ALEKS®

AP Statistics (Quantitative)

This course covers the topics shown below.
Students navigate learning paths based on their level of readiness.
Institutional users may customize the scope and sequence to meet curricular needs.

Curriculum (307 topics + 98 additional topics)

- Arithmetic and Algebra Review (33 topics)
  - Arithmetic (7 topics)
    - Decimal place value: Tenths and hundredths
    - Rounding decimals
    - Using a calculator to convert a fraction to a rounded decimal
    - Using a calculator to approximate a square root
    - Order of operations with whole numbers
    - Order of operations with whole numbers and grouping symbols
    - Order of operations with whole numbers and exponents: Basic
  - Percentages (9 topics)
    - Introduction to converting a decimal to a percentage
    - Converting between percentages and decimals
    - Converting between percentages and decimals in a real-world situation
    - Converting a fraction to a percentage: Denominator of 20, 25, or 50
    - Using a calculator to convert a fraction to a rounded percentage
    - Converting a fraction to a percentage in a real-world situation
    - Finding a percentage of a whole number
    - Finding a percentage of a total amount: Real-world situations
    - Writing a ratio as a percentage
  - Algebraic Expressions and Real Numbers (5 topics)
    - Evaluating an algebraic expression: Whole numbers with two operations
    - Evaluating a formula
    - Evaluating a linear expression: Integer multiplication with addition or subtraction
    - Distributive property: Whole number coefficients
    - Combining like terms: Integer coefficients
  - Equations and Inequalities (12 topics)
    - Solving a two-step equation with integers
    - Solving a linear equation with several occurrences of the variable: Variables on the same side and distribution
    - Solving a linear equation with several occurrences of the variable: Variables on both sides and distribution
    - Solving for a variable in terms of other variables using addition or subtraction: Basic
    - Solving for a variable in terms of other variables using multiplication or division: Advanced
    - Solving for a variable in terms of other variables using addition or subtraction with division
    - Translating a sentence into a one-step equation
    - Translating a sentence by using an inequality symbol
    - Writing an inequality for a real-world situation
    - Graphing a linear inequality on the number line
    - Graphing a compound inequality on the number line
    - Writing and graphing inequalities given in context
- Slope and Lines (28 topics)
  - Graphing and Intercepts (12 topics)
    - Reading a point in the coordinate plane
    - Plotting a point in the coordinate plane
    - Finding a solution to a linear equation in two variables
    - Graphing a line given two of its points
    - Graphing a line given its equation in slope-intercept form: Integer slope
    - Graphing a line given its equation in slope-intercept form: Fractional slope
    - Finding x- and y-intercepts given the graph of a line on a grid
    - Y-intercept of a line
    - Finding x- and y-intercepts of a line given the equation: Basic
    - X- and y-intercepts of a line given the equation in standard form
    - Graphing a line given its x- and y-intercepts
    - Interpreting a line graph
  - Slope (7 topics)
    - Finding slope given the graph of a line in quadrant 1 that models a real-world situation
    - Classifying slopes given graphs of lines
    - Finding slope given the graph of a line on a grid

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    - Finding slope given two points on a line
    - Graphing a line given its slope and y-intercept
    - Finding a coordinate pair given the slope and a point on a line
    - Graphing a line through a given point with a given slope

  - Equations of Lines (6 topics)
    - Finding the slope and y-intercept of a line given its equation in the form $y = mx + b$
    - Finding the slope and y-intercept of a line given its equation in the form $Ax + By = C$
    - Writing an equation of a line given its slope and y-intercept
    - Writing an equation in slope-intercept form given the slope and a point
    - Writing the equation of a line given the y-intercept and another point
    - Writing the equation of a line through two given points

  - Applications (3 topics)
    - Finding outputs of a two-step function with decimals that models a real-world situation: Two variable equation
    - Finding the intercepts and rate of change given a graph of a linear function
    - Interpreting the parameters of a linear function that models a real-world situation

