



**CertAdda**

Adda For Your Certification Needs



# Python Developer Program



## About CertAdda

CertAdda is one of the world's largest and most effective online education platform for technology professionals. In a span of 10 years, 100,000+ students from over 176 countries have upskilled themselves with the help of our online courses. Since our inception, we have been dedicated to helping technology professionals from all corners of the world learn Programming, Data Science, Big Data, Cloud Computing, DevOps, Business Analytic, Java & Mobile Technologies, Software Testing, Web Development, System Engineering, Project Management, Digital Marketing, Business Intelligence, Cybersecurity, RPA and more.

We have an easy and affordable learning solution that is accessible to millions of learners. With our learners spread across countries like the US, India, UK, Canada, Singapore, Australia, Middle East, Brazil, and many others, we have built a community of over 1 million learners across the globe.

## About the Program

CertAdda's Python Developer MastersProgram is curated by industry experts after in-depth research to help you become an expert in Python and its various libraries. Learners can gain expertise on Data Science, Machine Learning, Deep Learning, Natural Language Processing, etc. and be industry-ready with our specially curated bouquet of hands-on and practical projects. This program is the ultimate opportunity to upskill, transform your professional trajectory, and unlock new opportunities. Join now and start your journey towards success!

## Python Developer Masters Program



### Elective Courses:

- Python Django Training and Certification
- Python Scripting Certification Training

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- 2 Data Science with Python Certification Course
- 3 Artificial Intelligence Certification Course
- 4 PySpark Certification Training Course
- 5 Python Statistics for Data Science Course (Self-Paced)

*\*Depending on industry requirements, CertAdda may make changes to the course curriculum*

# Python Certification Training Course



Course Curriculum

## Course Outline

### Module 1: Introduction to Python

#### Topics:

- Need for programming
- Advantages of programming
- Overview of python
- Organizations using python
- Python Applications in various domains
- Variables
- Operands and expressions
- Conditional statements
- Loops
- Structural pattern matching

### Module 2: Sequences and File Operations

#### Topics:

- Accepting user input and eval function
- Files input/output functions
- Lists

- Tuples
- Strings manipulation
- Sets and set operations
- Python dictionary

### **Module 3: Functions and Object-oriented Programming**

#### **Topics:**

- User-defined functions
- Function parameters
- Different types of arguments
- Global variables
- Global keyword
- Lambda functions
- Built-in functions
- Object-oriented concepts
- Public, protected and private attributes
- Class variable and instance variable
- Constructor and destructor
- Inheritance and its types
- Method resolution order
- Overloading and overriding
- Getter and setter methods

### **Module 4: Working with Modules and Handling Exceptions**

#### **Topics:**

- Standard libraries
- Packages and import statements



- Reload function
- Creating a module
- Important modules in python
- Sys module
- OS module
- Math module
- Date-time module
- Random module
- JSON module
- Regular expression
- Exception handling

## **Module 5: Array Manipulation using NumPy**

### **Topics:**

- Basics of data analysis
- NumPy - Arrays
- Array operations
- Indexing, slicing, and Iterating
- NumPy array attributes
- Matrix product
- NumPy functions
- Array manipulation
- File handling using NumPy

## Module 6: Data Manipulation using Pandas

### Topics:

- Basics of data analysis
- NumPy - Arrays
- Array operations
- Indexing, slicing, and Iterating
- NumPy array attributes
- Matrix product
- NumPy functions
- Array manipulation
- File handling using NumPy

## Module 7: Data Visualization using Matplotlib and Seaborn

### Topics:

- Why data visualization?
- Matplotlib library
- Seaborn
- Line plots
- Multiline plots
- Bar plot
- Histogram
- Pie chart
- Scatter plot
- Boxplot
- Saving charts
- Customizing visualizations
- Saving plots

- Grids
- Subplots
- Heatmaps

## **Module 8: GUI Programming**

### **Topics:**

- Ipywidgets package
- Numeric widgets
- Boolean widgets
- Selection widgets
- String widgets
- Date picker
- Color picker
- Container widgets
- Creating a GUI application

