AI FOUNDATIONAL COURSE • CURRICULUM

PYTHON FOR AI

Start your journey towards AI the right way.

LEARN → BUILD → SHOWCASE

Python • SQL • Machine Learning • Deep Learning
Generative AI • GitHub • Professional Portfolio

12 WEEKS
Approx. 3 months

1 HOUR DAILY
Online live classes

SATURDAYS
Practice + doubts

Course objective

Build strong foundations in Python, SQL/DBMS, Machine Learning, Deep Learning and Generative AI, with live coding, practical assessments, and a professional portfolio of 5+ projects.

Python — Basic to Advanced + Projects	**30 hours**
DBMS + SQL	**18 hours**
Elementary Machine Learning	**6 hours**
Elementary Deep Learning	**4 hours**
First Step Toward Gen AI	**5 hours**
GitHub	**3 hours**
LinkedIn / Professional Profile	**2 hours**
TOTAL LEARNING HOURS	**68**

MODULE 01 • 30 HOURS

Python & programming

Lessons 01–05 / Basics to advanced + projects

01 Python & Programming Foundation

Topics Programming fundamentals, Why Python for AI/Data Science, Python features and applications, Interpreter vs compiler, Python execution, VS Code/Jupyter, .py vs .ipynb

Practical Hello World; Basic print statements; First Python program

Assessment Install/configure Python and create a first program

02 Variables & Data Types

Topics Variables and naming conventions, Dynamic typing, int, float, str, bool, None, type() and id()

Practical Student/employee information variables; Inspect data types

Assessment Create a student information program

03 Input, Output & Type Casting

Topics input(), print(), Multiple variables, int(), float(), str(), bool(), Type conversion

Practical Student information program; Simple calculator

Assessment Build a student information system

04 Operators

Topics Arithmetic, Comparison, Assignment, Logical, Membership, Identity, Bitwise

Practical Salary calculator; Shopping bill; Result calculator

Assessment Create programs using and/or/not/in/is

05 Conditional Statements

Topics if, if-else, if-elif-else, Nested conditions, Multiple conditions, and/or/not

Practical Grade calculator; Login validation; Loan eligibility

Assessment Create an eligibility/result application



MODULE 01 • 30 HOURS

Python & programming

Lessons 06–10 / Basics to advanced + projects

06

Loops

Topics for, while, range(), Nested loops, Loop control

Practical Tables; Sum; Factorial; Prime; Fibonacci

Assessment Solve 10 loop problems

07

Break, Continue & Pass

Topics break, continue, pass, Nested loops

Practical Number guessing game; Menu-driven program

Assessment 20-question Python assessment + 5 coding problems

08

Strings

Topics String creation, Indexing, Negative indexing, Slicing, String methods

Practical upper/lower; strip; replace; split; join; find; count

Assessment Build a text-processing application

09

Lists

Topics List creation, Indexing, Slicing, Nested lists, List operations

Practical append; extend; insert; remove; pop; sort; reverse

Assessment Student marks management

10

Tuple, Set & Dictionary

Topics Tuple, Set, Dictionary, Data structure comparison, Dictionary methods, Set operations

Practical Student database using dictionary

Assessment Build a small record-management program

MODULE 01 • 30 HOURS

Python & programming

Lessons 11–15 / Basics to advanced + projects

11 Comprehensions

Topics List comprehension, Conditional comprehension, Nested comprehension, Dictionary comprehension, Set comprehension

Practical Create square/even/filtered collections

Assessment 10 comprehension problems

12 Functions

Topics Function definition, Parameters, Arguments, return, Default/keyword arguments, *args, **kwargs, Scope

Practical Reusable utility functions

Assessment Build a function-based application

13 Lambda, Map, Filter & Reduce

Topics Lambda, map(), filter(), reduce(), sorted(key=...)

Practical Lambda transformations; Filtering; Aggregation

Assessment 20 lambda/map/filter/reduce problems

14 Modules & Packages

Topics import, Modules, Packages, pip, Virtual environments, requirements.txt

Practical Create a custom module/package

Assessment Build a reusable Python utility package

15 File Handling

Topics Text files, Read/write/append, with open(), CSV, JSON

Practical Read/write student records; CSV and JSON handling

Assessment Student record system using files

MODULE 01 • 30 HOURS

Python & programming

Lessons 16–20 / Basics to advanced + projects

16 Exception Handling

Topics Errors vs exceptions, try/except/else/finally, Multiple exceptions, Custom exceptions

