

# Certified Entry-Level Data Analyst with Python (PCED™)

This entry-level Certified Entry-Level Data Analyst with Python (PCED™) training prepares data analysts to manipulate, analyze and visualize data using Python.

[CBT Nuggets course material](#) →

## WEEK 1

### Introduction to NumPy

153 min.

Working with NumPy Arrays	10
Accessing and Slicing NumPy Arrays	10
Other Ways to Create NumPy Arrays	8
Challenge & Solution: NumPy Array Practice	7

### Working with Multidimensional NumPy Arrays

Multi-Dimensional Arrays	13
Accessing Multi-Dimensional Array Values	13
Slicing Multi-Dimensional Arrays	10
Challenge & Solution: 4D Arrays	14

### NumPy Array Operations

Sorting NumPy Arrays	11
Concatenating and Removing Array Elements	8
Reshaping and Resizing Arrays	10
NumPy Array Attributes	5
Challenge & Solution: np.lexsort	7

### Basics of Jupyter Notebooks

What are Jupyter Notebooks?	8
Getting Started with Jupyter Notebooks	9
The Basic Jupyter Interface	10

## WEEK 2

152 min.

Essential Jupyter Hotkeys	10
Hotkey Challenge	10

## Introduction to Fancy Indexing in NumPy

Integer Array Indexing	13
Combining Integer Indexing with Slicing	11
Boolean Array Indexing	11
Challenge & Solution: Combining Integer and Boolean Indexing	18

## NumPy Array Broadcasting In-Depth

Array Broadcasting Basics	11
Broadcasting with Arrays of Different Sizes	14
Resizing and Reshaping with Broadcasting	14
Challenge & Solution: Broadcasting Applications	11

## Basic Data Analysis with NumPy Arrays

Using "Toy" Datasets	12
Manipulating Toy Datasets with NumPy	9
Using NumPy's .mean Method	8

## WEEK 3

161 min.

Using NumPy's Descriptive Statistics Functions	8
Challenge & Solution: Applying NumPy Operations to Datasets	2

## Basics of Pandas Series

Introduction to Pandas	5
Creating Pandas Series	14
Accessing and Manipulating Pandas Series	11
Useful Series-Creation Functions	10
Challenge & Solution: Series-Series Operations	5

## Basics of Pandas DataFrames

Creating DataFrames	13
Accessing Rows and Columns on DataFrames	9
Adding and Removing Columns	10
Challenge & Solution: Other Ways of Creating DataFrames	11

## NumPy's Data Types In-Depth

NumPy Integer Types	15
NumPy Float Types	10
Other Common Data Types	10
Challenge & Solution: Structured Data Types	7

## Generating Random Numbers with NumPy and Pandas

Generating Random Floats	9
Generating Random Integers	12

## WEEK 4

152 min.

Making Random Selections from Arrays	8
Generating Random Numbers from Distributions	8
Challenge & Solution: Generating Synthetic Data	5

## Working with Datasets in Pandas

Loading and Viewing CSV Datasets	11
Basic Data Exploration	12
Viewing Unique Values	9
Renaming DataFrame Columns	9
Challenge: Your Turn	1

## Dataset Cleaning in Pandas

Finding Missing Values in DataFrames	11
Viewing Rows with Missing Values	5
Handling Missing Values	13
Retrying DataFrame Columns	10
Challenge & Solution: Cleaning Real-Estate Data	9

## The Basics of Pandas Dataset Grouping

Setting Up a Dataset	16
Grouping DataFrames By Column	11
Grouping By Multiple Columns	9
Challenge & Solution: Data Grouping Tasks	5

## WEEK 5

### Intermediate Dataset Grouping

158 min.

Introduction to Pandas Categories	15
Aggregation Functions	8
Grouping Non-Categorical Data	11
Challenge & Solution: Another Method for Non-Categorical Grouping	2

### Filtering Data in Pandas

Filtering Pandas Series	13
Filtering Pandas DataFrames	11
Filtering Groups of Series	10
Filtering Groups of DataFrames	7
Challenge & Solution: More DataFrameGroupBy Filtering	5

## Transforming Data in Pandas

Transforming Series	9
Transforming Series Using Lists and Dictionaries	7
Transforming DataFrames	7
Transforming Groups	9
Challenge & Solution: Transformation Exercises	4

## Applying Functions in Pandas

Applying Functions to Entire DataFrames	16
Applying Functions to Columns	8
Applying Functions to Rows	7
Applying Functions to Cells	9

## WEEK 6

152 min.

