uCertify

Course Outline

Exploratory Data Analysis with Python



27 Mar 2024

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1. Course Objective

Get hands-on experience of Exploratory Data Analysis with Python with the comprehensive course and lab. The lab provides hands-on learning of EDA (Exploratory Data Analysis), beginning up with the basics to gain insights along with diverse techniques like data cleaning, data preparation, data exploration, and data visualization. The course and lab deal with importing, cleaning, and exploring data to perform preliminary analysis using powerful Python packages, and many more. Using Python for data analysis, you'll work with real-world datasets, understand data, summarize its characteristics, and visualize it for business intelligence.

2. Pre-Assessment

Pre-Assessment lets you identify the areas for improvement before you start your prep. It determines what students know about a topic before it is taught and identifies areas for improvement with question assessment before beginning the course.

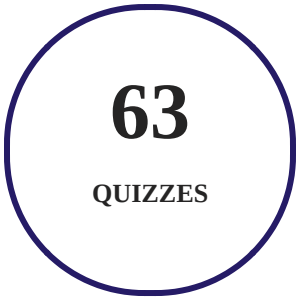
3. Exercises

There is no limit to the number of times learners can attempt these. Exercises come with detailed remediation, which ensures that learners are confident on the topic before proceeding.



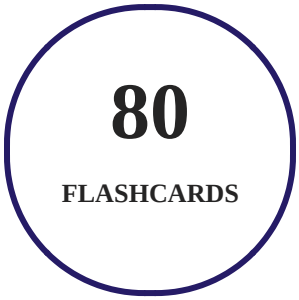
4. Quizzes

Quizzes test your knowledge on the topics of the exam when you go through the course material. There is no limit to the number of times you can attempt it.



5. flashcards

Flashcards are effective memory-aiding tools that help you learn complex topics easily. The flashcard will help you in memorizing definitions, terminologies, key concepts, and more. There is no limit to the number of times learners can attempt these. Flashcards help master the key concepts.



6. Glossary of terms

uCertify provides detailed explanations of concepts relevant to the course through Glossary. It contains a list of frequently used terminologies along with its detailed explanation. Glossary defines the key terms.



7. Expert Instructor-Led Training

uCertify uses the content from the finest publishers and only the IT industry's finest instructors. They have a minimum of 15 years real-world experience and are subject matter experts in their fields. Unlike a live class, you can study at your own pace. This creates a personal learning experience and gives you all the benefit of hands-on training with the flexibility of doing it around your schedule 24/7.

8. ADA Compliant & JAWS Compatible Platform

uCertify course and labs are ADA (Americans with Disability Act) compliant. It is now more accessible to students with features such as:

- Change the font, size, and color of the content of the course
- Text-to-speech, reads the text into spoken words
- Interactive videos, how-tos videos come with transcripts and voice-over
- Interactive transcripts, each word is clickable. Students can clip a specific part of the video by clicking on a word or a portion of the text.

JAWS (Job Access with Speech) is a computer screen reader program for Microsoft Windows that reads the screen either with a text-to-speech output or by a Refreshable Braille display. Student can easily navigate uCertify course using JAWS shortcut keys.

9. State of the Art Educator Tools

uCertify knows the importance of instructors and provide tools to help them do their job effectively. Instructors are able to clone and customize course. Do ability grouping. Create sections. Design grade scale and grade formula. Create and schedule assessments. Educators can also move a student from self-paced to mentor-guided to instructor-led mode in three clicks.

