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Business Statistics

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

Alta Business Statistics was developed to meet the scope and sequence of an introductory business 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 Business Statistics. Alta Business 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.

Alta Business Statistics has two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Between our text and video content and Knewton SMEs, 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. Alta 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.

This course features two versions of the hypothesis testing chapters (chapters 9 and 10). First versions focus on business applications in hypothesis testing, while the second versions focus on a most step by step walkthrough, and break up of critical value and p-value approaches, as well as technology applications.

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2.7 Quartiles and Box Plots
- Find and interpret percentiles and quartiles of a business-related data set
- Find the five-number summary of a business-related data set
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- Construct and understand box-and-whisker plots in business contexts

2.8 Skewness and Standard Deviation
- Determine if a data set is skewed in business examples
- Compute variance and standard deviation
- Compute the sample variance and sample standard deviation in business contexts
- Interpret the standard deviation of a set of business-related data
- Compute z-scores and use them to compare values from different data sets

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- Calculate mean, median and mode for a dataset using Technology - Calculator
- Create and interpret box and whisker plot using Technology - Calculator

2.10 Calculate measures of center and spread using Technology - Excel
- Calculate mean, median and mode for a dataset using Technology - Excel
- Create and interpret box and whisker plot using Technology - Excel

2.11 Calculate Variance and Standard Deviation with Technology - Calculator
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2.12 Variance, Standard Deviation and Z-scores with technology - Excel
- Compute the variance and standard deviation with technology - Excel
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Chapter 3: Probability Topics

3.1 Probability Terminology and Notation
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- Use conditional probability notation to describe events

3.2 Basic Probability
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- Compute probability involving and, or, and not
- Compute probability using the complement rule

3.3 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

3.4 Counting Principles
- Understand factorial notation
- Calculate and apply combinations
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3.4 Addition and Multiplication Rules
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- Use the multiplication rule for independent event probabilities
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- Use the binomial distribution to compute probability

4.3 Geometric Distribution
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- Create and interpret a Geometric Distribution with Technology - Calculator

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- Create and interpret a Binomial Distribution with Technology - Excel
- Create and interpret a Poisson Distribution with Technology - Excel
- Create and interpret a Geometric Distribution with Technology - Excel

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- 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

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- Understand the parameters of the exponential distribution
- Use the exponential distribution to compute probability
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Chapter 6: The Normal Distribution

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- Understand the notation and interpret the parameters of a normal distribution in business examples
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- Use the normal distribution to compute probability with technology - Calculator
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- Use the normal distribution to approximate the binomial with technology - Calculator

6.4 Using the Normal Distribution with Technology- Excel

- Use the normal distribution to compute probability with technology - Excel
- Use the normal distribution to compute a value for a random variable given probability - Excel
- Use the normal distribution to approximate the binomial with technology - Excel

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7.1 The Central Limit Theorem

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- 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

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- Find and interpret confidence interval estimates in business examples using the empirical rule
- Work backwards to calculate the error bound and sample mean given the confidence interval in business contexts

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8.2 Student's T-Distribution
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- Distinguish between one- and two-tailed hypotheses tests and understand possible conclusions in business examples
- Differentiate between Type I and Type II errors when performing a hypothesis test in business examples

9.2 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 in business examples
- Determine the critical value(s) of a one-mean z-test at a given significance level to define a rejection region in business contexts
- Make a conclusion and interpret the results of a one-mean hypothesis test using the Critical Approach with a known standard deviation in business contexts

9.3 One-Mean Hypothesis Test Using a P-Value

- Use the p-value to make a conclusion and interpret the results of a one-mean hypothesis test with a known standard deviation in business contexts
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9.4 One-Mean T-Test

- 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 in business contexts
- Understand the assumptions and conditions for using the t-test for hypothesis testing, and compute the value of the test statistic

9.5 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 in business applications
- Conduct and interpret a one-mean hypothesis test using the Critical Approach with an unknown standard deviation in business contexts

Chapter 9: Hypothesis Testing for One Population - V2

9.1 Hypothesis Test for the Mean - Population Standard Deviation Known

- Identify the null and alternative hypotheses for an experiment with one population mean
- Distinguish between one- and two-tailed hypothesis tests and understand possible conclusions
- Differentiate between Type I and Type II errors when performing a hypothesis test
- Compute the value of the test statistic (z-value) for a hypothesis test for one population mean with a known standard deviation*