## **Module 9: Developing Web Maps and Representing Information using Plots (Self-paced)**

### **Topics:**

- Use of Folium library
- Use of Pandas library
- Flow Chart of web map application
- Developing web map using Folium and Pandas
- Reading Information from titanic dataset and represent It using plots

## Module 10: Web Scraping and Computer Vision using OpenCV (Self-paced)

### Topics:

- BeautifulSoup library
- Scrapy
- Requests library
- Scrap All hyperlinks from a webpage using BeautifulSoup and Requests
- Plotting charts using Bokeh
- Plotting scatterplots using Bokeh
- Image editing using OpenCV
- Face detection using OpenCV
- Motion detection and capturing video

## Module 11: Database Integration with Python (Self-paced)

### Topics:

- Basics of database management
- Python MySQL
- Create database
- Create a table
- Insert into table
- Select query
- Where clause
- OrderBy clause
- Delete query
- Drop table
- Update query
- Limit clause
- Join and Self-Join

- MongoDB (Unstructured)
- Insert\_one query
- Insert\_many query
- Update\_one query
- Update\_many query
- Create\_index query
- Drop\_index query
- Delete and drop collections
- Limit query

# Data Science with Python Certification Course



Course Curriculum

## Course Outline

### **Module 1: Introduction to Data Science and ML using Python.**

#### **Topics:**

- Overview of Python
- The Companies using Python
- Different Applications where Python is Used
- Discuss Python Scripts on UNIX/Windows
- Values, Types, Variables
- Operands and Expressions
- Conditional Statements
- Loops
- Command Line Arguments
- Writing to the Screen
- What is Data Science?
- What does Data Science involve?
- Era of Data Science
- Business Intelligence vs Data Science
- Life cycle of Data Science
- Tools of Data Science

## Module 2: Data Handling, Sequences and File Operations

### Topics:

- Data Analysis Pipeline
- What is Data Extraction?
- Types of Data
- Raw and Processed Data
- Data Wrangling
- Python files I/O Functions
- Numbers
- Strings and related operations
- Tuples and related operations
- Lists and related operations
- Dictionaries and related operations
- Sets and related operations

## Module 3: Deep Dive – Functions, OOPs, Modules, Errors, and Exceptions

### Topics:

- Functions
- Function Parameters
- Global Variables
- Variable Scope and Returning Values
- Lambda Functions
- Object Oriented Concepts
- Standard Libraries
- Modules Used in Python
- The Import Statements
- Module Search Path

- Package Installation Ways
- Errors and Exception Handling
- Handling Multiple Exceptions

## **Module 4: Introduction to NumPy, Pandas, and Matplotlib**

### **Topics:**

- Data Analysis
- NumPy - arrays
- Operations on arrays
- Indexing, slicing, and iterating
- Reading and writing arrays on files
- Pandas - data structures & index operations
- Reading and Writing data from Excel/CSV formats into Pandas
- Metadata for imported Datasets
- Matplotlib library
- Grids, axes, plots
- Markers, colors, fonts, and styling
- Types of plots - bar graphs, pie charts, histograms
- Contour plots

## **Module 5: Data Manipulation**

### **Topics:**

- Basic Functionalities of a data object
- Merging of Data objects
- Concatenation of data objects
- Types of Joins on data objects
- Exploring and analyzing datasets



- Analysing a dataset

## **Module 6: Introduction to Machine Learning with Python**

### **Topics:**

- What is Machine Learning?
- Machine Learning Use-Cases
- Machine Learning Process Flow
- Machine Learning Categories
- Linear regression
- Gradient descent

## **Module 7: Supervised Learning - I**

### **Topics:**

- What are Classification and its use cases?
- What is a Decision Tree?
- Algorithm for Decision Tree Induction
- Creating a Perfect Decision Tree
- Confusion Matrix
- What is Random Forest?

