DATA SCIENCE AND ANALYTICS

STATISTICS AND PROBABILITY

COURSE
SYLLABUS

TABLE OF CONTENTS

COURSE DETAILS

Duration

36 hours • 9 Modules

Course description

In this course, learners will gain an understanding of statistics and probability whilst using Excel as the main calculation tool. The course will discuss the topics of descriptive statistics, probability, sampling methods, hypothesis testing, and linear regression. Learners will work through a variety of hands-on activities in the subjects of finance, healthcare, sports, and entertainment.

By the end of this course, learners will be well-versed in the capabilities of Excel for visual and statistical purposes. Additionally, learners will get the opportunity to practice developing their soft skills through presenting their statistical findings to their peers.

Before taking the Statistics and Probability course, learners should have:

- A reliable and recent PC
- Basic knowledge of computers, such as how to open programs, point and click, and navigate in web browsers
- Knowledge of basic math through high school algebra
- Excel 2007 or newer

Learners will use the knowledge acquired here to complete the first milestone project of the program.

Learning goals

By the end of this course, you will be able to:

- Calculate descriptive statistics to describe a distribution.
- Demonstrate the rules of probability.
- Describe and institute sampling methods for different testing outcomes.
- Perform a variety of hypothesis tests.
- Conduct analysis of variance.
- Create a linear regression model.

Learning objectives

- Use Excel functions and formulas to calculate descriptive statistics.
- Use the **Data Analysis ToolPak** to perform and interpret hypothesis tests, as well as conduct linear regression.
- Use Excel's chart functions to visually represent statistical concepts and findings.

REQUIREMENTS

Course completion requirements

- Attend 80% of classes.
- Show passion, aptitude, and potential.

Software

To complete the course, learners need the following:

- Computer with access to the internet
- Web browser
- Excel 2007 or newer

GRADING

Assessment scale

Assessment	Points	% of Grade	# of Assessments	Cumulative Points
Quizzes	10	100%	9	90
			Points Possible	**90**

COURSE OVERVIEW

Class details

#	Module Name	Lessons and Workshops
SP-01	Introduction to Statistics	Lesson 1: Statistics and Excel Introduction Lesson 2: Introduction to Descriptive Statistics Lesson 3: Calculating Descriptive Statistics *Asynchronous Lesson: Pivot Tables*
SP-02	Visualizations	Lesson 1: Statistical Visualizations Lesson 2: Creating Statistical Visualizations Lesson 3: Bias *Asynchronous Lesson: Cleaning with Excel*
SP-03	Probability Theory	Lesson 1: Introduction to Probability Lesson 2: Terminology and Notation Lesson 3: Independent Events and Mutual Exclusivity *Asynchronous Lesson: Validating with Excel*
SP-04	Conditional Probability	Lesson 1: Basic Operation Rules Lesson 2: Conditional Probability Lesson 3: Bayes' Theorem *Asynchronous Lesson: The Binomial Distribution*
SP-05	Sampling	Lesson 1: Introduction to Sampling Lesson 2: Probability and Non-probability Sampling Lesson 3: Determining Sample Size *Asynchronous Lesson: Types of Statistical Studies*
SP-06	Introduction to Hypothesis Testing	Lesson 1: Introduction to Hypothesis Testing Lesson 2: Formulating a Hypothesis Lesson 3: Independence and Linearity *Asynchronous Lesson: Random Sampling Methods*
SP-07	Interpreting Hypothesis Tests	Lesson 1: T-Tests and ANOVA Lesson 2: Significance Levels and Error Types Lesson 3: Confidence Levels and Intervals *Asynchronous Lesson: Testing for Normality and Symmetry*
SP-08	Advanced Testing	Lesson 1: Chi-Square Distribution and Goodness of Fit Lesson 2: Test for Homogeneity Lesson 3: F Distribution *Asynchronous Lesson: Test for Independence*

SP-09	Linear Regression Primer	Lesson 1: Introduction to Linear Regression and Correlation Lesson 2: Line of Best Fit Lesson 3: Making Predictions *Asynchronous Lesson: Testing the Correlation Coefficient*

Class assignments

#	Module Name	To-Dos Before Next Class	Canvas Assignments
--	Prework		Nothing to submit
SP-01	Introduction to Statistics	• Answer questions about your industry or workplace. • Work with the data set from class to remove duplicates and locate errors. • Perform the cleaning techniques from class on a data set of 150 movie catchphrases.	Quiz #1
SP-02	Visualizations	• Watch two videos on how to calculate descriptive statistics. • Create a grocery list and calculate descriptive statistics. • Use ***V/X-lookup()*** to match Congress people to their party code.	Quiz #2
SP-03	Probability Theory	• Create a frequency table and sketch a histogram of car rental price. • Create a boxplot and histogram with Jon Peltier. • Read an article to compare the examples to visualizations you have seen in real life.	Quiz #3
SP-04	Conditional Probability	• Calculate single probabilities. • Calculate independent and mutually exclusive events. • Complete five binomial distribution examples.	Quiz #4
SP-05	Sampling	• Complete addition and	Quiz #5

		multiplication probability questions. ● Answer five questions on events and probability. ● Calculate the probability of your friend getting a second interview for Walt the Weatherman's team.	
SP-06	Introduction to Hypothesis Testing	● Practice quiz on populations vs. samples. ● Read through the *methods* section of a research study to determine how the sample was acquired. ● Determine what type of study the research is.	Quiz #6
SP-07	Interpreting Hypothesis Tests	● Read an article to learn new module terminology. ● Practice writing null and alternative hypotheses on Khan Academy. ● Read a finance article.	Quiz #7
SP-08	Advanced Testing	● Read about how skewed data affects different industries. ● Complete two example problems on Stat Trek. ● Use p-values to make a business decision.	Quiz #8
SP-09	Linear Regression Primer	● Research how the chi-square distribution demonstrates in different industries.	Quiz #9