

# LLMs + RAG Learning Roadmap (Beginner to Advanced)

## Phase 0: Prerequisites (1 week)

- Learn Basic Python, APIs (e.g., using `requests`, `FastAPI`), and NLP basics.

Resources:

- Hugging Face NLP Crash Course: <https://huggingface.co/learn/nlp-course/chapter1>
- Codebasics NLP Playlist: <https://youtube.com/playlist?list=PLZoTAEELRMXVPkI7oRvzyNnyj1HS4wt2K->

## Phase 1: Getting Started with LLMs (1-1.5 weeks)

- Understand LLMs (GPT, BERT), tokenization, embeddings, attention mechanism.
- Use OpenAI and Hugging Face APIs.

Resources:

- Hugging Face Transformers Basics: <https://huggingface.co/docs/transformers/index>
- How GPT Works (AssemblyAI): <https://www.youtube.com/watch?v=bZQun8Y4L2A>
- OpenAI Playground: <https://platform.openai.com/playground>
- LangChain Docs (Basic): <https://docs.langchain.com/docs/>

## Phase 2: Embeddings + Vector Databases (1 week)

- Learn about Embeddings (text to vectors), and vector DBs like FAISS, ChromaDB, Pinecone.

Resources:

- OpenAI Embeddings Guide: <https://platform.openai.com/docs/guides/embeddings>
- Pinecone RAG Series: <https://www.pinecone.io/learn/series/rag/>
- FAISS Tutorial: <https://github.com/facebookresearch/faiss/wiki>

## Phase 3: Retrieval-Augmented Generation (RAG) (1-2 weeks)

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- Learn how to retrieve external documents and combine with LLMs.
- Use LangChain or LlamaIndex.

Resources:

- LangChain RAG Docs: <https://docs.langchain.com/docs/use-cases/question-answering/>
- LangChain RAG Project (Krish Naik): <https://youtu.be/i8wPqvW8-cA>
- Build ChatGPT for Your Data (DataProfessor): <https://www.youtube.com/watch?v=yDdxD9a1Fco>

### Mini Projects

- PDF Q&A Bot - LangChain + FAISS
- Wikipedia Chatbot - RAG + Wikipedia API
- College FAQ Bot - ChromaDB + LangChain
- Product Search Bot - Vector Search + Streamlit

### Phase 4: Go Advanced (1-2 weeks)

- Learn Fine-tuning small LLMs, Custom RAG, LLM evaluation, Prompt Engineering.

Resources:

- OpenAI Cookbook: <https://github.com/openai/openai-cookbook>
- LangChain Advanced Docs: <https://docs.langchain.com/docs/guides/>
- LLM University (Cohere): <https://learn.cohere.com/>

### Optional Resources

- DeepLearning.AI LangChain Course:  
<https://www.deeplearning.ai/short-courses/langchain-chat-with-your-data/>
- RAG from Scratch (Colab):  
<https://colab.research.google.com/github/hwchase17/langchain/blob/master/docs/modules/chains/examples/r>

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