## **Module 8: Dimensionality Reduction**

### **Topics:**

- Introduction to Dimensionality
- Why Dimensionality Reduction
- PCA
- Factor Analysis
- Scaling dimensional model

- LDA

## **Module 9: Supervised Learning - II**

### **Topics:**

- What is Naïve Bayes?
- How Naïve Bayes works?
- Implementing Naïve Bayes Classifier
- What is a Support Vector Machine?
- Illustrate how Support Vector Machine works
- Hyperparameter Optimization
- Grid Search vs. Random Search
- Implementation of Support Vector Machine for Classification

## **Module 10: Unsupervised Learning**

### **Topics:**

- What is Clustering & its Use Cases?
- What is K-means Clustering?
- How does the K-means algorithm works?
- How to do optimal clustering
- What is C-means Clustering?
- What is Hierarchical Clustering?
- How does Hierarchical Clustering work?

## **Module 11: Association Rules Mining and Recommendation Systems**

### **Topics:**

- What are Association Rules?

- Association Rule Parameters
- Calculating Association Rule Parameters
- Recommendation Engines
- How do Recommendation Engines work?
- Collaborative Filtering
- Content-Based Filtering

## **Module 12: Reinforcement Learning (Self-paced)**

### **Topics:**

- What is Reinforcement Learning?
- Why Reinforcement Learning?
- Elements of Reinforcement Learning
- Exploration vs. Exploitation dilemma
- Epsilon Greedy Algorithm
- Markov Decision Process (MDP)
- Q values and V values
- Q – Learning
- Values

## **Module 13: Time Series Analysis (Self-paced)**

### **Topics:**

- What is Time Series Analysis?
- Importance of TSA
- Components of TSA
- White Noise
- AR model
- MA model

- ARMA model
- ARIMA model
- Stationarity
- ACF & PACF

## **Module 14: Model Selection and Boosting**

### **Topics:**

- What is Model Selection?
- Need for Model Selection
- Cross Validation
- What is Boosting?
- How do Boosting Algorithms work?
- Types of Boosting Algorithms
- Adaptive Boosting

## **Module 15: Statistical Foundations (Self-paced)**

### **Topics:**

- What is Exploratory Data Analysis?
- EDA Techniques
- EDA Classification
- Univariate Non-graphical EDA
- Univariate Graphical EDA
- Multivariate Non-graphical EDA
- Multivariate Graphical EDA
- Heat Maps

**Module 16: Database Integration with Python (Self-paced)****Topics:**

- Basics of database management
- Python MySql
- Create database
- Create a table
- Insert into table
- Select query
- Where clause
- OrderBy clause
- Delete query
- Drop table
- Update query
- Limit clause
- Join and Self-Join
- MongoDB (Unstructured)
- Insert\_one query
- Insert\_many query
- Update\_one query
- Update\_many query
- Create\_index query
- Drop\_index query
- Delete and drop collections
- Limit query

**Module 17: Data Connection and Visualization in Tableau (Self-paced)****Topics:**

- Data Visualization

- Business Intelligence tools
- VizQL Technology
- Connect to data from the File
- Connect to data from the Database
- Basic Charts
- Chart Operations
- Combining Data
- Calculations

### **Module 18: Advanced Visualizations (Self-paced)**

#### **Topics:**

- Trend lines
- Reference lines
- Forecasting
- Clustering
- Geographic Maps
- Using charts effectively
- Dashboards
- Story Points
- Visual best practices
- Publish to Tableau Online

### **Module 19: In-Class Project (Self-paced)**

#### **Topics:**

- Predict the species of Plant.

# Artificial Intelligence Certification Course



Course Curriculum

## Course Outline

### **Module 1: Introduction to Text Mining and NLP**

#### **Topics:**

- Overview of Text Mining
- Need of Text Mining
- Natural Language Processing (NLP) in Text Mining
- Applications of Text Mining
- OS Module
- Reading, Writing to text and word files
- Setting the NLTK Environment
- Accessing the NLTK Corpora

### **Module 2: Extracting, Cleaning and Preprocessing Text**

#### **Topics:**

- Tokenization
- Frequency Distribution
- Different Types of Tokenizers
- Bigrams, Trigrams & Ngrams