9.2 Conduct a Hypothesis Test for Mean - Population Standard Deviation Known - Critical Value/Rejection Region Approach

- 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 (population standard deviation known) using the Critical Value/Rejection Region Approach

9.3 Conduct a Hypothesis Test for Mean - Population Standard Deviation Known: P-Value Approach

- Find the p-value using a table given test statistic value (z-score) of a one-mean hypothesis test
- Make a conclusion and interpret the results of a one-mean hypothesis test (population standard deviation known) using the P-Value Approach

9.4 Developing Hypothesis and understanding Possible Conclusions

- Compute the value of the test statistic (t-value) and degrees of freedom for a hypothesis test for one population mean with an unknown population standard deviation*

9.5 Conduct a Hypothesis Test for Mean - Population Standard Deviation Unknown - Critical Value/Rejection Region Approach

- Conduct and interpret a one-mean hypothesis test using the Critical Approach with an unknown standard deviation*
- Make a conclusion and interpret the results of a one-mean hypothesis test (population standard deviation unknown) using the Critical Value/Rejection Region Approach

9.6 Conduct a Hypothesis Test for Mean - Population Standard Deviation Unknown: P-Value Approach
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9.7 Hypothesis Test for Proportion - Developing Hypothesis and understanding Possible Conclusions
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- Make a conclusion and interpret the results of a hypothesis test for a proportion using the Critical Value/Rejection Region Approach

9.9 Conduct a Hypothesis Test for Proportion - P-Value Approach
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- Perform and interpret a hypothesis test for the mean, population standard deviation known using Technology - Excel
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10.1 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

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Chapter 10: Hypothesis Testing with Two Populations

10.1 Two-Mean Hypothesis Tests - Independent Samples - Population Standard Deviations Known

- Two-Mean Hypothesis Test with Population Standard Deviations Known
    - Identify null and alternative hypothesis for testing the difference between two means - independent samples - population standard deviations known
    - Calculate test statistic for testing the difference between two means (z value) - population standard deviations known
- Two-Mean Hypothesis Test - Population Standard Deviations Known - Critical Value/Rejection Region Approach
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    - Make a conclusion and interpret the results for testing the difference between two means (population standard deviations known) using the Critical Value/Rejection Region Approach
- Two-Mean Hypothesis Test - Population Standard Deviation Known - P-Value Approach
    - Determine the p-value for a hypothesis test for the difference between two means (population standard deviations known)
    - Make a conclusion and interpret the results for testing the difference between two means (population standard deviation known) using the P-Value Approach

10.2 Two-Mean Hypothesis Tests - Independent Samples - Population Standard Deviations Unknown

- Two-Mean Hypothesis Tests with Population Standard Deviations Unknown
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    - Calculate the test statistic (t-value) for a two-mean hypothesis test for population variances assumed equal (pooled estimate of the standard deviation)
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Chapter 11: Chi-Square Distributions

11.1 Introduction to the Chi-Square Distribution

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- Distinguish between use cases of the chi-square tests

11.2 Chi-Square Goodness-of-Fit Test

- Compute the value of the test statistic using the expected frequencies for a chi-square goodness-of-fit test
- Conduct and interpret a chi-square goodness-of-fit test

11.3 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
- 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

12.1 Linear Regression Equations

- Understand properties of linear equations in business applications
- Understand the relationship between scatter plots and table and determine patterns in business applications
- Find the linear regression equation given a list of data points with business applications

12.2 Uses of Linear Regression

- Find and interpret the correlation coefficient in business contexts
- Make predictions about business scenarios using a line of best fit
- Find outliers in a business-related data set

12.3 Multivariate Relationships

- Identify applications where Multiple Regression can be performed
- Define the format for a multiple regression equation
- Make predictions using the multiple regression equation

12.4 Performing Linear Regressions with Technology - Calculator
- Calculate the correlation coefficient using Technology - Calculator
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- Calculate the correlation coefficient using Technology - Excel
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- ANOVA Basics - Critical Value Approach
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