AI Engineer

Roadmap 2025 🚀

Build Production Agentic AI, RAG pipelines, Fine-Tuning LLMs, Reinforcement Learning, with 11 industry-level apps.

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Microsoft - MVP

Detailed Roadmap:
https://god-level-python.notion.site/AI-Engineer-HQ-b3c98407b4ab45819811db081ae9d102?pvs=4

Curriculum

Prerequsites

- 7-Step AI Prep Challenge

1. Foundations of AI Engineering
2. Mastering Large Language Models (LLMs)
3. Retrieval-Augmented Generation (RAG)
4. Fine-Tuning LLMs
5. Reinforcement Learning and Ethical AI
6. Agentic Workflows
7. Career Acceleration
8. Bonus

Prerequsites

7-Step AI Prep Challenge

This challenge is for you to get started. You may already know about these topics and can complete the challenge in 1 day as well.

Steps	Topic	Content	Actions [Task]	Resources
Step 1	Python Basics	First Program, Variables, Operators, Conditional Statements	- complete the basic topics - complete [Code with Me] for Logic Building	Himanshu Ramchandani **Python for AI Engineering [1]**
Step 2	Command Line Basics	Navigate dirs (directories), run Python files, basic commands (cd, python)	- run a Python script from terminal - use command `python hello.py`	**commandline.md** arewadataScience/ArewaDS-Machine-Learning
Step 3	Git Basics	Clone a repo, commit/push changes intro to GitHub	- create a repo on github - push your first changes to GitHub	Akash Rajvanshi **Step-By-Step Guide To Push Your First Project On GitHub!!**
Step 4	API Basics	What's an API? GET/POST with `requests` JSON basics	- complete the following video to understand `APIs` - use postman for hit some APIs	freeCodeCamp.org **APIs for Beginners - How to use an API (Full Course / Tutori...**
Step 5	Pickle Files	Save/load a model with pickle, why it matters	- save/load a simple `scikit-learn` model	Asha **Serialization and Deserialization Techniques in Python Deser...**
Step 6	Deployments Basics	Creating environment and deployment in Python	- create a python environment - deploy your first app	Real Python **Python Web Applications: Deploy Your Script as a Flask App –...**
Step 7	Docker Basics	What's Docker? Run a container, build a simple image	- create a docker image - put a `flask` app in it	DEV Community **Creating a Docker Image for a Simple python-flask "hello wor...**

Access the Challenge links here:
https://god-level-python.notion.site/7-Step-AI-Bootcamp-Prep-Challenge-1c3ffb33c49580ef92eae98681a2ec6b?pvs=4

[Module - 1]

Foundations of AI Engineering

1.1 - Python

1.1.1 - [Hands-On] Functions & Higher Order Functions

1.1.2 - [Hands-On] Modules, Packages, Library & Framework

1.1.3 - [Hands-On] OOPs [Object Oriented Programming]

1.1.4 - [Hands-On] Data Structures & Algorithms

1.1.5 - [Hands-On] Data Manipulation [NumPy & Pandas]

1.2 - Mathematics in AI

1.2.1 - Linear Algebra

1.2.2 - Calculus

1.2.3 - Statistics & Probability

1.3 - Overview of the AI Ecosystem

1.3.1 - AI and Its Evolution

1.3.2 - AI vs ML vs DL vs GenAI vs LLM vs ChatGPT vs RL

1.3.3 - LLM Ecosystem - ChatGPT, Grok, HuggingFace

1.3.4 - AI Market Analysis & Career Opportunity

1.3.5 - AI Use Cases & Tools

1.4 - Machine Learning as of 2025

1.4.1 - All you need to know about Machine Learning

1.4.2 - [Hands-On] Building a Classification Model

1.4.3 - [Hands-On] Building Multiple Linear Regression model

1.4.4 - When to use Which ML Algorithm?

1.5 - Deep Learning as of 2025

1.5.1 - [Hands-On] Building Your First Neural Network

1.5.2 - [Hands-On] Activation Functions from Scratch

1.5.3 - Drawbacks in RNN, CNN, LSTM architecture

1.6 - The Project Lab [Build-Deploy-Market]

[The Project Lab - 01] AI-powered Resume Analyzer using Python, Flask & NLP

[Thus Showcase] - Show your project publicly [Community/YouTube/GitHub]

1.7 - Interview & Resources

Technical Interview Practice Questions

[Task] - Research Papers

[Module - 2]

Mastering Large Language Models (LLMs)

2.1 - LLM Ecosystem and Access

2.1.1 - Introduction to Transformer Architecture

2.1.2 - LLM Model Architectures

2.1.3 - How to train LLMs?

