

Certified Associate Data Analyst with Python (PCAD™)

This course prepares you to sit the PCAD - Certified Associate Data Analyst with Python certification, covering the core skills employers expect from a professional data analyst. You'll work through Python for data manipulation, Pandas, NumPy, Matplotlib, and Seaborn for querying and aggregating datasets, and statistical methods for drawing reliable conclusions from data. The course maps to the official PCAD exam objectives, so you're building practical skills and exam readiness at the same time. It's perfect for candidates at an early to mid stage of their analytics career, including those transitioning from data-adjacent roles.

[CBT Nuggets course material](#) →



WEEK 1

Basics of Jupyter Notebooks

- Getting Started with Jupyter Notebooks
- The Basic Jupyter Interface
- Essential Jupyter Hotkeys
- Hotkey Challenge

Introduction to NumPy

- Basic NumPy Concepts
- Working with NumPy Arrays
- Accessing and Slicing NumPy Arrays
- Other Ways to Create NumPy Arrays
- Challenge & Solution

Working with Multidimensional NumPy Arrays

- Multi-Dimensional Arrays
- Accessing Multi-Dimensional Array Values
- Slicing Multi-Dimensional Arrays
- Challenge & Solution

NumPy Array Operations

- Sorting NumPy Arrays
- Concatenating and Removing Array Elements

WEEK 2

- Reshaping and Resizing Arrays
- NumPy Array Attributes
- Challenge & Solution

Introduction to Fancy Indexing in NumPy

Integer Array Indexing

Combining Integer Indexing with Slicing

Boolean Array Indexing

Challenge & Solution

NumPy Array Broadcasting In-Depth

Array Broadcasting Basics

Broadcasting with Arrays of Different Sizes

Resizing and Reshaping with Broadcasting

Challenge & Solution

Basic Data Analysis with NumPy Arrays

Using "Toy" Datasets

Manipulating Toy Datasets with NumPy

Using NumPy's .mean Method

WEEK 3

Using NumPy's Descriptive Statistics Functions

Challenge & Solution

NumPy's Data Types In-Depth

NumPy Integer Types

NumPy Float Types

Other Common Data Types

Challenge & Solution

Basics of Pandas Series

Introduction to Pandas

Creating Pandas Series

Accessing and Manipulating Pandas Series

Useful Series-Creation Functions

Challenge & Solution

Basics of Pandas DataFrames

Creating DataFrames

Accessing Rows and Columns on DataFrames

Adding and Removing Columns

Challenge & Solution

Generating Random Numbers with NumPy and Pandas

Generating Random Floats

Generating Random Integers

WEEK 4

Making Random Selections from Arrays

Generating Random Numbers from Distributions

Challenge & Solution

Working with Datasets in Pandas

Loading and Viewing CSV Datasets

Basic Data Exploration

Viewing Unique Values

Renaming DataFrame Columns

Challenge

Dataset Cleaning in Pandas

Finding Missing Values in DataFrames

Viewing Rows with Missing Values

Handling Missing Values

Retrying DataFrame Columns

Challenge & Solution

An In-Depth Look At Missing Values

The Different Types Of "Missingness"

How MCAR Affects Datasets

How MAR and MNAR Affect Datasets

Challenge & Solution

The Basics of Pandas Dataset Grouping

Setting Up a Dataset

Grouping DataFrames By Column

Grouping By Multiple Columns

Challenge & Solution

Intermediate Dataset Grouping

Introduction to Pandas Categories

Aggregation Functions

Grouping Non-Categorical Data

Challenge & Solution

Filtering Data in Pandas

Filtering Pandas Series

Filtering Pandas DataFrames

Filtering Groups of Series

WEEK 5

Filtering Groups of DataFrames

Challenge & Solution

Transforming Data in Pandas

Transforming Series

Transforming Series Using Lists and Dictionaries

Transforming DataFrames

Transforming Groups

Challenge & Solution

Applying Functions in Pandas

Applying Functions to Entire DataFrames

Applying Functions to Columns

Applying Functions to Rows

Applying Functions to Cells

Challenge & Solution

Sorting Pandas Data Structures

Sorting Series

Sorting DataFrames by Column

DataFrame Sorting Settings

Reordering DataFrame Columns

Getting the Largest and Smallest Values

Challenge & Solution

Introduction to Web Scraping with BeautifulSoup

WEEK 6

The Basic Web Scraping Process
Loading and Parsing HTML
Basic Parsing with BeautifulSoup
Scraping a Website with BeautifulSoup
Challenge & Solution