- Stemming
- Lemmatization
- Stopwords
- POS Tagging
- Named Entity Recognition

### **Module 3: Analyzing Sentence Structure**

#### **Topics:**

- Syntax Trees
- Chunking
- Chinking
- Context Free Grammars (CFG)
- Automating Text Paraphrasing

### **Module 4: Text Classification-I**

#### **Topics:**

- Machine Learning: Brush Up
- Bag of Words
- Count Vectorizer
- Term Frequency (TF)
- Inverse Document Frequency (IDF)

### **Module 5: Introduction to Deep Learning**

#### **Topics:**

- What is Deep Learning?
- Curse of Dimensionality
- Machine Learning vs. Deep Learning



- Use cases of Deep Learning
- Human Brain vs. Neural Network
- What is Perceptron?
- Learning Rate
- Epoch
- Batch Size
- Activation Function
- Single Layer Perceptron

## **Module 6: Getting Started with TensorFlow 2.0**

### **Topics:**

- Introduction to TensorFlow 2.x
- Installing TensorFlow 2.x
- Defining Sequence model layers
- Activation Function
- Layer Types
- Model Compilation
- Model Optimizer
- Model Loss Function
- Model Training
- Digit Classification using Simple Neural Network in TensorFlow 2.x
- Improving the model
- Adding Hidden Layer
- Adding Dropout
- Using Adam Optimizer

## Module 7: Convolution Neural Network

### Topics:

- Image Classification Example
- What is Convolution
- Convolutional Layer Network
- Convolutional Layer
- Filtering
- ReLU Layer
- Pooling
- Data Flattening
- Fully Connected Layer
- Predicting a cat or a dog
- Saving and Loading a Model
- Face Detection using OpenCV

## Module 8: Regional CNN

### Topics:

- Regional-CNN
- Selective Search Algorithm
- Bounding Box Regression
- SVM in RCNN
- Pre-trained Model
- Model Accuracy
- Model Inference Time
- Model Size Comparison
- Transfer Learning
- Object Detection – Evaluation

- mAP
- IoU
- RCNN – Speed Bottleneck
- Fast R-CNN
- RoI Pooling
- Fast R-CNN – Speed Bottleneck
- Faster R-CNN
- Feature Pyramid Network (FPN)
- Regional Proposal Network (RPN)
- Mask R-CNN

## **Module 9: Boltzmann Machine & Autoencoder**

### **Topics:**

- What is Boltzmann Machine (BM)?
- Identify the issues with BM
- Why did RBM come into the picture?
- Step-by-step implementation of RBM
- Distribution of Boltzmann Machine
- Understanding Autoencoders
- Architecture of Autoencoders
- Brief on types of Autoencoders
- Applications of Autoencoders

## **Module 10: Generative Adversarial Network (GAN)**

### **Topics:**

- Which Face is Fake?
- Understanding GAN

- What is Generative Adversarial Network?
- How does GAN work?
- Step by step Generative Adversarial Network implementation
- Types of GAN
- Recent Advances: GAN

### **Module 11: Emotion and Gender Detection (Self-paced)**

#### **Topics:**

- Which Face is Fake?
- Understanding GAN
- What is Generative Adversarial Network?
- How does GAN work?
- Step by step Generative Adversarial Network implementation
- Types of GAN
- Recent Advances: GAN

### **Module 12: Introduction to RNN and GRU (Self-paced)**

#### **Topics:**

- Issues with Feed Forward Network
- Recurrent Neural Network (RNN)
- Architecture of RNN
- Calculation in RNN
- Backpropagation and Loss calculation
- Applications of RNN
- Vanishing Gradient
- Exploding Gradient
- What is GRU?