2.1.4 - [Cloud providers] Azure Open AI, AWS Bedrock, GCP Vertex AI

2.1.5 - [Open-source LLMs] DeepSeek, LLaMA, Mistral 7b (via Hugging Face)

2.1.6 - [Hands-On] Setup LLM on your Local machine using Ollama

2.1.7 - [Hands-On] Sentiment classification pipeline for Amazon product reviews

2.2 - Enterprise Applications

2.2.1 - Business problems solved by LLMs

2.2.2 - Workflow for developing LLM-based applications

2.2.3 - [Hands-On] Azure Open AI's Python API to generate text

2.2.4 - [Cost-benefit analysis] Cloud vs. on-premise

2.2.5 - [Hands-On] HR query bot and outline of workflow

2.2.6 - Multimodal AI Systems

2.2.6 - Vision Models

2.3 - Prompt Engineering

2.3.0 - What is prompt engineering?

2.3.1 - Zero-shot & Few-shot

2.3.2 - Chain-of-Thought & Tree-of-Thought

2.3.3 - Designing prompts for evaluation [LLM as a judge]

2.3.4 - [Hands-On] Design zero-shot and few-shot prompts using Azure AI

2.3.5 - [Hands-On] CoT prompt to solve a math problem

2.4 - System Design

2.4.1 - The 7 Step ML System Design Framework

2.4.2 - Pinterest - Visual Search ML System

2.4.3 - How to build a GenerativeAI Platform?

2.5 - The Project Lab [Build-Deploy-Market]

[The Project Lab - 02] Building LLM from Scratch

[Thus Showcase] - Show your project publicly [Community/YouTube/GitHub]

2.6 - Interview & Resources

Technical Interview Practice Questions

Resources

[Module - 3]

Retrieval-Augmented Generation (RAG)

3.1 - RAG Fundamentals & Workflow

3.1.1 - What is RAG? & Workflow

3.1.2 - Why RAG matters? Overcoming LLM limitations

3.1.3 - RAG Architecture

3.1.4 - [Hands-On] RAG demo using a pre-built tool - LangChain

3.2 - Embeddings and Vector Databases

3.2.1 - What are Vector representations of Text

3.2.2 - How embeddings work? Word2Vec, BERT

3.2.3 - [Hands-On] Generate embeddings for sentences using Hugging Face

3.2.4 - Vector Database Ecosystem overview - ChromaDB, Pinecone, Postgres Vector

3.2.5 - [Hands-On] Vector database with Tesla 10-K statements

3.3 - Advanced RAG

3.3.0 - Reranking and Structured Retrieval

3.3.1 - [Hands-On] Implement a basic RAG pipeline

3.3.2 - Workflow optimization - Balancing retrieval quality and generation coherence

3.3.3 - Evaluating RAG Outputs

3.3.4 - [Hands-On] Tesla RAG

3.3.5 - Hybrid Search

3.3.6 - RAG evaluation [RAGAS]

3.4 - The Project Lab [Build-Deploy-Market]

[The Project Lab - 03] Finance Annual Report RAG Q&A

[Thus Showcase] - Show your project publicly [Community/YouTube/GitHub]

3.5 - Interview & Resources

Technical Interview Practice Questions

[Module - 4]

Fine-Tuning LLMs

4.1 - Fine-tuning Fundamentals

4.1.1 - Why fine-tune? When is it beneficial?

4.1.2 - How transformers enable fine-tuning [Transfer learning principles]

4.1.3 - [Hands-On] Preparing Data for Fine-Tuning

4.1.4 - [Hands-On] Fine-tune Mistral 7b on a domain-specific dataset

4.2 - Parameter-Efficient Fine-Tuning (PEFT)

4.2.1 - What is PEFT?