10. Award Winning Learning Platform (LMS)

uCertify has developed an award winning, highly interactive yet simple to use platform. The SIIA CODiE Awards is the only peer-reviewed program to showcase business and education technology's finest products and services. Since 1986, thousands of products, services and solutions have been

recognized for achieving excellence. uCertify has won CODiE awards consecutively for last 7 years:

- **2014**
    1. Best Postsecondary Learning Solution

- **2015**
    1. Best Education Solution
    2. Best Virtual Learning Solution
    3. Best Student Assessment Solution
    4. Best Postsecondary Learning Solution
    5. Best Career and Workforce Readiness Solution
    6. Best Instructional Solution in Other Curriculum Areas
    7. Best Corporate Learning/Workforce Development Solution

- **2016**
    1. Best Virtual Learning Solution
    2. Best Education Cloud-based Solution
    3. Best College and Career Readiness Solution
    4. Best Corporate / Workforce Learning Solution
    5. Best Postsecondary Learning Content Solution
    6. Best Postsecondary LMS or Learning Platform
    7. Best Learning Relationship Management Solution

- **2017**
    1. Best Overall Education Solution
    2. Best Student Assessment Solution
    3. Best Corporate/Workforce Learning Solution
    4. Best Higher Education LMS or Learning Platform

- **2018**
    1. Best Higher Education LMS or Learning Platform

2. Best Instructional Solution in Other Curriculum Areas
3. Best Learning Relationship Management Solution

- **2019**
  1. Best Virtual Learning Solution
  2. Best Content Authoring Development or Curation Solution
  3. Best Higher Education Learning Management Solution (LMS)

- **2020**
  1. Best College and Career Readiness Solution
  2. Best Cross-Curricular Solution
  3. Best Virtual Learning Solution

11. Chapter & Lessons

uCertify brings these textbooks to life. It is full of interactive activities that keeps the learner engaged. uCertify brings all available learning resources for a topic in one place so that the learner can efficiently learn without going to multiple places. Challenge questions are also embedded in the chapters so learners can attempt those while they are learning about that particular topic. This helps them grasp the concepts better because they can go over it again right away which improves learning.

Learners can do Flashcards, Exercises, Quizzes and Labs related to each chapter. At the end of every lesson, uCertify courses guide the learners on the path they should follow.

Syllabus

Chapter 1: Preface

- Who this course is for?
- What this course covers?
- To get the most out of this course

- Conventions used

Chapter 2: Exploratory Data Analysis Fundamentals

- Understanding data science
- The significance of EDA
- Making sense of data
- Comparing EDA with classical and Bayesian analysis
- Software tools available for EDA
- Getting started with EDA
- Summary
- Further reading

Chapter 3: Visual Aids for EDA

- Technical requirements
- Line chart
- Bar charts
- Scatter plot
- Area plot and stacked plot

- Pie chart
- Table chart
- Polar chart
- Histogram
- Lollipop chart
- Choosing the best chart
- Other libraries to explore
- Summary
- Further reading

Chapter 4: Activity: EDA with Personal Email

- Technical requirements
- Loading the dataset
- Data transformation
- Data analysis
- Summary
- Further reading

Chapter 5: Data Transformation

- Technical requirements
- Background
- Merging database-style dataframes
- Transformation techniques
- Benefits of data transformation
- Summary
- Further reading

Chapter 6: Descriptive Statistics

- Technical requirements
- Understanding statistics
- Measures of central tendency
- Measures of dispersion
- Summary
- Further reading

Chapter 7: Grouping Datasets

- Technical requirements

- Understanding groupby()
- Groupby mechanics
- Data aggregation
- Pivot tables and cross-tabulations
- Summary
- Further reading

Chapter 8: Correlation

- Technical requirements
- Introducing correlation
- Types of analysis
- Discussing multivariate analysis using the Titanic dataset
- Outlining Simpson's paradox
- Correlation does not imply causation
- Summary
- Further reading

Chapter 9: Activity: Time Series Analysis

- Technical requirements

- Understanding the time series dataset
- TSA with Open Power System Data
- Summary
- Further reading

Chapter 10: Hypothesis Testing and Regression

- Hypothesis testing
- p-hacking
- Understanding regression
- Model development and evaluation
- Summary
- Further reading

Chapter 11: Model Development and Evaluation

- Technical requirements
- Types of machine learning
- Understanding supervised learning
- Understanding unsupervised learning

- Understanding reinforcement learning
- Unified machine learning workflow
- Summary
- Further reading

Chapter 12: Activity: EDA on Wine Quality Data Analysis

- Technical requirements
- Disclosing the wine quality dataset
- Analyzing red wine
- Analyzing white wine
- Model development and evaluation
- Summary
- Further reading

Chapter 13: Appendix

- String manipulation
- Using pandas vectorized string functions
- Using regular expressions
- Further reading

12. Practice Test

Here's what you get

35	35
PRE-ASSESSMENTS QUESTIONS	POST-ASSESSMENTS QUESTIONS

Features

Each question comes with detailed remediation explaining not only why an answer option is correct but also why it is incorrect.

