📅 Q1 2025: Foundations & PyTorch Mastery

Goal: Build strong fundamentals in ML, PyTorch, and Deep Learning.

ML & Python for AI

- ✅ Revise Python (NumPy, Pandas, Matplotlib, Scikit-Learn)
- ✅ Study core ML concepts (Supervised, Unsupervised Learning)
- ✅ Implement Regression, Classification models in Scikit-Learn
- ✅ Learn probability, statistics, and linear algebra for ML
  🔗 **Courses:**
- Python for Data Science (Udemy)
- Machine Learning Specialization (Andrew Ng)

PyTorch & Deep Learning Fundamentals

- ✅ Master PyTorch basics (Tensors, Autograd, Neural Networks)
- ✅ Implement Feedforward & Convolutional Neural Networks (CNNs)
- ✅ Train models on MNIST & CIFAR-10 datasets
- ✅ Understand loss functions, optimizers (SGD, Adam)
  🔗 **Courses:**
- Deep Learning with PyTorch (Udacity)
- Fast.ai Deep Learning Course
- Udemy (Daniel Bourke) Pytorch

Advanced Neural Networks & Deployment Basics

- ✅ Learn RNNs, LSTMs, Transformers
- ✅ Study activation functions, batch normalization, dropout
- ✅ Introduction to model deployment (TorchServe, Flask)
- ✅ Mini Project: Build & deploy an image classifier
  🔗 **Courses:**
- Deep Learning Specialization (Coursera)

📅 Q2 2025: Specializing in NLP & Computer Vision

Goal: Dive deep into NLP and Vision.

NLP Basics & Transformers

- ✅ Learn Text Preprocessing (Tokenization, Embeddings)
- ✅ Study RNNs, LSTMs for NLP tasks
- ✅ Work with Hugging Face Transformers library
- ✅ Fine-tune BERT on sentiment analysis
  🔗 **Courses:**
- NLP Specialization (Coursera)
- Hugging Face's NLP Course

Computer Vision (CNNs, Object Detection)

- ✅ Train CNN models for image classification
- ✅ Study object detection (YOLO, Faster R-CNN)
- ✅ Experiment with segmentation models (U-Net)
- ✅ Mini Project: Implement real-time object detection
  🔗 **Courses:**
- Convolutional Neural Networks (Coursera)
- PyTorch Vision Tutorials

Large Language Models & Fine-Tuning

- ✅ Study Transformer architectures (GPT, T5)
- ✅ Fine-tune LLaMA, GPT-4 on custom datasets
- ✅ Learn Retrieval-Augmented Generation (RAG)
- ✅ Deploy a chatbot using a fine-tuned LLM
  🔗 **Courses:**
- Hugging Face's LLM Course
- Generative AI with LLMs (DeepLearning.AI)

📅 Q3 2025: Multimodal AI & Advanced AI Research

Goal: Work on Vision + NLP (Multimodal AI) and advanced AI models.

Multimodal Learning (Vision + NLP)

- ✅ Study CLIP, DALL·E, Flamingo architectures
- ✅ Experiment with OpenAI's CLIP model
- ✅ Implement text-to-image generation
  🔗 **Resources:**
- Hugging Face's Multimodal AI Course

Generative AI & Diffusion Models

- ✅ Study Stable Diffusion & MidJourney
- ✅ Experiment with DreamBooth & Text-to-3D
- ✅ Mini Project: Fine-tune a text-to-image model
  🔗 **Resources:**
- Stable Diffusion Paper
- Hands-On Generative AI with Stable Diffusion

MLOps & AI Model Deployment

- ✅ Learn MLOps fundamentals (CI/CD, Model Serving)
- ✅ Study deployment platforms (TensorRT, Triton)
- ✅ Mini Project: Deploy an LLM-powered API
  🔗 **Courses:**
- MLOps Specialization (Coursera)

📅 Q4 2025: Research, Competitions & Specialization

Goal: Work on real-world applications & contribute to AI research.

Research & Cutting-Edge AI

- ✅ Follow research papers on NeurIPS, ICML, CVPR
- ✅ Implement papers from Papers with Code
- ✅ Contribute to open-source AI projects
  🔗 **Resources:**
- Two Minute Papers YouTube

AI Hackathons & Kaggle Competitions

- ✅ Join Kaggle competitions in NLP & CV
- ✅ Participate in AI hackathons
- ✅ Publish a blog on Medium/Kaggle Notebooks
  🔗 **Resources:**
- Kaggle Competitions

Final Capstone Project

- ✅ Work on a final AI project (choose one):
  - AI-powered chatbot (LLM + RAG)
  - Multimodal search engine (CLIP-based)
  - AI-generated artwork (Stable Diffusion)

- ✅ Deploy project on GitHub, Hugging Face Spaces, or a personal website
🔗 **Resources:**
- FastAPI for AI Deployment

Quarter	**Focus Area**
Q1	ML, PyTorch, Deep Learning Basics
Q2	NLP, Computer Vision, LLM Fine-Tuning
Q3	Multimodal AI, Generative AI, Deployment
Q4	AI Research, Kaggle, Final Capstone Project