- Components of GRU
- Update gate
- Reset gate
- Current memory content
- Final memory at current time step

### **Module 13: LSTM (Self-paced)**

#### **Topics:**

- What is LSTM?
- Structure of LSTM
- Forget Gate
- Input Gate
- Output Gate
- LSTM architecture
- Types of Sequence-Based Model
- Sequence Prediction
- Sequence Classification
- Sequence Generation
- Types of LSTM
- Vanilla LSTM
- Stacked LSTM
- CNN LSTM
- Bidirectional LSTM
- How to increase the efficiency of the model?
- Backpropagation through time
- Workflow of BPTT

## **Module 14: Auto Image Captioning Using CNN LSTM (Self-paced)**

### **Topics:**

- Auto Image Captioning
- COCO dataset
- Pre-trained model
- Inception V3 model
- The architecture of Inception V3
- Modify the last layer of a pre-trained model
- Freeze model
- CNN for image processing
- LSTM or text processing

## **Module 15: Developing a Criminal Identification and Detection Application Using OpenCV (Self-paced)**

### **Topics:**

- Why is OpenCV used?
- What is OpenCV
- Applications
- Demo: Build a Criminal Identification and Detection App

## **Module 16: TensorFlow for Deployment (Self-paced)**

### **Topics:**

- Use Case: Amazon's Virtual Try-Out Room.
- Why Deploy models?
- Model Deployment: Intuit AI models
- Model Deployment: Instagram's Image Classification Models
- What is Model Deployment

- Types of Model Deployment Techniques
- TensorFlow Serving
- Browser-based Models
- What is TensorFlow Serving?
- What are Servables?
- Demo: Deploy the Model in Practice using TensorFlow Serving
- Introduction to Browser based Models
- Demo: Deploy a Deep Learning Model in your Browser.

### **Module 17: Text Classification-II (Self-paced)**

#### **Topics:**

- Converting text to features and labels
- Multinomial Naive Bayes Classifier
- Leveraging Confusion Matrix

### **Module 18: In Class Project (Self-paced)**

#### **Topics:**

- Sentiment Classification on Movie Rating Dataset

# PySpark Certification Training Course



Course Curriculum

## Course Outline

### Module 1: Introduction to Big Data Hadoop and Spark

#### Topics:

- What is Big Data?
- Big Data Customer Scenarios
- Limitations and Solutions of Existing Data Analytics Architecture with Uber Use Case
- How Hadoop Solves the Big Data Problem?
- What is Hadoop?
- Hadoop's Key Characteristics
- Hadoop Ecosystem and HDFS
- Hadoop Core Components
- Rack Awareness and Block Replication
- YARN and its Advantage
- Hadoop Cluster and its Architecture
- Hadoop: Different Cluster Modes
- Big Data Analytics with Batch & Real-Time Processing
- Why is Spark Needed?
- What is Spark?
- How Spark Differs from its Competitors?
- Spark at eBay



- Spark's Place in Hadoop Ecosystem

## **Module 2: Introduction to Python for Apache Spark**

### **Topics:**

- Overview of Python
- Different Applications where Python is Used
- Values, Types, Variables
- Operands and Expressions
- Conditional Statements
- Loops
- Command Line Arguments
- Writing to the Screen
- Python files I/O Functions
- Numbers
- Strings and related operations
- Tuples and related operations
- Lists and related operations
- Dictionaries and related operations
- Sets and related operations

### **Module 3: Functions, OOPS, and Modules in Python**

#### **Topics:**

- Spark Components & its Architecture
- Spark Deployment Modes
- Introduction to PySpark Shell
- Submitting PySpark Job
- Spark Web UI
- Writing your first PySpark Job Using Jupyter Notebook
- Data Ingestion using Sqoop

### **Module 4: Deep Dive into Apache Spark Framework**

#### **Topics:**

- Spark Components & its Architecture
- Spark Deployment Modes
- Introduction to PySpark Shell
- Submitting PySpark Job
- Spark Web UI
- Writing your first PySpark Job Using Jupyter Notebook
- Data Ingestion using Sqoop

### **Module 5: Playing with Spark RDDs**

#### **Topics:**

- Challenges in Existing Computing Methods
- Probable Solution & How RDD Solves the Problem
- What is RDD, It's Operations, Transformations & Actions

- Data Loading and Saving Through RDDs
- Key-Value Pair RDDs
- Other Pair RDDs, Two Pair RDDs
- RDD Lineage
- RDD Persistence
- WordCount Program Using RDD Concepts
- RDD Partitioning & How it Helps Achieve Parallelization
- Passing Functions to Spark

