Format: Live, hands-on coding from scratch (no copy-paste)
Focus: Build & deploy AI agents using Python, LangChain, LangGraph, and Semantic Kernel across Energy, Environment, Banking/Trading domains.

Day 1 – Python Foundations + First Banking/Trading Agent

Kick-off & Overview (09:00 – 09:15)

- **What:** Introduction to the program flow, rules, and expectations. Emphasis on strict coding from scratch.

- **Why:** To set the context, ensure participants understand the structure and objectives, and establish coding discipline.

- **When:** First 15 minutes of the day.

- **Hands-On / Case Studies:** Orientation, coding. Prepare the environment and tools.

Python Essentials (09:15 – 10:15)

- **What:** Cover basic Python concepts including data types, lists, dictionaries, loops, and file I/O.

- **Why:** Building the foundation needed for handling financial datasets, automating tasks, and preparing data for AI processing.

- **When:** Morning session after kick-off.

- **Hands-On / Case Studies:** Perform data cleaning on stock and energy datasets to remove inconsistencies, handle missing values, and format data.

Advanced Python Part 1 (10:15 – 11:15)

- **What:** Object-Oriented Programming (OOP), modules, and packages.

- **Why:** To structure Python programs efficiently and create reusable components. Essential for complex banking/trading applications.

- **When:** Mid-morning session.

- **Hands-On / Case Studies:** Implement a class for "TradeOrder" objects including attributes like order type, amount, price, and methods for execution.

Break (11:15 – 11:30)

- Short break for refreshment.

Advanced Python Part 2 (11:30 – 12:15)

- **What:** Error handling, generators, and decorators.

- **Why:** To write robust and efficient code. Error handling ensures smooth execution; generators improve memory management; decorators enable logging and reusable code.

- **When:** Late morning session.

- **Hands-On / Case Studies:** Create a decorator for logging transactions, tracking order execution time, and recording errors.

Python for AI (12:15 – 13:00)

- **What:** Working with APIs, asynchronous programming, and environment variables.

- **Why:** To fetch real-time data from financial markets and manage credentials securely.

- **When:** Before lunch.

- **Hands-On / Case Studies:** Fetch live stock and cryptocurrency prices using public APIs with async calls and environment variable handling.

Lunch (13:00 – 14:00)

- Break for lunch and refreshment.

LangChain Basics (14:00 – 14:50)

- **What:** Introduction to LangChain including PromptTemplates and Chains.

- **Why:** Enables building AI agents that can interact with financial data intelligently.

- **When:** Early afternoon session.

- **Hands-On / Case Studies:** Q&A exercise on banking regulations and how AI can process them using LangChain prompts and chains.

Semantic Kernel Basics (14:50 – 15:40)

- **What:** Understanding plugins and semantic functions.

- **Why:** To develop AI agents capable of semantic understanding and summarization of complex financial reports.

- **When:** Mid-afternoon session.

- **Hands-On / Case Studies:** Build a summarizer for trading reports to extract key insights.

Break (15:40 – 16:00)

- Short break for refreshment.

Case Study 1 – Banking/Trading (16:00 – 17:00)

- **What:** Implement an AI agent for stock market news summarization.

- **Why:** To consolidate Python foundations and AI concepts into a practical, industry-relevant project.

- **When:** Late afternoon session.

- **Hands-On / Case Studies:** 45 minutes coding to build the agent from scratch, followed by a 15-minute demo of the AI agent summarizing financial news.

Wrap-up & Assessment (17:00 – 17:15)

- **What:** Quiz and coding checkpoints to evaluate understanding.

- **Why:** To assess participants' grasp of Python fundamentals and their ability to implement AI agents.

- **When:** End of the day.

- **Hands-On / Case Studies:** Complete a short quiz and submit coding exercises for review.

Day 2 – Advanced Agents + Energy/Environment Case Studies

Recap & Review (09:00 – 09:15)

- **What:** Review and demo of Day-1 outputs.

- **Why:** Reinforce previous learning and identify areas for improvement before advancing to more complex agents.

- **When:** First 15 minutes of the day.

- **Hands-On / Case Studies:** Showcase AI agents from Day 1 and discuss outcomes.

LangChain Agents Deep Dive (09:15 – 10:00)

- **What:** Explore multi-tool orchestration with LangChain agents.

- **Why:** To enable agents to perform complex tasks by interacting with multiple tools and APIs.

- **When:** Morning session.

- **Hands-On / Case Studies:** Build a multi-tool assistant for smart grid management.

LangGraph Advanced (10:00 – 10:45)

- **What:** State management, branching, and parallel execution.

- **Why:** To manage complex workflows and parallel processes in energy monitoring applications.

- **When:** Mid-morning session.

- **Hands-On / Case Studies:** Implement an emission monitoring flow with branching logic.

Break (10:45 – 11:00)

- Short break for refreshment.

Memory & Personalization (11:00 – 11:45)

- **What:** Context handling and embeddings for agent memory.

