

DEPARTMENT OF EMERGING AND SPECIALIZED LEARNING
GEN AI – DATA SCIENTIST

End-to-End ML Project-Based Learning: 20 Days of Hands-On Industry-Focused Training			
Module	Day	Session	Topics
Foundation of Python	1	FN	Python
		AN	
Core Machine Learning & Mathematical Foundations	2	FN	What is ML? (Supervised vs Unsupervised vs Reinforcement), Real-world ML Applications, GitHub setup (Version Control)
		AN	Linear Algebra (Vectors, Matrices, Transformations), Descriptive Statistics, Probability Basics (Conditional Probability, Bayes Theorem) + NumPy Hands-on
Python for Data Science & Exploratory Data Analysis (EDA)	3	FN	Python Libraries for ML (NumPy, Pandas, Matplotlib, Seaborn) + EDA, Preprocessing and Visualization
Supervised Learning – Regression Models		AN	What is a Model? Target vs Features, Overfitting vs Underfitting + Linear Regression (Theory + Hands-on), Evaluation Metrics
	4	FN	Regression Metrics, Project: Coffee Shop Sales Prediction + Streamlit Deployment
		AN	Hands-on Practice
Supervised Learning – Classification Models (Part 1)	5	FN	Logistic Regression + Evaluation Metrics, Mini Project: Heart Disease Classification
		AN	Hands-on Practice
	6	FN	K-Nearest Neighbors (KNN)

		AN	Hands-on model implementation and practice
Supervised Learning – Classification Models (Part 2)	7	FN	Naive Bayes Algorithm (Theory + Hands-on), Mini Project: Spam Classifier + Streamlit Deployment
		AN	Hands-on coding practice and problem-solving
	8	FN	Decision Tree (Gini vs Entropy) + Flask App
		AN	Hands-on Practice
Supervised Learning – Ensemble Methods (Bagging-Based)	9	FN	Random Forest (Ensemble Learning) + Project: House Price Prediction
		AN	Hands-on Practice / Practical Implementation
Supervised Learning – Margin-Based Models	10	FN	Support Vector Machine (SVM)
		AN	Hands-on Practice
	11	FN	Bagging Algorithm, AdaBoost
		AN	Hands-on Practice
Supervised Learning – Boosting Algorithms (Ensemble Techniques)	12	FN	Gradient Boosting
		AN	Hands-on Practice
	13	FN	XGBoost Algorithm
		AN	Hands-on Practice / Practical Implementation
Unsupervised Learning – Clustering Techniques (Part 1)	14	FN	K-Means Clustering, Elbow Method, Find Optimal no. of Clusters + Customer Segmentation Project
		AN	Hands-on coding practice and problem-solving
Unsupervised Learning – Clustering Techniques (Part 2) + Unsupervised Learning – Dimensionality Reduction Techniques	15	FN	Hierarchical Clustering + Dimensionality Reduction (PCA) + Real-Time Data Application

		AN	Hands-on Practice
Supervised Learning – Model Evaluation & Validation Techniques	16	FN	Bias–Variance Tradeoff
		AN	Hands-on model implementation and practice
	17	FN	Cross Validation (K-Fold)
		AN	Hands-on model implementation and practice
Unsupervised Learning – Density-Based Clustering (DBSCAN)	18	FN	DBSCAN Algorithm (Density-Based Clustering)
		AN	Hands-on Practice
Model Optimization – Hyperparameter Tuning	19	FN	Hyperparameter Tuning (GridSearchCV, RandomizedSearchCV)
		AN	Hands-on Practice
Model Optimization – Feature Engineering & Selection	20	FN	Feature Selection (Filter & Wrapper Methods)
		AN	Feature Selection (Embedded Methods - L1&L2) + Feature Reduction (PCA & ICA for Unsupervised Data)

Weekly Review Plan (Final Week)

Common ML Interview Questions

Data Science Scenario-Based Q&A

Mock Interview (Self / Peer)

MCQ & Assessment

Debate / Group Discussion

Resume Finalization

LinkedIn Profile Touch-Up

Build Portfolio Website (Optional)

Add Final GitHub Projects

Project Presentation