- Descriptive Statistics (75 topics)

  - Collecting Data (10 topics)
    - Differentiating between parameters and statistics
    - Classification of variables
    - Classification of variables and levels of measurement
    - Discrete versus continuous variables
    - Choosing units of measurement and an appropriate method to gather data
    - Choosing an appropriate method to conduct a survey and making an estimation
    - Classifying samples
    - Understanding the differences between designed experiments and observational studies
    - Identifying confounders and ways to eliminate them in an observational study
    - Identifying and reducing statistical bias

  - Displaying Data (20 topics)
    - Interpreting a tally table
    - Computing a percentage from a table of values
    - Constructing a frequency distribution for non-grouped data
    - Constructing a line plot
    - Constructing a bar graph for non-numerical data
    - Interpreting a bar graph
    - Interpreting a double bar graph
    - Understanding how adjusting the vertical scale can make a graph misleading
    - Understanding how two dimensional graphs can be misleading
    - Constructing a frequency distribution for grouped data
    - Constructing a frequency distribution and a histogram
    - Histograms for grouped data
    - Constructing a relative frequency distribution for grouped data
    - Interpreting relative frequency histograms
    - Shapes of discrete distributions
    - Constructing a frequency distribution and a frequency polygon
    - Cumulative distributions and ogives
    - Interpreting a stem-and-leaf display
    - Interpreting a pie chart
    - Finding a percentage of a total amount in a circle graph

  - Venn Diagrams (3 topics)
    - Interpreting Venn diagram cardinalities with 2 sets for a real-world situation
    - Introduction to shading a Venn diagram with 2 events
    - Shading a Venn diagram with 2 events: Unions, intersections, and complements

  - Measures of Center (18 topics)
    - Introduction to summation notation
    - Summation of indexed data
    - Mean of a data set
    - Finding the mean of a symmetric distribution
    - Computations involving the mean, sample size, and sum of a data set
    - Finding the value for a new score that will yield a given mean
    - Rejecting unreasonable claims based on average statistics
    - Weighted mean: Tabular data
    - Approximating the mean of a data set given a frequency distribution
    - Comparing means without calculation
    - Approximating the mean of a data set given a histogram
    - Median of a data set
    - Mode of a data set
    - Mean, median, and mode: Computations

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    - How changing a value affects the mean and median
    - Choosing the best measure to describe data
    - Comparing the mean, median, and mode of a data set
    - Making reasonable inferences based on proportion statistics

  - Measures of Variation (10 topics)
    - Range of a data set
    - Comparing measures of center and variation
    - Identifying the center, spread, and shape of a data set
    - Using back-to-back stem-and-leaf displays to compare data sets
    - Population standard deviation
    - Sample standard deviation
    - Notation for the population mean, sample mean, population standard deviation, and sample standard deviation
    - Comparing standard deviations without calculation
    - Approximating the standard deviation of a data set given a histogram
    - The Empirical Rule for discrete distributions

  - Measures of Position (14 topics)
    - Finding a z-score for a given data value
    - Finding a z-score and interpreting it in terms of the population mean and standard deviation
    - Comparing the relative sizes of data values based on their z-scores
    - Percentage of data below a specified value
    - Percentiles
    - Interpreting percentile ranks
    - Finding quartiles
    - Five-number summary and interquartile range
    - Introduction to finding outliers in a data set
    - Using the IQR to find outliers in a data set
    - Interpreting a box-and-whisker plot
    - Constructing a box-and-whisker plot
    - Constructing a box-and-whisker plot involving outliers
    - Using box-and-whisker plots to compare data sets

- Correlation and Simple Linear Regression (15 topics)

  - Scatterplots and Correlation (6 topics)
    - Constructing a scatter plot
    - Sketching the least-squares regression line
    - Scatter plots and correlation
    - Linear relationship and the sample correlation coefficient
    - Classifying linear and nonlinear relationships from scatter plots
    - Identifying correlation and causation

