (90-minutes each) or 8 class periods (45-minutes each)	<p>Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. <p>Probability and Random Variables. The student applies the mathematical process standards to connect probability and statistics. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.5A Determine probabilities, including the use of a two-way table. • STAT.5B Describe the relationship between theoretical and empirical probabilities using the Law of Large Numbers.
Unit 8: Sampling Distribution Students construct a distribution and compare statistical measures.	7 class periods (90-minutes each) or 14 class periods (45-minutes each)	<p>Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. <p>Probability and Random Variables. The student applies the mathematical process standards to connect probability and statistics. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.5C Construct a distribution based on a technology-generated simulation or collected samples for a discrete random variable; and • STAT.5D Compare statistical measures such as sample mean and standard deviation from a technology-simulated sampling distribution to the theoretical sampling distribution.

5 th Cycle	30 Days	The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.
	Feb. 13 – Mar. 31, 2017	
Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
Unit 9: Confidence Interval Students interpret, explain, and calculate confidence intervals.	3.5 class periods (90-minutes each) or 7 class periods (45-minutes each)	<p>Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. <p>Inference. The student applies the mathematical process standards to make inferences and justify conclusions from statistical studies. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.6A Explain how a sample statistic and a confidence level are used in the construction of a confidence interval; • STAT.6B Explain how changes in the sample size, confidence level, and standard deviation affect the margin of error of a confidence interval. • STAT.6C Calculate a confidence interval for the mean of a normally distributed population with a known standard deviation. • STAT.6D Calculate a confidence interval for a population proportion. • STAT.6E Interpret confidence intervals for a population parameter, including confidence intervals from media or statistical reports.
Unit 10: Statistical Parameters Students use sample statistics and construct hypotheses around population parameters.	4 class periods (90-minutes each) or 8 class periods (45-minutes each)	<p>Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. <p>Inference. The student applies the mathematical process standards to make inferences and justify conclusions from statistical studies. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.6F Explain how a sample statistic provides evidence against a claim about a population parameter when using a hypothesis test. • STAT.6G Construct null and alternative hypothesis statements about a population parameter. • STAT.6J Describe the potential impact of Type I and Type II Errors.

5 th Cycle	30 Days	The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.
	Feb. 13 – Mar. 31, 2017	
Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
Unit 11: Inference Students interpret the results of a hypothesis test.	4 class periods (90-minutes each) or 8 class periods (45-minutes each)	<p>Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. <p>Inference. The student applies the mathematical process standards to make inferences and justify conclusions from statistical studies. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.6H Explain the meaning of the p-value in relation to the significance level in providing evidence to reject or fail to reject the null hypothesis in the context of the situation. • STAT.6I Interpret the results of a hypothesis test using technology-generated results such as large sample tests for proportion, mean, difference between two proportions, and difference between two independent means.

6 th Cycle	38 Days	The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.
	Apr. 3 – May 25, 2017	
Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
Unit 12: Bivariate Data Students analyze relationships among bivariate quantitative data.	3 class periods (90-minutes each) or 6 class periods (45-minutes each)	<p>Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. <p>Bivariate Data. The student applies the mathematical process standards to analyze relationships among bivariate quantitative data. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.7A Analyze scatterplots for patterns, linearity, outliers, and influential points. • STAT.7B Transform a linear parent function to determine a line of best fit.
Unit 13: Line of Best Fit Students identify, compare, and interpret the reasonableness of attributes of lines of best fit within the context.	6 class periods (90-minutes each) or 12 class periods (45-minutes each)	<p>Statistical Process Sampling and Experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.2E Formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions. <p>Bivariate Data. The student applies the mathematical process standards to analyze relationships among bivariate quantitative data. The student is expected to:</p> <ul style="list-style-type: none"> • STAT.7C Compare different linear models for the same set of data to determine best fit, including discussions about error. • STAT.7D Compare different methods for determining best fit, including median-median and absolute value. • STAT.7E Describe the relationship between influential points and lines of best fit using dynamic graphing technology. • STAT.7F Identify and interpret the reasonableness of attributes of lines of best fit within the context, including slope and y-intercept.

Recommended Resources

Graphing Technology:

- [Desmos](#) – a free graphing program
- [Geogebra](#) – a free and multi-platform dynamic mathematics software involving multiple representations for all levels of mathematics including geometry, algebra, statistics, and calculus
- [TI-84+/TI Nspire Education Technology](#) – calculator activities for use as a discovery and analytical tool

Adopted Instructional Materials:

- Knovation
- OpenStax

Online Resources:

(NOTE: for additional web 2.0 tools, access HISD [Instructional Technology Web Tools](#))

- [AnalyzeMath](#) – an interactive applet with definitions, examples, and practice exercises
- [Bubbl.us](#) – a tool for creating graphic organizers and mind maps
- [Creately](#) – a Venn diagram maker
- [Edmodo](#) – a social communication platform
- [Khan Academy](#) – instructional videos and practice exercises
- [Math Warehouse](#) – definitions, examples, and practice exercises
- [Math Open Reference](#) – free interactive mathematics textbook
- [NCTM Illuminations](#) – interactive activities
- [OnlineMathLearning](#) – mathematics help and learning resources
- [Padlet](#) – a tool for classroom collaboration
- [Problem-atic](#) – 100,000 questions from NY Regents, State Assessments, Academic Competitions, etc.
- [Purple Math](#) – tutorial guides
- [Quia](#) – a collection of instructional tools for creating online content
- [Socrative](#) – interactive games and exercises
- [StudyStack](#) – study aids for vocabulary
- [TeacherTube](#) – instructional videos
- [Virtual Nerd](#) – instructional videos
- [Wolfram Demonstrations Project](#) – an application for mathematics investigations
- [YouTube](#) – instructional videos