Phase 1: Deep Learning Foundations & Hands-on Projects (Weeks 1–5)

Week 1: Introduction to Deep Learning (ANN & CNN)

- Learn how Artificial Neural Networks (ANN) and Convolutional Neural Networks (CNN) work.
- Implement simple ANN and CNN models using TensorFlow/PyTorch.
- Explore use cases like image classification.

Parallel Task: Set up a basic frontend and backend for AI-based applications.

Week 2: Loss Functions, Optimizers, and Evaluation Metrics

- Understand how models learn using loss functions and optimizers like SGD, Adam, etc.
- Learn key evaluation metrics (accuracy, precision-recall, confusion matrix, BLEU score for NLP).
- Experiment with hyperparameter tuning.

Parallel Task: Build APIs for ML models using Flask/Django/FastAPI.

Week 3: Recurrent Neural Networks (RNN) & Transformer Networks

- Learn about sequence-based models (RNN, LSTMs, GRUs).
- Introduction to Transformer architectures (BERT, GPT).
- Apply RNNs for text data and Transformers for NLP tasks.

Parallel Task: Design a frontend UI for AI-driven applications (e.g., chatbot interface).

Week 4: Working on Pre-existing Deep Learning Projects

- Complete **3 structured projects** using pre-existing datasets and models.
- Suggested projects:
    - Image classification (CNN-based).
    - Sentiment analysis (RNN/Transformer-based).
    - Object detection or speech recognition.

Parallel Task: Deploy models into a simple web or mobile application.

Week 5: Generative AI & Large Language Models (LLMs)

- Introduction to Generative AI: GANs, VAEs, and Diffusion Models.
- Explore LLMs and how they are fine-tuned (BERT, GPT, LoRA fine-tuning).
- Work on prompt engineering for LLMs.

Parallel Task: Build an interactive AI-powered application with frontend/backend integration.

Week 6: Custom Deep Learning Project (End-to-End)

- Start an end-to-end deep learning project from scratch.
- Define a problem statement, collect data, train a model, and deploy it.
- Ensure model performance improvement with fine-tuning.

Parallel Task: Complete full-stack integration of the custom AI model.

Phase 2: Deep Learning & Research (Weeks 7–12) [To be detailed later]