With AI

Gen & Agentic - AI



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Java, Python, aws, GENAI, UI UX, React, Infinity, Angular, Selenium, SailPoint

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Behind Every Great Institute is a Great Founder



Mr. Kunal Sir

Director of **CJC EdTech by Kunal Sir.**

Mr. Kunal Sonu, Director of **CJC EdTech by Kunal Sir,** holds a Master's degree in Computer Applications & has over **15+ years** of experience in Java/J2EE technologies. After resigning from Syntel, he pursued a career in teaching to provide in-depth knowledge and guidance to aspiring professionals. **Mr. Kunal** has delivered lectures at renowned institutions such as **Sinhgad Institutes, JSPM Group,** & **MMCOE, Pune.** With a passion for education, he is dedicated to helping **students achieve success in their careers.**

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Module 1 – Core Python

Python setup & foundations

- VS Code
- Venv
- Variables
- Data types
- Input/output
- First script

Control flow & functions

- if/else
- for/while loops
- Defining functions
- Scope
- Return values
- Basic recursion

Data structures

- Lists
- Tuples
- Dicts
- Sets
- CRUD ops
- List comprehensions
- Nested structures

OOP basics

- Classes
- Objects
- __init__
- Methods
- Inheritance
- Dunder methods
- Model a real-world entity

Files, JSON & error handling

- Read/write files
- Parse JSON
- try/except/finally
- Custom exceptions
- Logging basics

Python for AI – libraries & async

- Pip
- Virtual envs
- Requests
- Dotenv
- Intro to async/await
- Call a mock API endpoint

Module 2 – Gen AI, LLM Basics & Prompt Engineering

How LLMs work

- How LLMs work
- Tokens
- Transformers (intuition)
- Pretraining vs fine-tuning
- Temperature
- Top-p
- Context windows

Calling LLMs via API for GenAI

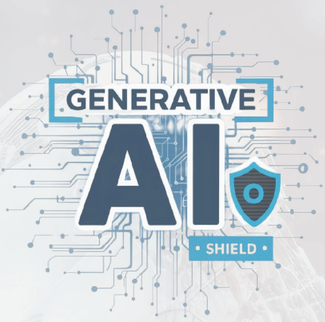
- OpenAI / Anthropic SDK
- System & user messages
- Streaming responses
- Managing API keys

Prompt engineering – core techniques for GenAI

- Zero-shot
- Few-shot
- Chain-of-thought
- Role prompting
- Formatting outputs with JSON mode

Tool use & function calling

- Tool schemas
- The tool-call loop
- Multi-turn with tool results
- Build a calculator tool



Ethics & safety in AI

- Hallucinations
- Bias
- Guardrails
- Responsible AI design
- Agentic failure modes & mitigation

Mini-project: CLI chatbot

- Build a multi-turn CLI chatbot with tool use (weather lookup)
- Peer review & debrief

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Module 3 – LangChain

LangChain intro & LCEL

- What is LangChain
- LangChain Expression Language (pipe syntax)
- Prompt templates
- Output parsers

Chains – sequential & parallel

- RunnableSequence
- RunnableParallel
- RunnablePassthrough
- Branching logic with RunnableBranch

Memory in LangChain

- ConversationBufferMemory
- Window memory
- Summary memory
- When and why to use each

LangChain tools & agents

- Built-in tools (search, Python REPL)
- Custom tools
- AgentExecutor
- ReAct agent loop

Document loaders & text splitters

- PDF/web/CSV loaders
- RecursiveCharacterTextSplitter
- Chunking strategy & overlap tradeoffs

Embeddings & semantic search

- What is MCP
- MCP servers vs clients
- Tool discovery
- Integrating an MCP server into a LangChain agent

MCP – Model Context Protocol

- What are embeddings
- Cosine similarity
- Embedding models
- Building a simple semantic search

Month 1 capstone project

- Build a document Q&A agent with memory, custom tools & MCP integration
- Demo & review

Module 4 – RAG & Vector Databases

RAG architecture & pipeline

- Naive vs advanced RAG
- Indexing vs retrieval vs generation phases
- When RAG beats fine-tuning

Vector databases — Chroma & FAISS

- ANN search
- HNSW index
- Chroma setup
- FAISS basics
- Similarity metrics
- Metadata filtering

Building a full RAG pipeline

- Ingest PDFs - chunk - embed - store - retrieve - generate
- RetrievalQA chain end-to-end

Advanced RAG techniques

- HyDE
- Multi-query retrieval
- Re-ranking with cross-encoders
- Contextual compression
- Hybrid search