## **Module 6: DataFrames and Spark SQL**

### **Topics:**

- Need for Spark SQL
- What is Spark SQL
- Spark SQL Architecture
- SQL Context in Spark SQL
- Schema RDDs
- User Defined Functions
- Data Frames & Datasets
- Interoperating with RDDs
- JSON and Parquet File Formats
- Loading Data through Different Sources
- Spark-Hive Integration

## Module 7: Machine Learning using Spark MLlib

### Topics:

- Why Machine Learning
- What is Machine Learning
- Where Machine Learning is used
- Face Detection: USE CASE
- Different Types of Machine Learning Techniques
- Introduction to MLlib
- Features of MLlib and MLlib Tools
- Various ML algorithms supported by MLlib

## Module 8: Deep Dive into Spark MLlib

### Topics:

- Supervised Learning: Linear Regression, Logistic Regression, Decision Tree, Random Forest
- Unsupervised Learning: K-Means Clustering & How It Works with MLlib
- Analysis of US Election Data using MLlib (K-Means)

## Module 9: Understanding Apache Kafka and Apache Flume

### Topics:

- Need for Kafka
- What is Kafka
- Core Concepts of Kafka
- Kafka Architecture
- Where is Kafka Used
- Understanding the Components of Kafka Cluster

- Configuring Kafka Cluster
- Kafka Producer and Consumer Java API
- Need of Apache Flume
- What is Apache Flume
- Basic Flume Architecture
- Flume Sources
- Flume Sinks
- Flume Channels
- Flume Configuration
- Integrating Apache Flume and Apache Kafka

## **Module 10: Apache Spark Streaming - Processing Multiple Batches**

### **Topics:**

- Drawbacks in Existing Computing Methods
- Why Streaming is Necessary
- What is Spark Streaming
- Spark Streaming Features
- Spark Streaming Workflow
- How Uber Uses Streaming Data
- Streaming Context & DStreams
- Transformations on DStreams
- Describe Windowed Operators and Why it is Useful
- Important Windowed Operators
- Slice, Window and ReduceByWindow Operators
- Stateful Operators

## **Module 11: Apache Spark Streaming - Data Sources**

### **Topics:**

- Apache Spark Streaming: Data Sources
- Streaming Data Source Overview
- Apache Flume and Apache Kafka Data Sources
- Example: Using a Kafka Direct Data Source

## **Module 12: Implementing an End-to-End Project**

### **Topics:**

- Project 1- Domain: Finance
- Project 2- Domain: Media and Entertainment

## **Module 13: Spark GraphX (Self-paced)**

### **Topics:**

- Introduction to Spark GraphX
- Information about a Graph
- GraphX Basic APIs and Operations
- Spark GraphX Algorithm - PageRank, Personalized PageRank, Triangle Count, Shortest Paths, Connected Components, Strongly Connected Components, Label Propagation

# Python Statistics for Data Science Course (Self-Paced)



Course Curriculum

## Course Outline

### Module 1: Understanding the Data

#### Topics:

- Introduction to Data Types
- Numerical parameters to represent data.
  - a. Mean
  - b. Mode
  - c. Median
  - d. Sensitivity
  - e. Information Gain
  - f. Entropy
- Statistical parameters to represent data.

### Module 2: Probability and its uses

#### Topics:

- Uses of probability
- Need of probability
- Bayesian Inference
- Density Concepts

- Normal Distribution Curve

### **Module 3: Statistical Inference**

#### **Topics:**

- Point Estimation
- Confidence Margin
- Hypothesis Testing
- Levels of Hypothesis Testing

### **Module 4: Data Clustering**

#### **Topics:**

- Association and Dependence
- Causation and Correlation
- Covariance
- Simpson's Paradox
- Clustering Techniques

### **Module 5: Testing the Data**

#### **Topics:**

- Parametric Test
- Parametric Test Types
- Non- Parametric Test
- Experimental Designing
- A/B testing



## Module 6: Regression Modelling

### Topics:

- Logistic and Regression Techniques
- Problem of Collinearity
- WOE and IV
- Residual Analysis
- Heteroscedasticity
- Homoscedasticity