  - Simple Linear Regression (9 topics)
    - Interpreting the slope of the least-squares regression line
    - Interpreting the equation of the least-squares regression line to make predictions
    - Approximating the equation of a line of best fit and making predictions
    - Performing a simple linear regression
    - Relating the sample correlation coefficient and the parameters of the least-squares regression line
    - Using summations to compute the sample correlation coefficient and the slope of the least-squares regression line
    - Computing residuals
    - Interpreting residual plots
    - Simple linear regression: Explained and unexplained variation

- Probability (44 topics)

  - Fundamental Counting Principle (4 topics)
    - Interpreting a tree diagram
    - Introduction to the counting principle
    - Counting principle
    - Counting principle with repetition allowed

  - Permutations and Combinations (5 topics)
    - Factorial expressions
    - Computing permutations and combinations
    - Introduction to permutations and combinations
    - Permutations and combinations: Problem type 1
    - Permutations and combinations: Problem type 2

  - Probability and Odds of an Event (10 topics)
    - Determining a sample space and outcomes for an event: Experiment involving a single selection
    - Determining a sample space and outcomes for an event: Experiment involving multiple selections
    - Introduction to the probability of an event
    - Probability involving one die or choosing from n distinct objects

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    - Probability involving choosing from objects that are not distinct
    - Probability of selecting one card from a standard deck
    - Probabilities of an event and its complement
    - Finding probabilities of events and complements
    - Experimental and theoretical probability
    - Outcomes and event probability

  - Addition and Multiplication Rules for Probability (15 topics)
    - Determining outcomes for unions, intersections, and complements of events
    - Calculating relative frequencies in a contingency table
    - Calculating relative frequencies in a contingency table: Advanced
    - Probability of independent events: Decimal answers
    - Probability of dependent events: Decimal answers
    - Probabilities involving two rolls of a die: Decimal answers
    - Probabilities of draws with replacement
    - Using a Venn diagram to understand the addition rule for probability
    - Word problem involving the probability of a union
    - Word problem involving the probability of a union or an intersection
    - Computing probability involving the addition rule using a two-way frequency table
    - Probability of the union and intersection of independent events
    - Probability of the union of mutually exclusive events and independent events
    - Probabilities involving two mutually exclusive events
    - Probabilities involving two independent events

  - Conditional Probability (10 topics)
    - Computing conditional probability using a sample space
    - Using a Venn diagram to understand the multiplication rule for probability
    - Identifying independent events given values of probabilities
    - Computing conditional probability using a two-way frequency table
    - Computing conditional probability using a large two-way frequency table
    - Conditional probability: Basic
    - Intersection and conditional probability
    - Tree diagrams for conditional probabilities
    - Law of total probabilities
    - Bayes' theorem

- Random Variables and Distributions (35 topics)

  - One Random Variable (7 topics)
    - Discrete probability distribution: Basic
    - Discrete probability distribution: Word problems
    - Discrete probability distribution: Word problem involving cumulative probabilities
    - Expectation and variance of a random variable
    - Introduction to expectation
    - Computing expected value in a game of chance
    - Computing expected value in a business application

  - The Binomial Distribution (7 topics)
    - Histograms of binomial distributions well approximated by the normal distribution
    - Graphs of binomial distributions with less than 20 trials
    - Binomial problems: Mean and standard deviation
    - Using the binomial formula to find the probability of exactly m successes
    - Using the binomial formula to find the probability of more or less than m successes
    - Binomial problems: Basic
    - Binomial problems: Advanced