Knowledge graphs for RAG

- Entities, relations, triples
- Neo4j basics
- GraphRAG
- Combining vector + graph retrieval

RAG evaluation & metrics

- Entities, relations, triples
- Neo4j basics
- GraphRAG
- Combining vector + graph retrieval

Module 5 – LangGraph & Agentic Orchestration

LangGraph core concepts

- Why graphs over chains
- StateGraph
- Nodes
- Edges
- Conditional edges
- State schema with TypedDict

First LangGraph agent

- ReAct agent from scratch in LangGraph
- Tool nodes
- Interrupt & human-in-the-loop checkpoints

Agent memory in LangGraph

- In-thread vs cross-thread memory
- MemorySaver checkpointer
- Short-term vs long-term memory patterns

Multi-agent — supervisor pattern

- Supervisor agent routing to sub-agents
- Shared state
- Result aggregation
- Task delegation design

Multi-agent — swarm & handoff

- Peer-to-peer handoffs
- Swarm architecture
- When to use supervisor vs swarm
- Failure recovery

Agentic design patterns

- Plan-and-execute
- Reflection & self-critique
- Tool-use patterns
- Guardrails & safe agent design

Module 6 – Tracing, Evaluation & FastAPI

Tracing with LangSmith

- Why tracing matters
- LangSmith setup
- Run trees
- Tagging
- Filtering traces
- Debugging agent loops

Evaluation frameworks

- LLM-as-judge
- Custom evaluators in LangSmith
- Building test datasets
- Regression testing agents

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FastAPI fundamentals

- Routes
- Path/query params
- Pydantic models
- Request/response schemas
- Async endpoints
- Auto docs

Serving agents via FastAPI

- Wrap a LangGraph agent as a REST API
- Streaming SSE responses
- Session management
- Error handling

Auth, middleware & background tasks

- API key auth
- Rate limiting middleware
- Background tasks for async agent runs
- Webhook callbacks

Mini-project: agent API service

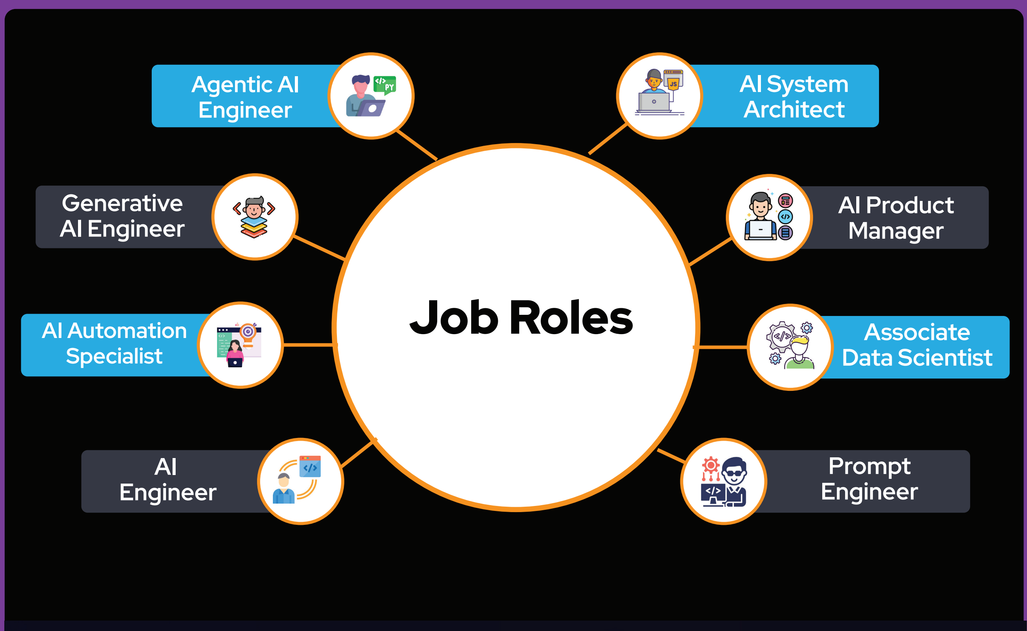
- Build & demo a production-style RAG agent served via FastAPI with tracing
- Peer review

Module 7 – Final Capstone

Capstone build day

- Guided build time — multi-agent system with RAG, memory, knowledge graph, served via FastAPI

Career Opportunites in Gen AI & Agentic AI





From Hello World to Full Applications, My Coding Growth

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Kunal Sir Has the **Answer!**



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