Phase 1: Foundations and Classic ML (Weeks 1–4)

Week	Focus Area	Key Concepts	Recommended Resources (Free/Low-Cost)	Project / Practice Goal
1	**Python & Tools**	Python Fundamentals (OOP, functions), NumPy (arrays, matrix operations), Environment Setup (Jupyter/Anaconda).	W3Schools Python Tutorial, NumPy Documentation, **Kaggle's Python track**.	Practice matrix math with NumPy; create a simple Python class.
2	**Data Analysis & Visualization**	**Pandas** (DataFrames, cleaning, manipulation), **Matplotlib & Seaborn** (Basic plots: scatter, histogram), Git/GitHub basics.	**Kaggle's Pandas/Data Viz tracks**, freeCodeCamp's Data Analysis Course.	Complete an **Exploratory Data Analysis (EDA)** on a simple dataset (e.g., Titanic).
3	**Math Essentials**	**Linear Algebra** (vectors, matrices), **Calculus** (introduction to Gradient Descent), **Probability & Statistics** (mean, variance, distributions).	**3Blue1Brown's Essence of Linear Algebra**, Khan Academy (Statistics/Probability), **StatQuest (YouTube)**.	Solve basic statistical problems and plot probability distributions in Python.

| 4 | ML Basics & Regression | Introduction to ML (Supervised vs. Unsupervised), Train/Test Split, **Linear & Logistic Regression**, Evaluation Metrics (MSE, R^2, Accuracy). | **Andrew Ng's Machine Learning Specialization (Coursera)** Course 1, Google's ML Crash Course. | Build a **Linear Regression model** to predict a simple variable (e.g., house price). |

Phase 2: Intermediate Algorithms & Deep Learning (Weeks 5–8)

Week	Focus Area	Key Concepts	Recommended Resources (Free/Low-Cost)	Project / Practice Goal
5	**Classification & Model Tuning**	**Decision Trees, Random Forests, SVM**, Evaluation Metrics (Precision, Recall, F1-Score), **Cross-Validation** & Hyperparameter Tuning.	Scikit-learn documentation/user guide, **Kaggle's Intermediate ML Course**.	Build a **Random Forest classifier** for the Titanic or a similar classification dataset.
6	**Unsupervised Learning & Clustering**	**K-Means Clustering**, Hierarchical Clustering, **Dimensionality Reduction (PCA)**, Association Rules.	Scikit-learn Unsupervised Learning modules.	Perform **Customer Segmentation** using K-Means and use PCA to visualize the results.

Wee k	Focus Area	Key Concepts	Recommended Resources (Free/Low-Cost)	Project / Practice Goal
7	**Deep Learning Foundations**	The Perceptron, **Neural Networks (NNs)** architecture, Activation Functions (Sigmoid, ReLU), **TensorFlow/Keras** setup.	**DeepLearning.AI's Deep Learning Specialization** (Course 1), **TensorFlow Tutorials**.	Build a simple **Feedforward NN** to classify the MNIST handwritten digits dataset.
8	**Convolutiona l Neural Networks (CNNs)**	Convolution/Poolin g layers, Basic CNN Architectures, **Transfer Learning** fundamentals for images.	**fast.ai Practical Deep Learning for Coders**, Specific **TensorFlow/PyTorc h CNN tutorials**.	Implement an **Image Classifier** or utilize a pre-trained model for a small image dataset.

Phase 3: Advanced Topics and Deployment (Weeks 9–12)

Week	Focus Area	Key Concepts	Recommended Resources (Free/Low-Cost)	Project / Practice Goal
9	**Recurrent Networks & Sequences**	**Recurrent Neural Networks (RNNs)**, **LSTMs** (Long Short-Term Memory) and	DeepLearning.AI's Specialization (Sequence Models), Tutorials on time series prediction.	Build a simple **Time Series Predictor** or a basic **Text Generator** using LSTMs.

		GRUs, handling sequence data.		
10	**Natural Language Processing (NLP)**	Text Preprocessing, Tokenization, **Word Embeddings (Word2Vec, GloVe)**, Basic **Transformer** architecture.	**Andrew Ng's NLP Specialization**, Hugging Face Introduction to Transformers.	Build a **Sentiment Analyzer** using an LSTM model on a text review dataset.
11	**MLOps & Deployment**	Model saving (Pickle), **API creation (Flask/FastAPI)**, Introduction to **Docker** (containerization).	Tutorials for deploying ML models with Flask/Streamlit, **Practical MLOps** guides.	**Deploy your Sentiment Analyzer model** as a simple web API using Flask or FastAPI.
12	**Final End-to-End Project**	Integrating all skills: Data acquisition, pre-processing, modeling, hyperparameter tuning, documentation, and presentation.	**Kaggle Competitions**, **GitHub** for portfolio management.	**Build a complete, fully documented project** (e.g., a personalized recommendation engine) and make it public on GitHub.

What's Next? Your Path After 12 Weeks

Career Action	Specific Goal / Outcome	Tools & Resources
Deepen Portfolio	**Build 3-5 Polished Projects** focused on a single domain (e.g., Computer Vision, Advanced NLP). Ensure at least one project is fully **deployed** and live.	**Kaggle** Competitions, GitHub, Streamlit / **Hugging Face Spaces** for easy deployment, **MLflow** for experiment tracking.
Advanced Specialization	Master a specific advanced track based on your interest: **MLOps** (production code) or **Deep Generative Models** (research/algorithms).	Tutorials on **Kubernetes/Docker**, **MLOps** principles, **arXiv** (for reading research papers), **Advanced Andrew Ng Specializations**.
Launch Job Search	Integrate your new projects into your resume, perfect your tech interview skills, and start networking efficiently.	**UpStride Cohort 8 Materials** (Resume/Branding), **LeetCode/HackerRank** (DSA practice), **UpStride Mentor** (for mock system design interviews and introductions).
Continuous Learning	Stay current with the rapidly evolving AI landscape and continuously iterate on your skills.	**ArXiv** (for new papers), Key **AI Newsletters**, DeepLearning.AI **Short Courses**, Industry blogs (e.g., Google AI, Meta AI).