Methodology: Self-pace learning. All learning is presented using animated lessons, quizzes, and hands-on exercises to help you easily learn, apply statistics and how to use Minitab Statistical Software.

Medium: Web-based. Internet connection is required.

Duration: 14 hours

This learning path emphasizes sound statistical approaches to exploring data, describing important characteristics, as well as creating and interpreting compelling visualizations. You will explore a broad range of graphical and statistical tools to assess if results are on target, investigate differences between groups, and explore relationships between variables. Specifically, discover the fundamentals of important graphical and statistical concepts, such as histograms, heatmaps, bar charts, boxplots, scatterplots, hypothesis testing, confidence intervals, analysis of variance, correlation, and simple regression.

Prerequisite: None. This path is a prerequisite for all other learning paths in Minitab Education Hub.

Course – Descriptive Statistics and Graphical Analysis

Learning Objectives:

- Use graphs and descriptive statistics to gain insight into objects, processes, events and people.
- Distinguish among different types of data.
- Choose the most appropriate visual representation for a given type of data and for the question we are trying to answer.
- Choose the most appropriate descriptive statistics to summarize different aspects of a given data set, such as the central tendency and spread.

Section: Types of Data
- Basic Concepts
- Data Types
- Quiz: Types of Data

Section: Using Graphs to Analyze Data
- Basic Concepts
- Bar Charts and Pareto Charts
- Pie Charts
- Heatmaps
- Histograms
- Dotplots

- Individual Values Plots
- Boxplots
- Time Series Plots
- Importance of Time Order
- Quiz: Using Graphs to Analyze Data
- Minitab Tools: Bar Chart
- Minitab Tools: Pie Chart
- Minitab Tools: Heatmap
- Minitab Tools: Histogram
- Minitab Tools: Dotplot
- Minitab Tools: Individual Value Plot
- Minitab Tools: Boxplot
- Minitab Tools: Time Series Plot
- Exercise: Graphical Analysis

Section: Using Statistical to Analyze Data
- Basic Concepts
- Mean and Median
- Range, Variance, and Standard Deviation
- Quiz: Using Statistical to Analyze Data
- Minitab Tools: Display Descriptive Statistics
- Exercise: Descriptive Statistics

Course – Statistical Inference
Learning Objectives:

- Examine populations by looking at a subset of the population - a sample - and using inferential statistics.
- Define data collection methods that allow you to draw conclusions with a known level of risk.
- Define the sampling distribution, an important theoretical construct statistic, and explain its impact on how well a sample statistic estimates a population parameter.
- Identify basic characteristics of the normal distribution and use them to calculate how well a sample mean estimates a population mean.

Section: Fundamentals of Statistical Inference
- Basic Concepts
- Random Samples
- Quiz: Fundamentals of Statistical Inference
- Minitab Tools: Random Sampling

Section: Sampling Distributions

- Basic Concepts
- Sampling Distribution of the Mean
- Quiz: Sampling Distributions

Section: Normal Distribution

- Basic Concepts
- Probabilities Associated with a Normal Distribution
- Probabilities Associated with the Sample Mean
- Quiz: Normal Distribution
- Minitab Tools: Cumulative Probabilities with a Normal Distribution
- Exercise: Probabilities and Normal Distributions

Course – Hypothesis Tests and Confidence Intervals

Learning Objectives:

- Establish hypotheses about business problems and use statistics to test those hypotheses.
- Use a 1-sample t-test to determine whether a population mean is equal to a hypothesized value.
- Use a 2 variances test to determine whether two populations have the same variance for a given parameter.
- Use a 2-sample t-test to determine whether two populations have equal means.
- Use a paired t-test to determine whether two dependent populations have equal means.
- Use a 1 proportion test to determine whether a population proportion is equal to a hypothesized value.
- Use a 2 proportions test to determine whether the two populations have equal proportions.
- Use a chi-square test to determine whether the values of the two categorical variables are related.