BeautifulSoup Types In-Depth

The 4 BeautifulSoup Types
The BeautifulSoup Tag Type
The NavigableString Type
Challenge & Solution

Finding Elements with BeautifulSoup

The Basics of Finding Elements

Finding Multiple Elements
Finding Sibling Elements
Finding Parent Elements
Challenge & Solution

CSS Selectors For Web Scraping

The Basics of Using CSS Selectors with BeautifulSoup
CSS Tag Selectors
CSS Class and ID Selectors
CSS Attribute Selectors
Challenge & Solution

WEEK 7

CSS Combinators for Web-Scraping

Additional Attribute Value Selectors
Selector Lists and Child Combinators
The Descendant Combinator
The Next-Sibling and Subsequent-Sibling Combinators
Challenge

CSS Pseudo-Classes for Web-Scraping

The First- and Last-Child Pseudo-Classes
The First- and Last-of-Type Pseudo-Classes
The "not" Pseudo-Class

The "has" Pseudo-Class
Challenge

Introduction to XPath for Web-Scraping

What is XPath?
Using XPath in Jupyter
Absolute and Relative XPaths
Selecting Elements by Attribute Value
Challenge & Solution

Intermediate XPath Concepts

Selecting Text and Attributes from Elements
Selecting Elements by Position
The Basics of XPath Axes
More XPath Axes
Challenge & Solution

WEEK 8

XPath Predicates Basics

What are Predicates?