- **Why:** To personalize agent responses and maintain conversation context over multiple interactions.

- **When:** Late morning session.

- **Hands-On / Case Studies:** Build an energy usage tracking chatbot with memory and personalized recommendations.

Semantic Kernel Advanced (11:45 – 12:30)

- **What:** Action planner, chaining functions, advanced semantic logic.

- **Why:** To automate decision-making in sustainability and energy planning applications.

- **When:** Late morning session.

- **Hands-On / Case Studies:** Develop a sustainability action planner that suggests energy-saving steps.

Lunch (12:30 – 13:30)

- Break for lunch.

RAG Pipelines (13:30 – 14:15)

- **What:** Retrieval-Augmented Generation pipelines including chunking, retrieval, and hybrid search.

- **Why:** To efficiently query large environmental compliance documents and generate accurate insights.

- **When:** Early afternoon.

- **Hands-On / Case Studies:** Perform Q&A on environmental compliance documents using a RAG pipeline.

Real-World Integration (14:15 – 15:00)

- **What:** Integration with APIs, databases, and IoT sensors.

- **Why:** To connect AI agents to live data streams for actionable insights.

- **When:** Mid-afternoon.

- **Hands-On / Case Studies:** Build an agent that ingests live climate and IoT sensor data for monitoring purposes.

Break (15:00 – 15:15)

- Short break for refreshment.

Case Study 2 – Energy Efficiency Audit (15:15 – 16:00)

- **What:** AI agent analyzing building energy data.

- **Why:** Apply all advanced agent skills to a real-world energy efficiency audit.

- **When:** Late afternoon.

- **Hands-On / Case Studies:** 30 minutes coding to create the agent + 15 minutes testing results and functionality.

Case Study 3 – Carbon Footprint Analysis (16:00 – 16:45)

- **What:** AI agent calculating and visualizing carbon footprint.

- **Why:** Provide actionable insights on carbon emissions for sustainability reporting.

- **When:** Late afternoon session.

- **Hands-On / Case Studies:** 30 minutes coding to build the agent + 15 minutes showcase results.

Wrap-up & Assessment (16:45 – 17:00)

- **What:** Quiz and code review.

- **Why:** To evaluate understanding of advanced agents and their application in energy and environmental use cases.

- **When:** End of the day.

- **Hands-On / Case Studies:** Complete a short quiz and review coding exercises for Day 2.

Day 3 – Multi-Agent Systems + Capstone

Recap & Project Planning (09:00 – 09:15)

- **What:** Teams finalize capstone projects and set goals.

- **Why:** To ensure clarity of objectives and alignment on project scope.

- **When:** First 15 minutes of the day.

- **Hands-On / Case Studies:** Discussion and planning session, no coding yet.

Multi-Agent Orchestration (09:15 – 10:00)

- **What:** Coordination among multiple agents.

- **Why:** To simulate real-world scenarios where multiple AI agents collaborate.

- **When:** Morning session.

- **Hands-On / Case Studies:** Implement smart grid orchestration flow with multiple AI agents working together.

Complex Tooling (10:00 – 10:45)

- **What:** Error handling and fallback mechanisms.

- **Why:** To build resilient and reliable AI monitoring systems.

- **When:** Mid-morning session.

- **Hands-On / Case Studies:** Create a resilient monitoring agent that can handle errors and provide fallback solutions.

Break (10:45 – 11:00)

- Short break for refreshment.

Latest Features (11:00 – 11:45)

- **What:** Explore LangChain v0.3 and Semantic Kernel planners.

- **Why:** To leverage the newest capabilities for agent planning and orchestration.

- **When:** Late morning session.

- **Hands-On / Case Studies:** Experiment session to test new LangChain and SK features.

Observability & Governance (11:45 – 12:30)

- **What:** Logging, safe prompting, and ethical AI considerations.

- **Why:** Ensure agents are secure, auditable, and ethically aligned.

- **When:** Late morning session.

- **Hands-On / Case Studies:** Build a secure and auditable AI agent with logging and safe prompt handling.

Lunch (12:30 – 13:30)

- Break for lunch.

Capstone Case Study (13:30 – 16:30)

- **What:** End-to-end Energy & Environment AI solution.

- **Why:** To integrate all learnings into a single, comprehensive project.

- **When:** Early afternoon to late afternoon session.

- **Hands-On / Case Studies:** 2.5 hours coding to build from scratch. Project options include:

    - Renewable energy forecasting dashboard

- - Smart city energy optimizer

  - Carbon tracker app

- Followed by 30 minutes of testing and refinement.

Break (16:30 – 16:45)

- Short break for refreshment.

Showcase & Final Assessment (16:45 – 17:15)

- **What:** Team presentations and feedback.

- **Why:** Evaluate understanding, creativity, and technical skills in a real-world project.

- **When:** End of the day.

- **Hands-On / Case Studies:** Teams showcase their capstone projects, receive feedback, and complete final assessment.