

## *Introduction to Statistics*

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 (116 topics + 36 additional topics)

- Mathematical Readiness (19 topics)
  - ◆ Arithmetic Readiness (10 topics)
    - ◇ Order of operations with whole numbers
    - ◇ Order of operations with whole numbers and grouping symbols
    - ◇ Decimal place value: Hundreds to ten thousandths
    - ◇ Rounding decimals
    - ◇ Converting between percentages and decimals
    - ◇ Finding a percentage of a whole number without a calculator: Basic
    - ◇ Writing a ratio as a percentage without a calculator
    - ◇ Converting a percentage to a fraction in simplest form
    - ◇ Converting a fraction to a percentage: Denominator of 20, 25, or 50
    - ◇ Summation of indexed data
  - ◆ Algebra Readiness (9 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
    - ◇ Y–intercept of a line
    - ◇ X– and y–intercepts of a line given the equation in standard form
    - ◇ Writing an equation of a line given the y–intercept and another point
    - ◇ Graphing a line given its x– and y–intercepts
    - ◇ Graphing a line given its equation in slope–intercept form
    - ◇ Graphing a line through a given point with a given slope
- Descriptive Statistics (22 topics)
  - ◆ Graphical Displays (11 topics)
    - ◇ Interpreting a pie chart
    - ◇ Computations from pie charts
    - ◇ Interpreting a double bar graph
    - ◇ Histograms for grouped data
    - ◇ Frequency polygons for grouped data
    - ◇ Interpreting relative frequency histograms
    - ◇ Cumulative distributions and ogives
    - ◇ Comparing means without calculation
    - ◇ Comparing standard deviations without calculation
    - ◇ Box–and–whisker plots
    - ◇ Interpreting a stem–and–leaf display
  - ◆ Descriptive Measures (11 topics)
    - ◇ Mean, median, and mode: Computations

- ◇ Rejecting unreasonable claims based on average statistics
- ◇ Weighted mean: Tabular data
- ◇ Approximating the mean of a data set given a histogram
- ◇ Percentiles
- ◇ Population standard deviation
- ◇ Sample standard deviation
- ◇ Approximating the standard deviation of a data set given a histogram
- ◇ Chebyshev's theorem and the empirical rule
- ◇ Mean, median, and mode: Comparisons
- ◇ Making reasonable inferences based on proportion statistics
- Probability (16 topics)
  - ◆ Counting (3 topics)
    - ◇ Factorial expressions
    - ◇ Combinations
    - ◇ Probabilities of draws with replacement
  - ◆ Events and Probability (6 topics)
    - ◇ Outcomes and event probability
    - ◇ Probabilities involving two rolls of a die: Decimal answers
    - ◇ Word problem involving the probability of a union or an intersection
    - ◇ Probability of the union and intersection of independent events
    - ◇ Probability of the union of mutually exclusive events and independent events
    - ◇ Probability of independent events: Decimal answers
  - ◆ Conditional Probability (7 topics)
    - ◇ Calculating relative frequencies in a contingency table
    - ◇ Conditional probability: Basic
    - ◇ Probability of dependent events
    - ◇ Intersection and conditional probability
    - ◇ Tree diagrams for conditional probabilities
    - ◇ Law of total probabilities
    - ◇ Bayes' theorem
- Random Variables and Distributions (20 topics)
  - ◆ One Random Variable (5 topics)
    - ◇ Classification of variables and levels of measurement
    - ◇ Discrete versus continuous variables
    - ◇ Discrete probability distribution: Basic
    - ◇ Discrete probability distribution: Word problems
    - ◇ Expectation and variance of a random variable
  - ◆ Fundamental Distributions (13 topics)
    - ◇ Binomial problems: Mean and standard deviation
    - ◇ Binomial problems: Basic
    - ◇ Binomial problems: Advanced
    - ◇ Standard normal probabilities
    - ◇ Standard normal values: Basic
    - ◇ Standard normal values: Advanced
    - ◇ Normal versus standard normal density curves
    - ◇ Normal distribution: Finding a raw score
    - ◇ Normal distribution: Finding a probability, basic
    - ◇  $t$  distribution
    - ◇ Chi-square distribution
    - ◇  $F$  distribution
    - ◇ Normal approximation to binomial
  - ◆ Central Limit Theorem (2 topics)
    - ◇ Central limit theorem: Sample mean