Challenge & Solution: Filling Addresses	2
---	---

### Sorting Pandas Data Structures

Sorting Series	7
Sorting DataFrames by Column	6
DataFrame Sorting Settings	10
Reordering DataFrame Columns	8
Getting the Largest and Smallest Values	8
Challenge & Solution: Sort By String Length	4

### Introduction to Web Scraping with BeautifulSoup

The Basic Web Scraping Process	7
Loading and Parsing HTML	10
Basic Parsing with BeautifulSoup	8
Scraping a Website with BeautifulSoup	16

Challenge & Solution: Scraping Multiple Pages 7

### BeautifulSoup Types In-Depth

The 4 BeautifulSoup Types 11

The BeautifulSoup Tag Type 14

The NavigableString Type 12

Challenge & Solution: The BeautifulSoup and Comment Types 8

### Finding Elements with BeautifulSoup

The Basics of Finding Elements 14

## WEEK 7

155 min.

Finding Multiple Elements 7

Finding Sibling Elements 13

Finding Parent Elements 6

Challenge & Solution: Finding Elements 11

### CSS Selectors For Web Scraping

The Basics of Using CSS Selectors with BeautifulSoup 10

CSS Tag Selectors 7

CSS Class and ID Selectors 10

CSS Attribute Selectors 11

Challenge & Solution: Internal Links 6

### CSS Combinators for Web-Scraping

Additional Attribute Value Selectors 13

Selector Lists and Child Combinators 8

The Descendant Combinator 8

The Next-Sibling and Subsequent-Sibling Combinators 12

Challenge: Combinator Quiz 1

### CSS Pseudo-Classes for Web-Scraping

The First- and Last-Child Pseudo-Classes 11

The First- and Last-of-Type Pseudo-Classes 11

The "not" Pseudo-Class 10

## WEEK 8

158 min.

The "has" Pseudo-Class 10

Challenge: CSS Pseudo-Class Golf! 1

### Introduction to XPath for Web-Scraping

What is XPath? 11

Using XPath in Jupyter 8

Absolute and Relative XPaths 9

Selecting Elements by Attribute Value 10

Challenge & Solution: Scraping HackerNews with XPath 4

### Intermediate XPath Concepts

Selecting Text and Attributes from Elements 12

Selecting Elements by Position 10

The Basics of XPath Axes 9

More XPath Axes 8

Challenge & Solution: Scraping Recipes 3

## XPath Predicates Basics

What are Predicates?	11
Other Ways of Filtering By Attributes	12
Filtering With Non-Attribute Properties	1
Challenge: More Recipe Scraping	3

## Advanced XPath Predicates

Path-Related XPath Predicates	13
Case-Insensitive Comparisons	11
Using Axes in Predicates	12

## WEEK 9

153 min.

Challenge & Solution: "Not"	7
-----------------------------	---

## Basics of Data Visualization with Matplotlib

Displaying a Line Plot	11
Plotting Multiple Lines	8
Customizing Plots	13
Challenge & Solution: Displaying Real Data	3

## Working with Scatterplots in Matplotlib

Scatterplot Basics	11
Customizing Scatterplot Appearance	7
Color-Mapping Scatterplots	6
Plotting Multiple Datasets	6
Challenge & Solution: Scatter-Plotting Groups	1

## Working with Bar Charts in Matplotlib

Displaying Basic Bar Charts	11
-----------------------------	----

Customizing Bar Chart Appearances	10
Adding Annotations to Bars	8
Drawing Different Bar Chart Types	8
Challenge & Solution: Annotating Vertical Bar Charts	1

## Working with Pie Charts in Matplotlib

Displaying Basic Pie Charts	8
Customizing Pie Chart Appearances	11
Drawing Different Types of Pie Charts	17
Challenge & Solution: Adding Another Layer	6

## WEEK 10

Statistical Visualization Basics with Matplotlib 151 min.

Displaying Histograms	12
Customizing Histograms	13
Drawing Boxplots	11
Challenge & Solution: Plotting Real-World Data	2

## Matplotlib Figures In-Depth

The Different Parts of a Figure	9
Displaying Multiple Plots	10
Another Way to Display Multiple Plots	9
Controlling Axes Layouts	8
Challenge & Solution: Displaying Real-World Data	2

## Adding Interactivity with Matplotlib Widgets

The Slider Widget	11
Responding to Widget Updates	13

The Range Slider Widget	10
Challenge & Solution: Using Real-World Data	1

### More Matplotlib Widgets

The Button Widget	14
The RadioButtons Widget	9
The RectangleSelector Widget	12
Challenge & Solution: The CheckButtons Widget	4

### Introduction to Seaborn

Seaborn Basics	1
----------------	---

## WEEK 11

162 min.

