

Python For AI & Research Computing Internship

(15 Days | Practical-Oriented | Industry Ready)

INTERNSHIP SYLLABUS

Internship Objectives

By the end of this internship, students will be able to:

- Master **Python for AI & scientific computing**
- Work with **real-world datasets**
- Implement **Machine Learning & Deep Learning basics**
- Perform **research-level data analysis**
- Build **end-to-end AI mini projects**
- Prepare **project reports & research documentation**

DAY 1 – Python Foundations for AI

- Python vs Other Languages for AI
- Python Environment Setup (Anaconda, VS Code, Jupyter)

Practical

Variables, Data Types

Input / Output

Basic AI-style problems

DAY 2 – Control Structures & Functions

- Conditional statements
- Loops
- Functions & Lambda

Practical

Data-driven logic building

Performance-focused coding

DAY 3 – Data Structures for AI

- Lists, Tuples, Sets
- Dictionaries for datasets
- Time & Space Complexity basics

Practical

Dataset simulation using dictionaries

AI-style data manipulation

DAY 4 – NumPy for Scientific Computing

- Why NumPy for AI?
- Arrays vs Lists
- Vectorized Operations

Practical

Matrix operations

Statistical calculations

DAY 5 – Pandas for Data Analysis

- Series & DataFrames
- Reading CSV / Excel / JSON
- Data Cleaning

Practical

Handling missing values

Dataset preprocessing

DAY 6 – Data Visualization with Matplotlib & Seaborn

- Importance of visualization in AI research

- Types of plots

Practical

Line, Bar, Scatter, Heatmap

Data storytelling

DAY 7 – Statistics & Probability for AI

- Mean, Median, Mode
- Variance, Standard Deviation
- Probability basics

Practical

Statistical analysis on datasets

DAY 8 – Introduction to Machine Learning

- Supervised vs Unsupervised Learning
- ML workflow
- Overfitting & Underfitting

Practical

Scikit-learn basics

DAY 9 – Regression Algorithms

- Linear Regression
- Multiple Regression

Practical

Model training

Evaluation metrics

DAY 10 – Classification Algorithms

- Logistic Regression
- KNN
- Decision Tree

Practical

Confusion Matrix

Accuracy, Precision, Recall

DAY 11 – Introduction to Deep Learning

- Neural Networks basics
- AI vs ML vs DL

Practical

TensorFlow / Keras intro

Simple neural network

DAY 12 – AI Research Computing

- Research methodology
- Dataset selection
- Ethical AI

Practical

Experiment documentation

Result interpretation

DAY 13 – Mini Project Development

- AI-based Prediction System
- Research Data Analysis Tool
- ML Model with Visualization

DAY 14 – Project Enhancement & Optimization

- Model tuning
- Feature engineering

Practical

Improve accuracy

Performance optimization

DAY 15 – Final Project Demo & Documentation

Activities

- Project presentation
- Viva & review
- Report & GitHub setup