Other Ways of Filtering By Attributes

Filtering With Non-Attribute Properties

Challenge

Advanced XPath Predicates

Path-Related XPath Predicates

Case-Insensitive Comparisons

Using Axes in Predicates

Challenge & Solution

Basics of Data Visualization with Matplotlib

Displaying a Line Plot

Plotting Multiple Lines

Customizing Plots

Challenge & Solution

Working with Scatterplots in Matplotlib

Scatterplot Basics

Customizing Scatterplot Appearance

Color-Mapping Scatterplots

Plotting Multiple Datasets

Challenge & Solution

Working with Bar Charts in Matplotlib

Displaying Basic Bar Charts

WEEK 9

Customizing Bar Chart Appearances

Adding Annotations to Bars

Drawing Different Bar Chart Types

Challenge & Solution

Working with Pie Charts in Matplotlib

Displaying Basic Pie Charts

Customizing Pie Chart Appearances

Drawing Different Types of Pie Charts

Challenge & Solution

WEEK 10

Statistical Visualization Basics with Matplotlib

Displaying Histograms

Customizing Histograms

Drawing Boxplots

Challenge & Solution

Matplotlib Figures In-Depth

The Different Parts of a Figure

Displaying Multiple Plots

Another Way to Display Multiple Plots

Controlling Axes Layouts

Challenge & Solution

Adding Interactivity with Matplotlib Widgets

The Slider Widget

Responding to Widget Updates

The Range Slider Widget

Challenge & Solution

More Matplotlib Widgets

The Button Widget

The RadioButtons Widget

The RectangleSelector Widget

Challenge & Solution

Introduction to Seaborn

Seaborn Basics

WEEK 11

Seaborn's Built-in Datasets

The Different Plot Types

A Basic Demonstration

Challenge

Working with Seaborn's Relational Plots

The .relplot Function

Changing Datapoint Appearances

Separating Data Into Multiple Plots

Challenge & Solution

Working with Seaborn's Categorical Plots

The .catplot Function

Changing Datapoint Appearances

The Different Types of Categorical Plots

Using Specific Categorical Plot Functions

Challenge & Solution

Machine Learning Algorithms: K-Nearest Neighbor

Basics of the K-Nearest Neighbor Algorithm

Creating Test Data with Scikit Learn

Predicting a Single Data Point

Using Training and Test Sets

Challenge & Solution

Machine Learning Algorithms: Linear Models

Intro

WEEK 12

Creating Test Data with Scikit Learn

Fitting a Line with Scikit Learn

Making Predictions

Challenge & Solution

Machine Learning Algorithms: K-Means Clustering

The Basics of K-Means Clustering

Running the K-Means Algorithm

Additional K-Means Details

Choosing the Optimal Number of Clusters

Challenge & Solution

Machine Learning Algorithms: Neural Networks

The Basics of Neural Networks
Constructing Neural Networks
Training a Neural Network
Challenge & Solution

Machine Learning Algorithms: Classification Trees

The Basics of Classification Trees
Finding Possible Splits
Deciding on the Best Split
Splitting Recursively
Challenge & Solution

Basics of Descriptive Statistics

What are Descriptive Statistics?

WEEK 13

Measures of Central Tendency
Measures of Variability
Different Types of Distributions
Challenge & Solution

Descriptive Statistics In-Depth

The Normal Distribution In-Depth
Useful Properties of the Normal Distribution
Z-Scores and How to Use Them
Samples vs. Populations in Statistics
Challenge & Solution

Correlation In Statistics

What is Correlation?
Common Correlation Misconceptions
Calculating Correlation in Datasets
Correlation Heat Maps
Challenge

Inferential Statistics Fundamentals

What is Inferential Statistics?
Basics of Hypothesis Testing
Hypothesis Testing in Jupyter
Challenge & Solution

Bootstrapping and Other Inferential Strategies

The Central Limit Theorem

WEEK 14

A Central Limit Theorem Demonstration
Bootstrapping Basics
A Bootstrapping Demonstration
Challenge & Solution

Introduction to SQL For Data Analysts

The SQL Landscape
Connecting to SQL Databases in Jupyter
Making SQL Queries
Making Queries with Magics
Challenge & Solution

SQL Query Fundamentals

The SELECT Statement

The WHERE Clause

Other WHERE Clause Situations

The ORDER BY Clause

Challenge & Solution

Managing Data in SQL Tables

Basics of SQL Tables

Creating SQL Tables

Inserting Data Into SQL Tables

WEEK 15

SQLite's Data Types and Constraints

Challenge & Solution

Updating and Deleting Data in SQL

Updating SQL Rows

Advanced UPDATE Usage

Deleting SQL Rows

Deleting and Altering SQL Tables

Challenge & Solution

SQL Relationships and Joins

What Are Table Relationships?

One-to-One Relationships

Performing Joins in SQL

One-to-Many Relationships

Many-to-Many Relationships

Challenge & Solution

Aggregates and Grouping in SQL

Aggregate Functions

Using Aggregate Functions in Queries

The GROUP BY Clause

The HAVING and DISTINCT Keywords

Challenge & Solution

SQL Subqueries

Basics of Subqueries

Single-Row Subqueries

WEEK 16

Multi-Row Subqueries

Correlated Subqueries

Challenge & Solution

SQL Transactions and Rollbacks

Basics of Transactions

Performing SQL Transactions

SQL Transactions with the sqlite3 Module

Rolling Back Transactions

Challenge & Solution

Object-Oriented Programming For Data Analysts

What Is Object-Oriented Programming?

Working With Methods

Defining Operator Behaviors With "Dunder" Methods

Challenge & Solution

PEP Guidelines For Data Analysts

What Are PEP Guidelines?

PEP8 Whitespace Guidelines

How To Structure Notebooks

PEP257 Docstring Guidelines

Challenge & Solution