4.2.2 - Low-Rank Adaptation [LoRA]

4.2.3 - [Hands-On] Fine-tune Mistral 7b with LoRA

4.2.4 - QLoRA

4.3 - Evaluation and Deployment

4.3.0 - Perplexity [language modeling], BERTScore [semantic similarity]

4.3.1 - [Hands-On] Evaluating Mistral

4.3.2 - [Hands-On] Fine-tuning job cost estimate using Azure ML pricing calculator

4.3.3 - [Hands-On] Deploy the fine-tuned Mistral 7b locally

4.3.4 - AI Cost Optimization

4.3.5 - Quantization

4.3.5 - [Hands-On] Quantize Supply Chain Forecaster

4.4 - The Project Lab [Build-Deploy-Market]

[The Project Lab - 04] Legal QnA - Domain Expert LLM

[Thus Showcase] - Show your project publicly [Community/YouTube/GitHub]

4.5 - Interview & Resources

Technical Interview Practice Questions

[Module - 5]

Reinforcement Learning and Ethical AI

5.1 - Reinforcement Learning with Human Feedback (RLHF)

5.1.1 - What is RLHF?

5.1.2 - Reward model & policy optimization [PPO]

5.1.3 - Limitations - Cost, subjectivity, scalability

5.1.4 - [Hands-On] Pre-trained RLHF model vs LLM

5.2 - RLHF Workflow and Implementation

5.2.1 - RLHF process

5.2.2 - [Hands-On] Simulate a RLHF cycle

5.3 - Ethical and Enterprise Considerations

5.3.0 - Bias and fairness

5.3.1 - [Hands-On] Gender stereotypes in text generation

5.3.2 - Content filtering

5.3.3 - [Hands-On] Toxicity filter using an LLM to flag harmful outputs

5.3.4 - [Hands-On] Create a Model Card

5.4 - The Project Lab [Build-Deploy-Market]

[The Project Lab - 05] Ethical Chatbot

[Thus Showcase] - Show your project publicly [Community/YouTube/GitHub]

5.5 - Interview & Resources

Technical Interview Practice Questions

[Module - 6]

Agentic Workflows

6.1 - Agentic Patterns

6.1.1 - What are agentic workflows?

6.1.2 - [Hands-On] Building First AI Agent from Scratch

6.1.3 - What is reflection?

6.1.4 - [Hands-On] Build a reflection agent using LangChain

6.2 - Tool Use - Managing Agentic Memory

6.2.1 - Memory in agents

6.2.2 - [Hands-On] Agent with MemGPT to manage a conversation history

6.3 - Tool Use - Function Calling with Agents

6.3.0 - Function calling

6.3.1 - [Hands-On] AI agent that calls a Hugging Face API

6.4 - Planning with Agents [ReAct Framework]

6.4.1 - What is planning?

6.4.2 - [Hands-On] Implement a ReAct agent to plan a travel itinerary

6.5 - Multi-Agent Collaboration

6.5.1 - What is multi-agent collaboration?

6.5.2 - Models - Open AI Swarm [triage], Crew AI [flow-based], LangGraph [graph-based]

6.5.3 - [Hands-On] Two-agent system using LangChain

6.5.4 - [Hands-On] Multi-agent system with LangGraph for a Q&A task

6.5.5 - [Hands-On] Autonomous Systems

6.5.6 - [Hands-On] Reasoning Fraud Agent

6.5.7 - Model Context Protocol [MCP]

6.5.8 - Agent-to-Agent [A2A] Protocol

6.6 - The Project Lab [Build-Deploy-Market]

[The Project Lab - 06] Travel Booking Agent

[Thus Showcase] - Show your project publicly [Community/YouTube/GitHub]

6.7 - Interview & Resources

Technical Interview Practice Questions

[Module - 7]

Career Acceleration

7.1 - Project with Mentoring

[The Project Lab - 07]

[1 - AI Tutor for Education]

[2 - AI Tutor for Education] RAG + Agentic

[3 - AI Tutor for Education] Planning agent to suggest study topics

[4 - AI Tutor for Education] Evaluate the tutor with queries

[Thus Showcase] - Show your project publicly [Community/YouTube/GitHub]

7.2 - Portfolio Building

7.2.1 - GitHub Profile & Repositories

7.2.2 - Personal Website Building & Deployment

7.3 - Resume and Interview Prep

7.3.1 - Resume Template

7.3.2 - Resume Checklist

7.3.3 - Interview Preparation

7.3.4 - AI/ML Interview Questions

7.3.5 - LLMs Interview Questions

7.3.6 - Machine Learning Interview Questions

7.4 - Networking

7.4.1 - Engaging in Following AI Communities

7.4.2 - Follow these AI Creators on LinkedIn

7.4.3 - Follow these AI Creators on YouTube

7.5 - Personal Branding [Not recommended for Everyone]

7.5.1 - LinkedIn Profile Optimization

7.5.2 - Sharing your work Online

7.5.3 - Cold Out Reach to Potential Clients/Recruiters

[Miscellaneous]

Bonus

Note: These bonus bundles will not be available anywhere else, but only inside the course.

