N.B.K.R. INSTITUTE OF SCIENCE & TECHNOLOGY
(AUTONOMOUS)
AFFILIATED TO JNTUA, ANANTHAPURAMU
Accredited by NAAC with 'A' Grade
Courses Accredited by NBA under TIER-I
VIDYANAGAR-524413, Tirupati Dist., A.P., INDIA
ist@nbkrist.org www.nbkrist.org +91-8985382247, 8985159547

Path 1: AI Application Development with Python

Provides a comprehensive introduction to Machine Learning and Data Science techniques to jumpstart your career in the field of AI.

Python is the entry Gate

SEMESTER 1

PYTHON + DATA SCIENCE + PREDICTIVE ANALYTICS FOUNDATIONS

UNIT 1 — Introduction to Modern AI Industry

Topics

- Evolution of Software & AI
- AI vs ML vs Deep Learning
- Generative AI overview
- AI career opportunities
- Real-world AI applications
- AI product ecosystem
- GitHub introduction
- Python ecosystem setup
- Jupyter Notebook

- VS Code setup
- Cloud Computing Introduction

Outcome

Students understand:

- AI industry landscape
- career paths
- development environment

UNIT 2 — Python Programming Foundations

Topics

- Variables & Datatypes
- Operators
- Conditions & Loops
- Functions
- Strings
- Lists/Tuples/Dictionaries
- File handling
- Exception handling
- Modules & Packages

Hands-On

- Calculator
- Student result system
- File reader
- Mini banking system

Outcome

Strong Python coding foundation.

UNIT 3 — Intermediate Python for AI Development

Topics

- OOP concepts
- APIs & JSON
- Regex basics
- Lambda functions
- List comprehensions
- Virtual environments
- Pip package manager
- Logging basics
- Debugging basics

Hands-On

- Weather API integration
- JSON data parser
- API-based applications

UNIT 4 — Data Science with Python

Topics

- NumPy arrays
- Pandas DataFrames
- CSV/Excel processing
- Data cleaning
- Missing values
- Filtering & grouping
- Feature engineering basics
- Exploratory Data Analysis (EDA)

Hands-On

- Student data analytics
- IPL dataset analysis

- Sales analytics

Industry Focus

Data analysis workflows used in companies.

UNIT 5 — Data Visualization & Storytelling

Topics

- Matplotlib
- Seaborn
- Charts & Graphs
- Histograms
- Correlation heatmaps
- Dashboard thinking
- Business storytelling with data

Hands-On

- COVID dashboard
- Placement analytics dashboard
- Student performance visualization

UNIT 6 — SQL for AI & Analytics

VERY IMPORTANT FOR PLACEMENTS.

Topics

- Database basics
- MySQL introduction
- CRUD operations
- Joins
- Aggregate functions
- Group By
- Subqueries

- SQL interview problems

Hands-On

- Student database
- Placement database
- Analytics queries

UNIT 7 — Predictive Analytics & Machine Learning

THIS SHOULD BE PRACTICAL-FIRST.

Topics

- ML workflow
- Train/test split
- Supervised learning
- Unsupervised learning
- Linear Regression
- Logistic Regression
- Decision Trees
- Random Forest basics
- Clustering basics
- Model evaluation metrics

Hands-On

- House price prediction
- Placement prediction
- Sales forecasting
- Student performance prediction

Outcome

Students understand practical ML usage.

UNIT 8 — Mini Project + GitHub Portfolio

Students MUST:

- Build mini AI project
- Upload to GitHub
- Write README
- Present project

Suggested Projects

- Placement prediction
- Sales analytics
- Student analytics system
- Recommendation system

SEMESTER 2

GENERATIVE AI + CLOUD AI + MLOPS + DEPLOYMENT

THIS becomes your strongest differentiator.

UNIT 1 — Introduction to Generative AI

Topics

- What is Generative AI
- LLM fundamentals
- Tokens & embeddings
- OpenAI overview
- Gemini overview
- Hugging Face overview
- AI APIs
- Prompt engineering basics

Hands-On

- AI text generation
- AI content creation

- ChatGPT API usage

UNIT 2 — Prompt Engineering & AI Workflows

Topics

- Zero-shot prompting
- Few-shot prompting
- AI hallucinations
- Prompt optimization
- AI safety basics
- AI workflow design

Hands-On

- AI email writer
- Resume generator
- AI notes summarizer

UNIT 3 — AI Application Development

Topics

- REST APIs basics
- Flask/FastAPI introduction
- AI API integration
- JSON handling
- API testing using Postman

Hands-On

- AI chatbot backend
- AI content generation API
- AI Q&A API

UNIT 4 — Generative AI Projects

Topics

- Conversational AI
- AI chatbot architecture
- AI assistants
- AI search systems
- Recommendation systems

Hands-On

- College enquiry chatbot
- AI FAQ assistant
- AI interview bot

UNIT 5 — Cloud Computing for AI

KEEP THIS BASIC + PRACTICAL.

Topics

- Cloud computing basics
- AWS overview
- Google Cloud overview
- Cloud storage concepts
- GPU computing basics
- Serverless AI overview

Platforms

- AWS SageMaker
- Vertex AI basics

Hands-On

- Uploading models
- Running notebooks on cloud
- Using cloud storage

UNIT 6 — MLOps Fundamentals

KEEP THIS FRESHER LEVEL.

Topics

- What is MLOps
- ML lifecycle
- GitHub workflows
- CI/CD basics
- Docker basics
- MLflow basics
- Model deployment basics
- Monitoring basics

Hands-On

- Dockerizing simple ML app
- MLflow experiment tracking
- Basic CI/CD workflow

UNIT 7 — AI Deployment & Production Systems

THIS IS EXTREMELY IMPORTANT.

Topics

- Model serving
- API deployment
- Streamlit deployment
- Render deployment
- Hugging Face Spaces
- Vercel basics
- Deployment debugging

Hands-On

- Deploying ML app

- Deploying AI chatbot
- Public project hosting

UNIT 8 — Capstone Project

Companies don't ask what you studied... they ask what you built."

A strong GitHub project is louder than a 9.0 GPA.

Anyone can copy code... very few can solve problems.

MOST IMPORTANT UNIT.

Students build:

- End-to-end AI application
- Hosted online
- GitHub repository
- Presentation-ready system

Industry Readiness Support

Don't just learn AI... build something that the world cannot ignore.