Python Syllabus

For Summer Training Program

python™ AI ML

HINDTECH
LEARNING POINT

Skill India
कौशल भारत-कुशल भारत

N·S·D·C
National Skill Development Corporation
Transforming the skill landscape

Python is a powerful, high-level, interpreted programming language that emphasizes code readability, developer productivity, and a minimalist design philosophy. Developed by Guido van Rossum and released in 1991, Python was intended to be an easy-to-understand language that could help both beginners and professionals write clean and maintainable code.

It supports multiple programming paradigms, including procedural, object-oriented, and functional programming, giving developers the flexibility to choose the most suitable approach for a given task. One of Python's most appealing features is its dynamic typing and automatic memory management, which allows developers to write less boilerplate code and focus more on solving real problems. The Python interpreter processes code line-by-line, making debugging easier and more intuitive. Its extensive standard library—sometimes referred to as "batteries included"—covers everything from file I/O and system calls to regular expressions, web services, and unit testing, drastically reducing the need for external dependencies in many applications.

In addition to the built-in library, Python boasts a massive ecosystem of third-party modules and frameworks available through the Python Package Index (PyPI). These libraries extend Python's capabilities in nearly every domain of computing. In web development, frameworks like Django, Flask, and FastAPI enable developers to build full-scale, secure web applications with minimal overhead. For scientific computing and data analysis, libraries such as NumPy, SciPy, Pandas, and Matplotlib offer high-performance operations on arrays, statistical analysis tools, and powerful data visualizations. Python has become the de facto language for artificial intelligence (AI), machine learning (ML), and deep learning, with tools like TensorFlow, PyTorch, Keras, and Scikit-learn facilitating the development of complex neural networks and predictive models. The language also excels in automation, scripting, and system administration tasks thanks to modules like os, shutil, and subprocess.

Python's cross-platform nature ensures that programs written on one operating system can usually run on another with little or no modification. This portability, combined with the simplicity of Python syntax, makes it ideal for rapid application development and prototyping. Educational institutions worldwide adopt Python as the first language for computer science students because it abstracts many of the complexities found in lower-level languages while still exposing the fundamentals of software development.

MODULE 1: PYTHON PROGRAMMING – FROM BASICS TO INTERMEDIATE

Objective: To build foundational Python programming skills required for image processing.

Introduction to Python
- Installation (Anaconda, Jupyter, VS Code)
- Basic syntax, variables, data types

Control Structures
- If-else, loops (for, while)

Functions and Modules
- Defining functions, importing modules

Data Structures
- Lists, tuples, dictionaries, sets

File Handling in Python
Exception Handling
Object-Oriented Programming Basics
Working with Libraries (NumPy, Matplotlib, OpenCV)

MODULE 2: BASICS OF IMAGE PROCESSING

Objective: To understand image representation, manipulation, and analysis using Python.

Introduction to Image Processing
Loading and Displaying Images (Matplotlib, OpenCV)
Image Types (Grayscale, RGB, Binary)

Image Transformations
- Resizing, Cropping, Rotation, Flipping

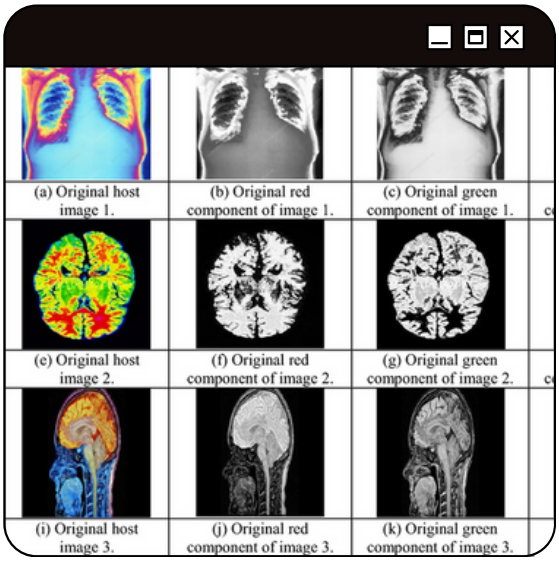


Image Enhancement
- Brightness, Contrast, Histogram Equalization

Filters and Noise Removal
- Gaussian, Median, Sharpening

Edge Detection Techniques
- Sobel, Canny

MODULE 3: BASIC CONCEPTS OF THE CARTESIAN COORDINATE SYSTEM

Objective: To understand how Cartesian coordinates apply in image positioning and spatial data.

- What is a Cartesian Plane?
- Origin, Axes, Quadrants
- Points and Coordinates
- Distance Formula, Midpoint
- Coordinate Systems in Digital Imaging
- Pixel Coordinates vs Physical Coordinates

MODULE 4: FUNDAMENTALS OF DIGITAL IMAGES

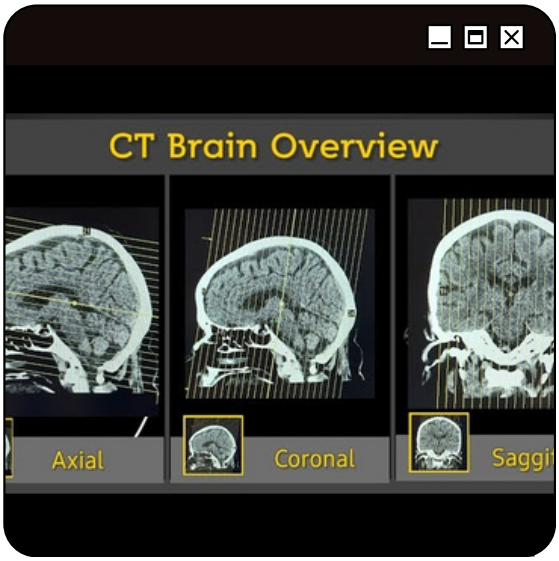
Objective: To explore the basic building blocks and properties of digital images.