AI Job Navigator Toolkit [$500 Value]

Freelance AI Profit Blueprint [$2000 Value]

VIP Masterclass Pass [$2000 Value]

Post-Course Success Playbook [$1000 Value]

The Project Lab Bonus Bundle [Build-Deploy-Market]

[The Project Lab - 08] Healthcare Symptom Diagnostic Agent

[The Project Lab - 09] E-Commerce Product Recommendation Engine

[The Project Lab - 10] Supply Chain Optimization Forecaster

[The Project Lab - 11] Real-Time Fraud Detection System

Pro Badge

AI EngineerHQ Challenge

Discord Study Group Sessions

Discord mini-Cohorts and Study Groups

Certified Accreditation

AI EngineerHQ Certified Professional

[Hands-On] Complete the Certification Process

Personalized Mentorship

Scheduling Your 1:1 Sessions

[Hands-On] Project Review with Mentor

[Career Strategy Session] Job applications or freelancing pitches

Exclusive Industry Access

AI EngineerHQ Job Board

AI Engineering Use Cases Bundle

AI Engineering Case Study Hub

[Hands-On] Crafting a Winning Freelancing Pitch

Advanced Tools and Resources

Azure Credit [In-process]

AI EngineerHQ Toolkit

Live Masterclasses with Industry Experts

Guest Speaker Series

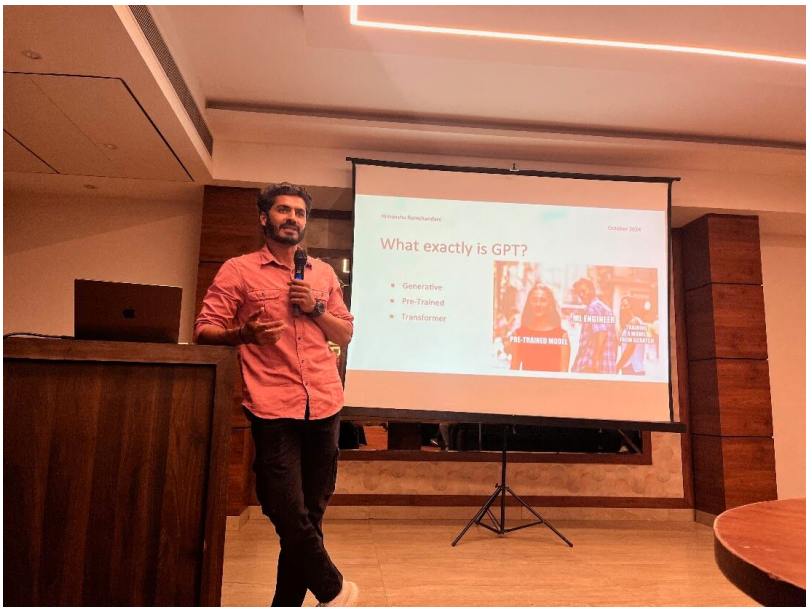
Post-Course Support

Community Access [Discord weekly QnA Calls]

Revenue Generating Projects

Monetizing Your Portfolio [Projects Into SaaS]

About Me



I’m Himanshu Ramchandani, I am from India.

Microsoft MVP

I am an AI Consultant with close to a decade of experience.

I worked on over 100 Data & AI projects in Energy, Healthcare, Law Enforcement & Defense.

I am the Founder of an AI engineering & Consulting company - Dextar.

I focus on action-oriented AI leadership & engineering implementation drills.

I provide AI Engineering & Leadership training to teams through AI Engineer HQ and The Elite [AI Leadership Accelerator]

In the last decade, I have never stopped sharing my knowledge and have helped over 10000 leaders, professionals, and students.

Detailed Roadmap:

https://god-level-python.notion.site/AI-Engineer-HQ-b3c98407b4ab45819811db081ae9d102?pvs=4

AI Newsletter:

https://newsletter.himanshuramchandani.co/

Join Telegram:

https://t.me/+sREuRiFssMo4YWJl

Join the Discord Community:

https://discord.gg/q3svy4VEEs