  - The Normal Distribution (13 topics)
    - Using the graph of a distribution to find probabilities: Basic
    - Using the graph of a distribution to find probabilities: Advanced
    - Using the empirical rule to identify values and percentages of a normal distribution
    - Word problem involving calculations from a normal distribution
    - Shading a region and finding its standard normal probability
    - Standard normal probabilities
    - Standard normal values: Basic
    - Standard normal values: Advanced
    - Normal versus standard normal curves
    - Normal distribution: Finding a probability, basic
    - Normal distribution: Finding a probability, advanced
    - Normal distribution: Finding a raw score
    - Drawing a normal quantile plot and using it to assess normality

  - Central Limit Theorem (8 topics)
    - The sampling distribution of the sample mean
    - Understanding the histogram of the sampling distribution of the sample mean

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- Sampling distribution of the sample mean: Mean and standard deviation
- Central limit theorem: Sample mean
- Notation for the population proportion and sample proportion
- Sampling distribution of a sample proportion: Mean and standard deviation
- Central limit theorem: Sample proportion
- Normal approximation to binomial

- Confidence Intervals and Hypothesis Testing (65 topics)

  - Confidence Intervals for the Population Mean (12 topics)
    - Selecting appropriate distributions for constructing confidence intervals for the population mean
    - Comparing confidence intervals for the population mean when the population standard deviation is known
    - Computing and comparing confidence intervals for the population mean when the population standard deviation is known
    - Introduction to constructing a confidence interval for a population mean using the standard normal distribution
    - Constructing a confidence interval to test a claim about the population mean: Standard normal
    - Confidence interval for the population mean: Use of the standard normal
    - Introduction to the t distribution
    - Introduction to finding the value that cuts off a given area under the curve: t distribution
    - *t* distribution
    - Introduction to constructing a confidence interval for a population mean using the t distribution
    - Constructing a confidence interval to test a claim about the population mean: t distribution
    - Confidence interval for the population mean: Use of the t distribution

  - Confidence Intervals for a Population Proportion (4 topics)
    - Computing and comparing confidence intervals for a population proportion
    - Introduction to constructing a confidence interval for a population proportion
    - Constructing a confidence interval to test a claim about a population proportion
    - Confidence interval for a population proportion

  - Confidence Intervals for the Population Standard Deviation (6 topics)
    - Introduction to the chi-square distribution
    - Introduction to finding the value that cuts off a given area under the curve: chi-square distribution
    - Chi-square distribution
    - Introduction to constructing a confidence interval for a population standard deviation
    - Constructing a confidence interval to test a claim about the population standard deviation
    - Confidence interval for the population standard deviation

  - Hypothesis Tests for the Population Mean (13 topics)
    - Choosing and calculating test statistics for hypothesis tests on the population mean
    - Determining null and alternative hypotheses for a test of a population mean
    - Introduction to performing a hypothesis test: Critical value method
    - Introduction to performing a hypothesis test: p value method
    - Introduction to hypothesis tests for the population mean using the critical value method: Z test
    - Introduction to hypothesis tests for the population mean using the p value method: Z test
    - Hypothesis test for the population mean: Z test using the critical value method
    - Hypothesis test for the population mean: Z test using p values
    - Understanding how the choice of a level of significance affects the results of a hypothesis test using the critical value method
    - Introduction to hypothesis tests for the population mean using the critical value method: t test
    - Introduction to hypothesis tests for the population mean using the p value method: t test
    - Hypothesis test for the population mean: t test using the critical value method
    - Hypothesis test for the population mean: t test using the p value method

  - Hypothesis Tests for a Population Proportion (7 topics)
    - Finding the value of the test statistic for a hypothesis test for a population proportion
    - Determining null and alternative hypotheses for a test of a population proportion
    - Introduction to hypothesis tests for a population proportion using the critical value method
    - Examining Type I and Type II errors for a hypothesis test for a population proportion using the p value method
    - Introduction to hypothesis tests for a population proportion using the p value method
    - Hypothesis test for a population proportion using the critical value method
    - Hypothesis test for a population proportion using the p value method