- What is a Digital Image?
- Image Resolution
- Pixel Depth (Bit Depth)
- Image Size vs File Size
- Grayscale vs Color Images
- Sampling and Quantization
- Image Histogram and Intensity Levels

MODULE 5: DIGITAL IMAGE CHARACTERISTICS

Objective: To define the measurable properties of digital images.

- Spatial Resolution
- Contrast Resolution
- Signal-to-Noise Ratio (SNR)
- Dynamic Range
- Image Fidelity and Artifacts
- Image Compression (Lossy vs Lossless)



MODULE 6: INTRODUCTION TO MEDICAL IMAGING

Objective: To understand the role and basics of medical imaging.

- What is Medical Imaging?
- History and Evolution
- Importance in Diagnosis and Treatment
- Market Value and Industry Scope

Medical Imaging Modalities:

- X-Ray, MRI, CT, PET, Ultrasound
- Comparison Table

MODULE 7: IMAGE FORMATS IN MEDICAL IMAGING

Objective: To identify and differentiate between various image formats used in medical imaging.

Common Medical Image Formats:

1. Bitmap (BMP)
2. Portable Network Graphics (PNG)
3. Joint Photographic Experts Group (JPEG)
4. DICOM (Digital Imaging and Communications in Medicine)
5. NIfTI (Neuroimaging Informatics Technology Initiative)
6. TIFF (Tagged Image File Format)
7. STL (Stereolithography for 3D Printing)

Format Comparison:

- Compression type
- Metadata support
- Use cases in medical field

MODULE 8: ESSENTIAL PYTHON LIBRARIES FOR IMAGE ANALYSIS

Objective: To introduce important Python libraries for image visualization and analysis.

Matplotlib

- Basic plotting
- Displaying images
- Histograms and Intensity graphs

NumPy

- Array operations on image data
- Matrix representation

OpenCV

- Reading and writing medical images
- Image transformations

Pydicom

- Reading DICOM files
- Extracting metadata

Nibabel
- Working with NIfTI images

SimpleITK / ITK
- Advanced medical image analysis
- Image registration and segmentation

PROJECT DEVELOPMENT

1. **Medical Imaging using Data Science and Machine Learning**

DURATION : 50 DAYS

OUTCOME:

1. **Master Python Programming:** Understand and apply core Python programming concepts, including data structures, control flow, functions, and object-oriented programming relevant to technical and scientific applications.
2. **Understand and Apply Image Processing Techniques:** Gain hands-on experience in basic image processing operations such as image enhancement, filtering, transformation, and edge detection using Python libraries like OpenCV and Matplotlib.
3. **Apply Cartesian Coordinate Concepts in Imaging:** Understand the Cartesian coordinate system and its application in positioning, pixel indexing, and geometric image operations.
4. **Comprehend the Fundamentals of Digital Images:** Understand digital image structure, resolution, grayscale levels, image formats, and characteristics that impact quality and diagnostics.
5. **Gain Knowledge of Medical Imaging and Modalities:** Learn about various medical imaging technologies (CT, MRI, X-ray, PET, Ultrasound) and how image processing is used in healthcare.

PROJECT VIEW

PYTHON SUMMER TRAINING SYLLABUS
PROGRESS TRACKER

PROJECTS

- ◯ Medi-ML (Python)

NOTES

The Premier Institute For Summer, Apprenticeship Training

HINDTECH IT SOLUTIONS

Hindtech Learning Point

A Trusted IT Institute Brand In Lucknow

Admission Open For

Summer Training
CSE/IT
Diploma, B.Tech/B.E, BCA, MCA
45 - 50 Days Program

Apprenticeship Training
CSE/IT
B.Tech, BCA, MCA, PGDCA, Dip.
6 to 8 Months Program

Industrial Training
CSE/IT
B.Tech, BCA, MCA, PGDCA, Dip.
3 to 5 Months Program

UI/UX Designing
CSE/IT or interested student
B.Tech, BCA, MCA, PGDCA, Dip.
45 - 50 Days Program

Number ONE **Excellent Performance by Hindtech Learning Point in IT Training**

Skill India कौशल भारत-कुशल भारत

N·S·D·C National Skill Development Corporation
Transforming the skill landscape

Flutter · MERN · Java · .NET · php · AI · Machine Learning

Since 2020, 1000+ students placed in top IT firms | Parmar Plaza, BKT, Bargadi, UP 226201 | Call: 6307738600 / 7905320279 | www.hindtechlearningpoint.com

HINDTECH
IT SOLUTIONS

Training	Duration	Amount
Python Summer Training Program	45 to 50 Days	₹6,000

www.hindtechitsolutions.com
www.hindtechlearningpoint.com
hr@hindtechitsolutions.com
hindtechlearningpointlko@gmail.com
+91 7905320279
+91 6307738600

Building No 10/703, Ground Floor, near Arvindo Park Road, Sector 10, Indira Nagar, Lucknow, Uttar Pradesh 226016

Branch 1

PARMAR PLAZA, 1st Floor, Bakshi Ka Talab, Bargadi Magath,
Uttar Pradesh 226201

Branch 2

Scan Me:

Scan this QR code for details

HINDTECH LEARNING POINT

Skill India कौशल भारत-कुशल भारत

N·S·D·C National Skill Development Corporation
Transforming the skill landscape

Hindtech Learning Point Brochure Update: June 2025-26. Details are applicable from this date.
We offer placement assistance to all eligible trainees.