Seaborn's Built-in Datasets	11
The Different Plot Types	10
A Basic Demonstration	10
Challenge: Your Turn!	1

### Working with Seaborn's Relational Plots

The .relplot Function	12
Changing Datapoint Appearances	13
Separating Data Into Multiple Plots	11
Challenge & Solution: Penguins	3

### Working with Seaborn's Categorical Plots

The .catplot Function	9
Changing Datapoint Appearances	10
The Different Types of Categorical Plots	5

Using Specific Categorical Plot Functions	1
Challenge & Solution: Recreate the Plot	9

### Machine Learning Algorithms: K-Nearest Neighbor

Basics of the K-Nearest Neighbor Algorithm	9
Creating Test Data with Scikit Learn	5
Predicting a Single Data Point	7
Using Training and Test Sets	12
Challenge & Solution: Apply K-Nearest Neighbor	4

### Machine Learning Algorithms: Linear Models

Creating Test Data with Scikit Learn	8
Fitting a Line with Scikit Learn	12

## WEEK 12

152 min.

Making Predictions	7
Challenge & Solution: Applying Linear Models	2

### Machine Learning Algorithms: K-Means Clustering

The Basics of K-Means Clustering	8
Running the K-Means Algorithm	1
Additional K-Means Details	12
Choosing the Optimal Number of Clusters	7
Challenge & Solution: Applying K-Means Clustering	7

### Machine Learning Algorithms: Neural Networks

The Basics of Neural Networks	8
Constructing Neural Networks	11

Training a Neural Network	14
Challenge & Solution: Finding Decision Boundaries	3

### Machine Learning Algorithms: Classification Trees

The Basics of Classification Trees	10
Finding Possible Splits	9
Deciding on the Best Split	10
Splitting Recursively	11
Challenge & Solution: Maximum Tree Depth	2

### Basics of Descriptive Statistics

What are Descriptive Statistics?	9
Measures of Central Tendency	11
Measures of Variability	10

## WEEK 13

153 min.

Different Types of Distributions	1
Challenge & Solution: Finding the Median and Mode	6

### Descriptive Statistics In-Depth

The Normal Distribution In-Depth	12
Useful Properties of the Normal Distribution	7
Z-Scores and How to Use Them	1
Samples vs. Populations in Statistics	1
Challenge & Solution: A Few Useful Functions	11

### Correlation In Statistics

What is Correlation?	10
----------------------	----

Common Correlation Misconceptions	9
Calculating Correlation in Datasets	14
Correlation Heat Maps	10
Challenge: Correlation of Real-World Data	2

### Inferential Statistics Fundamentals

What is Inferential Statistics?	15
Basics of Hypothesis Testing	11
Hypothesis Testing in Jupyter	12
Challenge & Solution: Perform a Hypothesis Test	7

### Bootstrapping and Other Inferential Strategies

The Central Limit Theorem	9
A Central Limit Theorem Demonstration	15

## WEEK 14

153 min.

Bootstrapping Basics	7
A Bootstrapping Demonstration	10
Challenge & Solution: Bootstrapping the Median	8

### Introduction to SQL For Data Analysts

The SQL Landscape	14
Connecting to SQL Databases in Jupyter	11
Making SQL Queries	7
Making Queries with Magics	7
Challenge & Solution: Practice with SQL	2

## SQL Query Fundamentals

The SELECT Statement	12
The WHERE Clause	11
Other WHERE Clause Situations	14
The ORDER BY Clause	5
Challenge & Solution: SQL Exercises	3

## Managing Data in SQL Tables

Basics of SQL Tables	10
Creating SQL Tables	7
Inserting Data Into SQL Tables	11
SQLite's Data Types and Constraints	1
Challenge & Solution: Checking Out Constraints	1

## Updating and Deleting Data in SQL

Updating SQL Rows	12
-------------------	----

## WEEK 15

153 min.

Advanced UPDATE Usage	13
Deleting SQL Rows	7
Deleting and Altering SQL Tables	14
Challenge & Solution: Renaming Columns	2

## SQL Relationships and Joins

What Are Table Relationships?	10
One-to-One Relationships	13
Performing Joins in SQL	8
One-to-Many Relationships	7
Many-to-Many Relationships	5

Challenge & Solution: Many-to-Many Implementation	1
---	---

## Aggregates and Grouping in SQL

Aggregate Functions	8
Using Aggregate Functions in Queries	10
The GROUP BY Clause	9
The HAVING and DISTINCT Keywords	11
Challenge & Solution: Practice with Aggregates	4

## SQL Subqueries

Basics of Subqueries	9
Single-Row Subqueries	15
Multi-Row Subqueries	7

## WEEK 16

55 min.

Correlated Subqueries	6
Challenge & Solution: More Subqueries	2

## SQL Transactions and Rollbacks

Basics of Transactions	9
Performing SQL Transactions	12
SQL Transactions with the sqlite3 Module	9
Rolling Back Transactions	9
Challenge & Solution: Inserting Data Into Multiple Tables	8