  - Hypothesis Tests for the Population Variance or Standard Deviation (6 topics)
    - Finding the value of the test statistic for a hypothesis test for a population variance or standard deviation
    - Determining null and alternative hypotheses for a test of a population variance or standard deviation
    - Introduction to hypothesis tests for the population variance or standard deviation using the critical value method
    - Introduction to hypothesis tests for the population variance or standard deviation using the p value method
    - Hypothesis test for the population variance or standard deviation using the critical value method
    - Hypothesis test for the population variance or standard deviation using the p value method

  - Sample Size, Effect Size, and Power (3 topics)
    - Choosing an appropriate sample size
    - Type I and Type II errors

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    - Type I and Type II errors and power

  - Confidence Intervals for Two Populations (7 topics)
    - Confidence interval for the difference of population means: Use of the standard normal
    - Confidence interval for the difference in population means: Paired comparisons
    - Confidence interval for the difference of population means: Use of the t distribution for populations with equal variances
    - Confidence interval for the difference of population means: Use of the t distribution for populations with unequal variances
    - Confidence interval for the difference of population proportions
    - *F* distribution
    - Confidence interval for the ratio of population variances

  - Hypothesis Tests for Two Populations (7 topics)
    - Determining whether two samples are independent or paired and the test statistic for a hypothesis test for the difference of two population means
    - Hypothesis test for the difference of population means: Z test
    - Hypothesis test for the difference of population means: Paired comparisons
    - Hypothesis test for the difference of population means: t test for populations with equal variances
    - Hypothesis test for the difference of population means: t test for populations with unequal variances
    - Hypothesis test for the difference of population proportions
    - Hypothesis test for the ratio of population variances

- Chi-square Tests, Inferences for Regression, and ANOVA (12 topics)

  - Chi-square Tests (3 topics)
    - Contingency tables: Expected frequencies
    - Chi-square goodness-of-fit test
    - Chi-square test of independence

  - Inferences for Regression (2 topics)
    - Confidence intervals and prediction intervals from simple linear regression
    - Hypothesis tests for the correlation coefficient and the slope of the least-squares regression line

  - One-way, Independent-samples ANOVA (3 topics)
    - ANOVA: Mean squares and the common population variance
    - ANOVA: Degrees of freedom and the *F* statistic
    - ANOVA: Hypothesis tests and the ANOVA table

  - Advanced ANOVA (2 topics)
    - Interpreting group means from a factorial design
    - Two-way, independent-samples ANOVA

  - Non-parametric Tests (2 topics)
    - Sign test
    - Wilcoxon signed-ranks test

- Other Topics Available(*) (98 additional topics)

  - Arithmetic and Algebra Review (5 topics)
    - Converting a percentage to a fraction in simplest form
    - Identifying numbers as integers or non-integers
    - Identifying numbers as rational or irrational
    - Solving for a variable inside parentheses in terms of other variables
    - Solving a two-step linear inequality: Problem type 1

  - Slope and Lines (5 topics)
    - Graphing a line by first finding its x- and y-intercepts
    - Finding the slopes of horizontal and vertical lines
    - Writing and evaluating a function that models a real-world situation: Advanced
    - Application problem with a linear function: Finding a coordinate given the slope and a point
    - Application problem with a linear function: Finding a coordinate given two points

  - Descriptive Statistics (21 topics)
    - Constructing a two-way frequency table: Advanced
    - Interpreting a pictograph table
    - Constructing a percent bar graph
    - Computations from pie charts
    - Angle measure in a circle graph
    - Constructing a Venn diagram with 2 sets
    - Constructing a Venn diagram with 2 sets to solve a word problem
    - Interpreting a Venn diagram with 3 sets for a real-world situation
    - Interpreting Venn diagram cardinalities with 3 sets for a real-world situation

