



Statistics

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Source	Author(s) (Text or Video)	Title(s)	Link (where applicable)
OpenStax (Text)	Barbara Illowsky, De Anza College Susan Dean, De Anza College	Introductory Statistics	OpenStax
www.onlinestatbook.com (Video and some Text)	David Lane Developed by Rice University, University of Houston Clear Lake, and Tufts University	Online Statistics Education: An Interactive Multimedia Course of Study	Online Stat Book
JB Statistics (Video)	Jeremy Balka, University of Guelph		YouTube Channel

Knewton Statistics was developed to meet the scope and sequence of an introductory statistics course . To develop the course, Knewton used four main sources of content: OpenStax, Rice University’s Online Stat Book, videos created by a Statistics professor at the University of Guelph, and a team of Subject Matter Experts (SMEs). The SMEs come from diverse backgrounds and are all accomplished academics in the field of Statistics. Knewton Statistics covers the breadth of statistics topics and also provides the necessary depth to ensure the course is manageable and engaging for instructors and students alike.

Knewton Statistics has two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Between our text, video, and original SME content, we were able to solicit ideas from statistics instructors and students at all levels of higher education, from community colleges to Ph.D- granting universities. Knewton Business Statistics provides a level of academic rigor, while also promoting relevance and accessibility for students. Knewton has added current and relevant contexts and examples to instruction and assessments.

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Chapter 1: Sampling and Data

- Sampling and Parameters
 - Understand the definitions of population, sampling, statistic, parameter, and data
 - Identify stratified, cluster, systematic, and convenience sampling
 - Identify sampling errors and bias
 - Identify situations in which statistics can be misleading
- Variables and Measures of Data
 - Identify explanatory and response variables in an experiment
 - Identify levels of measurement of data
 - Define and distinguish between qualitative, quantitative, discrete, and continuous variables

Chapter 2: Descriptive Statistics

- Histograms and Frequencies
 - Construct and understand frequency tables for a set of data
 - Create and interpret histograms
 - Create and interpret stem-and-leaf plots
 - Line and Bar Graphs
 - Create and interpret bar graphs
 - Create and interpret line graphs of data
 - Choose appropriate graphs and charts to display data
 - Measures of Central Tendency
 - Find the mean of a set of data
 - Find the mean from a frequency table
 - Find the median of a set of data
 - Find the mode of a set of data
 - Determine whether the mean, median, or mode is the best measure of center for a data set
 - Quartiles and Box Plots
 - Find and interpret percentiles and quartiles of a data set
 - Find the five-number summary of a data set
 - Identify the interquartile range and potential outliers in a set of data
 - Construct and understand box-and-whisker plots
 - Skewness and Standard Deviation
 - Determine if a data set is skewed
 - Compute the sample variance and sample standard deviation
 - Interpret the standard deviation of a set of data
 - Compute z-scores and use them to compare values from different data sets
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Chapter 3: Probability Topics

- Probability Terminology and Notation
 - Understand definitions of events, outcomes, trials, independent/dependent events, and mutually exclusive events
 - Use and, or, and not notation to describe events
 - Use conditional probability notation to describe events
- Basic Probability
 - Compute basic probability in a situation where there are equally-likely outcomes
 - Compute probability involving and, or, and not
 - Compute probability using the complement rule
- Independent and Mutually Exclusive Events
 - Understand mutually exclusive events
 - Find the conditional probabilities of independent and mutually exclusive events
 - Distinguish between independent or mutually exclusive events given conditional probability information
- Addition and Multiplication Rules
 - Use the multiplication rule for conditional probabilities
 - Use the multiplication rule for independent event probabilities
 - Use the addition rule for probabilities
 - Use the addition rule for mutually exclusive event probabilities
- Diagrams and Contingency Tables
 - Interpret and complete a contingency table
 - Use a contingency table to find conditional probabilities
 - Use a tree diagram to list outcomes and compute probabilities
 - Use a venn diagram to compute compound and conditional probabilities

Chapter 4: Discrete Random Variables

- Discrete Probability Density Functions
 - Understand the properties of a discrete probability density function
 - Find the mean of a discrete random variable from its probability density function
 - Find the standard deviation of a discrete random variable from its probability density function
 - Binomial Distribution
 - Understand the parameters of the binomial distribution
 - Use the binomial distribution to compute probability
 - Poisson Distribution
 - Understand the parameters of the poisson distribution
 - Use the poisson distribution to compute probability
 - Geometric Distribution
 - Understand the geometric distribution and use it to compute probability
 - Compute the mean of a geometric distribution
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Chapter 5: Continuous Random Variables