Section: Tests and Confidence Intervals

- Primer: Confidence Intervals for Population Parameters
- Confidence Intervals
- Hypothesis Testing
- Using Hypothesis Tests to Make Decisions
- Type I and Type II Errors and Power
- Quiz: Tests and Confidence Intervals

Section: 1-Sample t-test

- Basic Concepts
- Individual Value Plots
- 1-Sample t-Test Results
- Assumptions
- Quiz: 1-Sample t-Test
- Minitab Tools: 1-Sample t-Test
- Exercise: 1-Sample t-Test

Section: 2 Variance Test

- Basic Concepts
- Boxplots
- 2 Variances Test Results
- Assumptions
- Quiz: 2 Variances Test
- Minitab Tools: 2 Variance Test
- Exercise: 2 Variances Test

Section: 2-Sample t-Test

- Basic Concepts
- Individual Value Plot
- 2-Sample t-Test Results
- Assumptions
- Quiz: 2-Sample t-Test
- Minitab Tools: 2-Sample t-Test
- Exercise: 2-Sample t-Test

Section: Paired t-Test

- Basic Concepts
- Individual Value Plots
- Paired t-Test Results
- Assumptions
- Quiz: Paired t-Test
- Minitab Tools: Paired t-Test
- Exercise: Paired t-Test

Section: 1 Proportion Test

- Basic Concepts
- 1 Proportion Test Results
- Assumptions
- Quiz: 1 Proportion Test
- Minitab Tools: 1 Proportion Test
- Exercise: 1 Proportion Test

Section: 2 Proportion Test

- Basic Concepts
- 2 Proportions Test Results
- Assumptions
- Quiz: 2 Proportions Test
- Minitab Tools: 2 Proportions Test
- Exercise: 2 Proportions Test

Section: Chi-Square Test
- Basic Concepts
- Chi-Square Test Results
- Assumptions
- Quiz: Chi-Square Test
- Minitab Tools: Chi-Square Test
- Exercise: Chi-Square Test

Course – Analysis of Variance (ANOVA)
Learning Objectives:
- Detect significant differences in the mean responses from two or more groups.
- Use individual value plots to visualize within- and between-group variation and identify group means.
- Identify groups whose mean responses differ from the mean responses of other groups in the set.
- Detect significant differences in a mean response due to either of two factors or to the interaction between those factors.

Section: Fundamentals of ANOVA
- Basic Concepts
- Graphs and Summary Statistics
- Quiz: Fundamentals of ANOVA

Section: One-Way ANOVA
- Hypothesis Test
- F-Statistics and P-Values
- Multiple Comparisons
- Assumptions and Residual Plots
- Quiz: One-Way ANOVA
- Minitab Tools: One Way ANOVA
- Exercise: One-Way ANOVA
- Blocking in One-Way ANOVA

Section: Two-Way ANOVA
- Basic Concepts
- Graphs
- Hypothesis Tests
- F-Statistics and P-Values
- Assumptions and Residual Plots
- Quiz: Two-Way ANOVA
- Minitab Tools: Two-Way ANOVA
- Exercise: Two-Way ANOVA

Course – Correlation and Regression

Learning Objectives:

- Identify and characterize relationships between variables and use the relationships to predict the outcomes of business decisions.
- Use scatterplots and correlation to visualize and quantify the strength and nature or relationships between numeric variables.
- Use regression to define linear relationships between numeric variables mathematically, producing equations to predict one value from another.

Section: Relationship Between Two Quantitative Variables
- Basic Concepts
- Scatterplot
- Correlation
- Quiz: Relationship Between Two Quantitative Variables
- Minitab Tools: Scatterplot
- Minitab Tools: Correlation
- Exercise: Scatterplot and Correlation

Section: Simple Regression

- Basic Concepts
- Regression
- Hypothesis Tests and R2
- Assumptions and Residual Plots
- Quiz: Simple Regression
- Minitab Tools: Simple Linear Regression
- Exercise Simple Regression
- Primer: Trend Analysis in Time Series