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- Introduction to shading a Venn diagram with 3 events
- Shading a Venn diagram with 3 events: Unions, intersections, and complements
- Shading a Venn diagram with 3 sets to represent a group
- Using a model to find the mean
- Understanding the mean graphically: Two bars
- Understanding the mean graphically: Four or more bars
- Finding the value for a new score to yield a mean that satisfies a given criterion
- Finding the mode and range from a line plot
- Comparing sample means
- Chebyshev's theorem
- Transforming the mean and standard deviation of a data set
- Computing mean absolute deviation from a list of numerical values

- Correlation and Simple Linear Regression (2 topics)
  - Choosing a quadratic model and using it to make a prediction
  - Choosing an exponential model and using it to make a prediction

- Probability (35 topics)
  - Counting principle involving a specified arrangement
  - Counting arrangements of objects that are not all distinct
  - Permutations and combinations: Problem type 3
  - Counting using combinations and addition
  - Counting using combinations and a complement
  - Counting five-card hands from a standard deck
  - Understanding likelihood
  - Probabilities of a permutation and a combination
  - Area as probability
  - Finding the odds in favor and against
  - Converting between probability and odds
  - Finding odds in favor and against drawing a card from a standard deck
  - Identifying independent events given descriptions of experiments
  - Experimental and theoretical probability for compound events
  - Probability of independent events involving a standard deck of cards
  - Probability of dependent events involving a standard deck of cards
  - Probability of dependent events involving a survey
  - Probabilities of draws without replacement
  - Probability of five-card hands
  - Outcomes and event probability: Addition rule
  - Probabilities involving three mutually exclusive events
  - Probabilities involving three independent events
  - The curious die
  - Outcomes and event probability: Conditional probability
  - Computing conditional probability to make an inference using a two-way frequency table
  - Conditional probability: Mutually exclusive events
  - Conditional probability: Independent events
  - Identifying outcomes in a random number table used to simulate a simple event
  - Using a random number table to simulate a simple event
  - Generating a random number table with technology to simulate a simple event
  - Identifying outcomes in a random number table used to simulate a compound event
  - Using a random number table to simulate a compound event
  - Generating a random number table with technology to simulate a compound event
  - Generating random samples from a population with known characteristics
  - Using a random number table to make a fair decision

- Random Variables and Distributions (16 topics)
  - Cumulative distribution function
  - Making predictions using experimental data for compound events
  - Rules for expectation and variance of random variables
  - Marginal distributions of two discrete random variables
  - Joint distributions of dependent or independent random variables
  - Probabilities of two random variables given their joint distribution
  - Conditional probabilities of two random variables given their joint distribution
  - Choosing histograms to match Poisson distributions
  - Finding the mean and standard deviation of a Poisson random variable
  - Computing the probability that a Poisson random variable takes a single value: Time interval
  - Computing the probability that a Poisson random variable takes a single value involving distance, area, or volume
  - Computing the probability that a Poisson random variable takes a value in a range: Time interval
  - Computing the probability that a Poisson random variable takes multiple values involving distance, area, or volume
  - Calculating a probability using the binomial distribution and using the Poisson distribution as an approximation
  - Normal distribution: Finding a mean or standard deviation
  - Central limit theorem: Sample sum

- Confidence Intervals and Hypothesis Testing (2 topics)
  - Effect size, sample size, and power

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    - Testing the plausibility of the results of multiple hypothesis tests

- Chi-square Tests, Inferences for Regression, and ANOVA (8 topics)
    - Interpreting the regression coefficients
    - Identifying degrees of freedom
    - ANOVA table: Problem type 1
    - ANOVA table: Problem type 2
    - F test of a multiple regression model
    - t test of a multiple regression model
    - One-way, repeated-measures ANOVA
    - Selecting among *t* tests and ANOVA tests

- Quality Control (4 topics)
    - Interpreting a control chart
    - R charts
    - x-bar charts
    - p charts

***Other Topics Available** By default, these topics are NOT included in the course, but can be added using the content editor in the Teacher Module.

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