

# LangChain Syllabus (JS + Gemini API Focus)

## Module 1 – Foundations of LangChain

- Introduction to LangChain (What is it, Why use it, Key Components).
- LangChain Setup (JS): Install, Configure Gemini API, Hello World.

## Module 2 – Core Building Blocks

- LLM Chains: PromptTemplate → LLM → OutputParser.
- Memory: BufferMemory, SummaryMemory, ConversationKGMemory.
- Tools: Custom tools (weather API, calculator, etc.), Tool calling with Gemini.

## Module 3 – Data & Knowledge Integration

- Embeddings in LangChain: Using Google's text-embedding-004.
- Vector Stores: Chroma, Pinecone, Weaviate, FAISS.
- Retrieval Augmented Generation (RAG): Step-by-step pipeline, Mini project with .txt.

## Module 4 – Advanced LangChain

- Agents: How they work, Action → Observation → Thought loop, Custom agent with Gemini.
- LangGraph: Why LangGraph, Workflow orchestration, Example multi-step reasoning.
- Evaluation & Debugging: LangSmith, Logging + monitoring LLM performance.

## Module 5 – Projects

- Mini Projects: Chatbot with memory & tools, Simple RAG on .txt files, Weather API agent.
- Capstone Project: Full RAG pipeline with vector DB + Gemini, multi-file knowledge base.