Practical Robust calculator; Input validation

Assessment Add error handling to an existing project

17 OOP Fundamentals

Topics Class, Object, Attributes, Methods, Constructor, self

Practical Student class; Employee class

Assessment Create an object-oriented mini application

18 OOP Advanced

Topics Encapsulation, Inheritance, Polymorphism, Abstraction, Class variables, Static methods, Instance methods

Practical Employee Management System

Assessment Complete OOP-based mini project

19 Python for Data/AI

Topics NumPy basics, Arrays, Vectorization, Pandas Series/DataFrame, CSV reading, Basic analysis

Practical df.head(); df.info(); df.describe(); Basic filtering

Assessment Student performance analysis

20 Python Capstone & Assessment

Topics Project architecture, Code organization, Testing/debugging, Project presentation

Practical Choose and build: Student Management, Expense Tracker, Employee System, Sales Analysis, E-commerce Analyzer

Assessment 20 MCQs + 10 coding problems + practical + project presentation

MODULE 02 • 18 HOURS

DBMS + SQL

Lessons 21–26 / Relational data, queries & reporting

21 DBMS Fundamentals

Topics Data, database, DBMS, RDBMS, Tables, rows, columns, Primary/foreign keys, Relationships, MySQL/PostgreSQL

Practical Create academy database

Assessment Design a simple relational database

22 SQL Basics

Topics SELECT, FROM, WHERE, ORDER BY, DISTINCT, LIMIT

Practical Student database queries

Assessment 20 SQL query exercises

23 DDL

Topics CREATE, ALTER, DROP, TRUNCATE

Practical Create and modify tables

Assessment Build academy database schema

24 DML + CRUD

Topics INSERT, UPDATE, DELETE, SELECT, CRUD concept

Practical Student CRUD operations

Assessment Create CRUD query set

25 SQL Operators

Topics Arithmetic, Comparison, Logical, IN, BETWEEN, LIKE, IS NULL

Practical Filtering customer/student data

Assessment 25 filtering exercises

26 Aggregate Functions & GROUP BY

Topics COUNT, SUM, AVG, MIN, MAX, GROUP BY, HAVING

Practical Sales analysis

Assessment Solve grouped business-analysis queries

MODULE 02 • 18 HOURS

DBMS + SQL

Lessons 27–32 / Relational data, queries & reporting

27

SQL Joins

Topics INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN, SELF JOIN, CROSS JOIN

Practical Customers + Orders database

Assessment 20 join problems

28

Subqueries

Topics Single-row, Multi-row, Correlated, Nested subqueries

Practical Employee/customer analysis

Assessment Advanced subquery assignment

29

Constraints & Database Design

Topics PRIMARY KEY, FOREIGN KEY, UNIQUE, NOT NULL, CHECK, DEFAULT, Referential integrity, Normalization basics

Practical Design relational tables

Assessment Normalize a sample database

30

DCL + TCL

Topics GRANT, REVOKE, COMMIT, ROLLBACK, SAVEPOINT, Transactions

Practical Transaction scenarios

Assessment Write transaction-management exercises

31

Advanced SQL

Topics CASE, COALESCE, NULL handling, String functions, Date functions, Math functions

Practical Business reporting queries

Assessment Advanced SQL worksheet

32

SQL Project & Assessment

Topics Database project design, Query optimization basics, Reporting

Practical E-commerce DB: Customers, Products, Orders, OrderDetails, Payments

Assessment 25 real-world SQL queries + assessment

MODULE 03 • 6 HOURS

Elementary Machine Learning

Lectures 1–6 / Applied foundations, evaluation & a mini-project

01 Introduction to Machine Learning

Topics ML concepts, real-world applications, features, labels and the ML workflow

Practical Identify ML use cases and map the basic workflow

Assessment Classify example problems and explain essential terms

02 Data Preparation for Machine Learning

Topics Datasets, missing values, encoding, scaling and train/test split

Practical Prepare a small CSV dataset using Pandas

Assessment Submit a clean, model-ready dataset

03 Supervised Learning: Regression

Topics Regression, linear models, fit and predict, MAE and MSE

Practical Train and test a simple house-price predictor

Assessment Explain predictions and regression errors

04 Supervised Learning: Classification

Topics Classes and labels, logistic regression, accuracy and confusion matrix

Practical Build a basic classification model

Assessment Interpret a confusion matrix

05 Unsupervised Learning and Clustering

Topics Unlabeled data, K-means, cluster groups and visual interpretation

Practical Create customer segments using sample data

Assessment Describe the meaning of each cluster

06 Model Evaluation and Mini-Project

Topics Validation, overfitting, model comparison and reporting results

Practical Complete a small regression or classification project

Assessment Submit notebook, metrics and presentation

MODULE DELIVERABLE

Machine Learning Mini-Project

Prepare data, train a model, evaluate results and present findings.