Unlimited Practice

Each test can be taken unlimited number of times until the learner feels they are prepared. Learner can review the test and read detailed remediation. Detailed test history is also available.

Each test set comes with learn, test and review modes. In learn mode, learners will attempt a question and will get immediate feedback and complete remediation as they move on to the next question. In test mode, learners can take a timed test simulating the actual exam conditions. In review mode, learners can read through one item at a time without attempting it.

13. Live Labs

The benefits of live-labs are:

- Exam based practical tasks
- Real equipment, absolutely no simulations
- Access to the latest industry technologies
- Available anytime, anywhere on any device
- Break and Reset functionality
- No hardware costs

Lab Tasks

Exploratory Data Analysis Fundamentals

- Styling a Dataframe
- Applying Function to a Dataframe
- Slicing and Subsetting
- Dividing NumPy Arrays
- Inspecting NumPy Arrays
- Defining NumPy arrays
- Selecting rows
- Reading Data from a CSV File
- Creating a Dataframe

Visual Aids for EDA

- Creating a Line chart
- Creating a Bar Chart
- Creating a Scatter Plot
- Creating a Bubble Chart
- Creating an Area Plot
- Creating a Pie Chart
- Creating a Table Chart
- Creating a Polar Chart

- Adding the Best-Fit Line for the Normal Distribution
- Creating a Histogram
- Creating a Lollipop Chart

Activity: EDA with Personal Email

- Performing EDA with Email Data
- Extracting Email Using Regex
- Converting a Field to datetime
- Removing NaN Values
- Dropping a Column

Data Transformation

- Stacking a Dataframe
- Concatenating Dataframes
- Analyzing Dataframes
- Combining Dataframes
- Merging on Index
- Permuting a Dataframe
- Removing Duplicate Data
- Replacing Values
- Interpolating Missing Values
- Backward and Forward Filling
- Handling NaN values
- Counting Missing Values
- Renaming Axis Indexes
- Binning
- Detecting Outliers

Descriptive Statistics

- Generating a Binomial Distribution Plot
- Generating an Exponential Distribution Plot
- Generating a Normal Distribution Plot
- Generating a Uniform Distribution Plot

- Using Statistical Functions
- Calculating Standard Deviation
- Finding Skewness and Kurtosis
- Creating a Box Plot
- Calculating Inter-Quartile Range

Grouping Datasets

- Finding Maximum Value for Each Group
- Grouping a Dataset
- Filtering Data
- Applying Aggregation Functions
- Creating a Pivot Table
- Creating a Cross-Tabulation Table

Correlation

- Calculating Correlation Coefficient

Activity: Time Series Analysis

- Sampling the Data
- Resampling the Data
- Changing the Index of a Dataframe

Hypothesis Testing and Regression

- Performing Z-Test
- Calculating the P-Value
- Performing T-test
- Scoring the Model
- Understanding the Linear Regression Model

Model Development and Evaluation

- Using TfidfVectorizer

Activity: EDA on Wine Quality Data Analysis

- Plotting a Heatmap
- Visualizing the Data in 3D Form

Appendix

- Accessing Characters
- String Slicing
- Updating a String
- Escape Sequencing
- Formatting Strings
- Displaying Last 10 items from a Dataframe
- Using String Functions with a Dataframe
- Finding Words from a String
- Counting Full Stops using Regex
- Matching Characters

Here's what you get

77	13	20
LIVE LABS	VIDEO TUTORIALS	MINUTES

14. Post-Assessment

After completion of the uCertify course Post-Assessments are given to students and often used in conjunction with a Pre-Assessment to measure their achievement and the effectiveness of the exam.