- Basic Continuous Density Functions
 - Use area under the curve to compute probability for continuous probability density functions
 - Use the uniform distribution to compute probability
 - Use the uniform distribution to compute conditional probability
 - Find the mean and standard deviation of the uniform distribution
- Exponential Distribution
 - Understand the parameters of the exponential distribution
 - Use the exponential distribution to compute probability
 - Use the memoryless property of the exponential distribution to compute conditional probability

Chapter 6: The Normal Distribution

- Parameters of the Normal Distribution
 - Understand the notation and interpret the parameters of a normal distribution
 - Standardize a normally distributed random variable
 - Calculate the mean and standard deviation of a standard normal distribution
- Probability Using the Normal Distribution
 - Use the empirical rule for normal distributions to estimate probability
 - Use the normal distribution to compute probability
 - Use the normal distribution to approximate the binomial

Chapter 7: The Central Limit Theorem

- The Central Limit Theorem
 - Use the Central Limit Theorem for Means to find the sample mean and the sample standard deviation
 - Use the Central Limit Theorem for Sums to find the sample mean and sample standard deviation
 - Use both forms of the Central Limit Theorem to compute probability

Chapter 8: Confidence Intervals

- Confidence Intervals for Population Mean
 - Find and interpret confidence interval estimates using the empirical rule
 - Work backwards to calculate the error bound and sample mean given the confidence interval
 - Determine the z-score for a stated confidence level and compute the error bound
 - Calculate and interpret the confidence interval for a population mean with a known standard deviation
 - Find the sample size required to estimate a population mean with a given confidence level
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- Student's T-Distribution
 - Determine the degrees of freedom to find and interpret the t-score of a normally distributed random variable
 - Use the Student's t-distribution to calculate the confidence interval for a population mean with an unknown standard deviation
- Confidence Intervals for Population Proportion
 - Find the confidence interval given a population proportion
 - Calculate the sample size required to estimate a population proportion with a given confidence level

Chapter 9: One-Mean Hypothesis Testing

- Introduction to Hypothesis Testing
 - Identify the null and alternative hypotheses for an experiment with one population mean
 - Distinguish between one- and two-tailed hypotheses tests and understand possible conclusions
 - Differentiate between Type I and Type II errors when performing a hypothesis test
 - One-Mean Z-Test
 - Compute the value of the test statistic (z-value) for a hypothesis test for one population mean with a known standard deviation
 - Determine the critical value(s) of a one-mean z-test at a given significance level to define a rejection region
 - Make a conclusion and interpret the results of a one-mean hypothesis test using the Critical Approach with a known standard deviation
 - One-Mean Hypothesis Test Using a P-Value
 - Find the p-value using a table given test statistic value (z-score) of a one-mean hypothesis test
 - Use the p-value to make a conclusion and interpret the results of a one-mean hypothesis test with a known standard deviation
 - One-Mean T-Test
 - Understand the assumptions and conditions for using the t-test for hypothesis testing, and compute the value of the test statistic
 - Determine the degrees of freedom for a t-test, and use a table to determine the critical values of a hypothesis test with an unknown standard deviation
 - Make a conclusion and interpret the results of a one-mean hypothesis test with an unknown standard deviation
 - One-Mean Hypothesis Tests
 - Conduct and interpret a one-mean hypothesis test with a known standard deviation using the critical approach or the p-value approach
 - Conduct and interpret a one-mean hypothesis test using the Critical Approach with an unknown standard deviation
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Chapter 10: Two-Mean Hypothesis Testing

- Two-Mean Hypothesis Tests
 - Identify and understand the null and alternative hypotheses for an experiment with two population means
 - Calculate the test statistic for a nonpooled two-mean hypothesis test
 - Calculate the test statistic for a pooled two-mean hypothesis test
 - Determine the degrees of freedom and critical value(s) for two-mean t-tests (pooled and nonpooled)
 - Make a conclusion and interpret a two-mean hypothesis test with assume unequal standard deviations

Chapter 11: Chi-Square Distributions

- Introduction to the Chi-Square Distribution
 - Understand the properties of the chi-square distribution
 - Distinguish between use cases of the chi-square tests
- Chi-Square Goodness-of-Fit Test
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 - Conduct and interpret a chi-square goodness-of-fit test
- Chi-Square Independence Test
 - Compute the value of the test statistic using the expected frequencies for a chi-square independence test
 - Conduct and interpret a test of independence with the chi-square distribution
- Chi-Square Homogeneity Test
 - Compute the value of the test statistic using the expected frequencies for a chi-square homogeneity test
 - Conduct and interpret a test for homogeneity with the chi-square distribution

Chapter 12: Linear Regression

- Linear Regression Equations
 - Understand properties of linear equations
 - Understand the relationship between scatter plots and table and determine patterns
 - Find the linear regression equation given a list of data points
 - Uses of Linear Regression
 - Find and interpret the correlation coefficient
 - Make predictions using a line of best fit
 - Find outliers in a data set
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