MODULE 04 • 4 HOURS

Elementary Deep Learning

Lectures 7–10 / Neural networks, training and a mini-project

07 Introduction to Deep Learning and Neural Networks

Topics Neurons, layers, weights, biases, activation functions and feedforward flow

Practical Build a small neural-network example

Assessment Label network components and explain outputs

08 Training Neural Networks

Topics Loss functions, gradient descent, backpropagation, epochs and batch size

Practical Train a model and compare training curves

Assessment Document training choices and model performance

09 Deep Learning Architectures

Topics MLPs, CNNs for images, RNNs for sequences and Transformer concepts

Practical Match example architectures to practical problems

Assessment Choose a suitable architecture for a use case

10 Deep Learning Mini-Project

Topics Data preparation, model building, training, evaluation and reflection

Practical Build a basic image classifier or tabular neural network

Assessment Submit the model, results and short demonstration

MODULE DELIVERABLE

Deep Learning Mini-Project

Build, train and evaluate a beginner-level neural network. Document the dataset, training choices and final results.

MODULE 05 • 5 HOURS

First Step Toward Gen AI

Days 1–5 / Prompting, LLM tools, text generation & app building

D1

Intro to Generative AI and Large Language Models

Topics Generative vs predictive AI, tokens, model abilities and limitations

Practical Compare outputs from general-purpose GenAI tools

Assessment Describe practical uses and responsible-use limits

D2

Prompt Engineering and Techniques

Topics Instructions, context, constraints, examples and output formats

Practical Create and refine structured prompt templates

Assessment Submit three improved prompts with results

D3

Working with LLMs and GenAI Tools

Topics LLM interaction, settings, APIs/no-code options and output review

Practical Test common tasks across accessible GenAI tools

Assessment Compare responses and note strengths or errors

D4

Generating Text

Topics Summaries, drafting, content transformation and quality checking

Practical Build a repeatable text-generation workflow

Assessment Demonstrate three useful text tasks

D5

Building a Simple GenAI App

Topics User input, prompt templates, model responses and basic testing

Practical Create a small text assistant with a simple interface

Assessment Present a working demo and project README

MODULE DELIVERABLE

Your First GenAI App

Create a simple text-generation assistant, test its responses, and showcase the finished project.

MODULES 06-07 • GITHUB 3 HOURS + PROFESSIONAL PROFILE 2 HOURS

Industry preparation

Document your work and build a professional technical portfolio

48

Git & GitHub Fundamentals

Topics Git vs GitHub, Repository, Local/remote, Clone, Add, Commit, Push, Pull, Branch

Practical git init; git status; git add; git commit; git push

Assessment Create and push first repository

49

GitHub Project & Portfolio

Topics README, .gitignore, requirements.txt, Branches, Pull requests, Profile, Project documentation

Practical Upload Python/ML project

Assessment Document and publish a project

50

LinkedIn & Professional Profile

Topics Professional headline, About section, Skills, Projects, Certifications, GitHub integration, Resume alignment, Technical posts, Networking

Practical Create/update LinkedIn profile; Write project descriptions

Assessment Complete professional portfolio: LinkedIn → GitHub → Projects → Resume



YOUR PROFESSIONAL PORTFOLIO

LinkedIn → GitHub → Projects → Resume

Publish your work with clear project descriptions and documentation.

MANDATORY PROJECT PORTFOLIO

Build. Document. Present.

Five core projects + one optional integrated project

01 **Student Management System**

Python, functions, lists, dictionaries, file handling, exceptions

02 **Expense Tracker**

Python, CSV, functions, Pandas, data analysis

03 **E-Commerce Database**

DBMS, SQL, CRUD, joins, GROUP BY, subqueries

04 **Simple GenAI Application**

Prompt templates, LLM tools, text generation, basic app design

05 **House Price Prediction**

Pandas, EDA, train/test split, Linear Regression, evaluation

06 **Employee Analytics System — Optional**

Python + SQL + Pandas

EXPECTED OUTCOME
After 12 weeks (approximately 3 months), students should be able to write structured Python programs, work with SQL databases, build and evaluate elementary ML and deep-learning models, create a simple GenAI app, and present a professional portfolio using GitHub and LinkedIn.