- ◇ Central limit theorem: Sample proportion
- Confidence Intervals and Hypothesis Testing (22 topics)
  - ◆ Confidence Intervals (9 topics)
    - ◇ Selecting a distribution for inferences on the population mean
    - ◇ Confidence interval for the population mean: Use of the standard normal
    - ◇ Confidence interval for the population mean: Use of the t distribution
    - ◇ Confidence interval for a population proportion
    - ◇ Confidence interval for the population standard deviation
    - ◇ Confidence interval for the difference of population means: Use of the standard normal
    - ◇ Confidence interval for the difference of population means: Use of the t distribution
    - ◇ Confidence interval for the difference of population proportions
    - ◇ Confidence interval for the ratio of population variances
  - ◆ Sample Size, Effect Size, and Power (3 topics)
    - ◇ Choosing an appropriate sample size
    - ◇ Type I and Type II errors
    - ◇ Type I and Type II errors and power
  - ◆ Hypothesis Tests (10 topics)
    - ◇ Determining null and alternative hypotheses
    - ◇ Hypothesis test for the population mean: Z test
    - ◇ Hypothesis test for the population mean: t test
    - ◇ Hypothesis test for a population proportion
    - ◇ Hypothesis test for the population variance or standard deviation
    - ◇ 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
    - ◇ Hypothesis test for the difference of population proportions
    - ◇ Hypothesis test for the ratio of population variances
- Regression and Correlation (7 topics)
  - ◆ Correlation and Simple Linear Regression (7 topics)
    - ◇ Sketching the least-squares regression line
    - ◇ Linear relationship and the sample correlation coefficient
    - ◇ Predictions from the least-squares regression line
    - ◇ Computing the sample correlation coefficient and the coefficients for the least-squares regression line
    - ◇ Explained and unexplained variation and the least-squares regression line
    - ◇ Confidence intervals and prediction intervals from simple linear regression
    - ◇ Hypothesis tests for the correlation coefficient and the slope of the least-squares regression line
- ANOVA, Chi-square and Nonparametric Tests (10 topics)
  - ◆ 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
  - ◆ Chi-square Tests (3 topics)
    - ◇ Contingency tables: Expected frequencies
    - ◇ Chi-square goodness-of-fit test
    - ◇ Chi-square test of independence
  - ◆ Non-parametric Tests (2 topics)
    - ◇ Sign test
    - ◇ Wilcoxon signed-ranks test

- Other Topics Available(\*) (36 additional topics)
  - ◆ Descriptive Statistics (2 topics)
    - ◇ Using back-to-back stem-and-leaf displays to compare data sets
    - ◇ Transforming the mean and standard deviation of a data set
  - ◆ Probability (13 topics)
    - ◇ Permutations
    - ◇ Permutations, combinations, and the multiplication principle for counting
    - ◇ Probabilities of draws without replacement
    - ◇ Venn diagrams: Two events
    - ◇ Venn diagrams: Three events
    - ◇ Shading a Venn diagram with 3 sets to represent a group
    - ◇ Probabilities involving two mutually exclusive events
    - ◇ Probabilities involving three mutually exclusive events
    - ◇ Probabilities involving two independent events
    - ◇ Probabilities involving three independent events
    - ◇ The curious die
    - ◇ Conditional probability: Mutually exclusive events
    - ◇ Conditional probability: Independent events
  - ◆ Random Variables and Distributions (8 topics)
    - ◇ Cumulative distribution function
    - ◇ 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
    - ◇ Normal distribution: Finding a mean or standard deviation
    - ◇ Central limit theorem: Sample sum
  - ◆ Confidence Intervals and Hypothesis Testing (1 topics)
    - ◇ Effect size, sample size, and power
  - ◆ Regression and Correlation (6 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
  - ◆ ANOVA, Chi-square and Nonparametric Tests (2 topics)
    - ◇ One-way, repeated-measures ANOVA
    - ◇ Selecting among  $t$  tests and ANOVA tests
  - ◆ Quality Control (4 topics)
    - ◇ Interpreting a control chart
    - ◇ R charts
    - ◇  $\bar{x}$ -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.*