**📚 Phase 1: Theory & Core Concepts (Weeks 1–8)**

**Objective:** Build foundational knowledge of AI, ML, Python, scientific computing, and modern AI application workflows.

**Week 1: Introduction to AI & Machine Learning**

* What is AI? History, trends, real-world use cases
* Types of ML: supervised, unsupervised, reinforcement
* Applications in healthcare, finance, retail, automation

**Week 2: Python Fundamentals**

* Syntax, variables, control structures
* Functions, loops, error handling
* Basic data structures: lists, dicts, sets, tuples

**Week 3: Advanced Python for AI**

* List comprehensions, lambda, map/filter
* Object-Oriented Programming
* File I/O, modules, virtual environments

**Week 4: Scientific Computing & Data Processing**

* NumPy & Pandas for data manipulation
* Data cleaning and preprocessing
* Exploratory data analysis
* Visualization using **Matplotlib**

**Week 5: Machine Learning Workflows**

* Model building with Scikit-Learn
* Train/test split, cross-validation
* Classification, regression, clustering
* Evaluation metrics: accuracy, precision, recall

**Week 6: AI Application Frontends**

* **Gradio**: rapid UI for AI models
* **Dash**: interactive dashboards
* Design principles for intuitive ML app UIs
* Embedding models into frontend flows

**Week 7: Version Control, Deployment & Hosting**

* Git & GitHub fundamentals
* Collaborative workflows: branches, pull requests
* Deploying apps to **Heroku, AWS, or GCP**
* Environment variables, buildpacks, model hosting

**Week 8: Ethics, Security, and Testing**

* Ethical AI: bias, fairness, transparency
* Model security: prompt injection, data privacy
* Testing ML pipelines, unit testing with pytest
* Debugging strategies for AI-powered apps

**🛠️ Phase 2: Smart Conversational Assistant with Memory (Weeks 9–12)**

**Objective:** Apply everything by building a **memory-aware AI chatbot** using **Django + DRF + HuggingFace** with an impressive UI and clean team workflows.

**Week 9: Project Kickoff + Team Workflows**

* Define feature scope, roadmap, user stories
* Set up GitHub repo, Agile board (Trello/Jira)
* Office etiquette: async updates, code reviews, standups
* Project setup: Django + DRF scaffold + repo baseline

**Week 10: Backend Development + HuggingFace Integration**

* Django models, DRF serializers, viewsets
* Integrate HuggingFace transformers (e.g., pipeline or custom model)
* Implement memory/context handling in conversations
* Secure endpoints, begin unit testing

**Week 11: Frontend UI + API Integration**

* Build clean and modern chat UI (HTML/CSS/HTMX/JS)
* Connect frontend with DRF API
* Style for usability: avatars, typing indicators, scroll history
* Add analytics/logging for chatbot usage

**Week 12: Cloud Deployment + Final Presentations**

* Deploy full app to Heroku/Render
* Ensure model + database + frontend work in production
* Live demos + peer code walkthroughs
* Write final documentation (README, architecture diagram)
* Portfolio updates, team retrospectives