BOARD INFINITY

COURSE 1 OF 3 · BUILDING AND DEPLOYING AI AGENTS SPECIALIZATION

AI Agent Architecture: Reasoning, Memory, and LangGraph

Full course syllabus - every module, video lesson, reading and assignment, from agent foundations to a working Research Assistant Agent.

Board Infinity
Instructor · Offered on Coursera

4	28	17	2 weeks
Modules	Video lessons	Assignments	At 10 hours a week

INSIDE THE COURSE

01	Foundations of Agentic AI Architecture	5 hours to complete
02	Building Structured and Reliable Agents	4 hours to complete
03	Memory and Persistence in Agents	4 hours to complete
04	Building and Evaluating the Research Assistant Agent	4 hours to complete

Enroll on Coursera

https://www.coursera.org/learn/ai-agent-architecture-reasoning-memory-and-langgraph

01 ABOUT THE COURSE

Architecting AI agents for real systems.

AI Agent Architecture goes beyond prompting a chatbot: it covers how agents perceive, reason and act, and how to build them so they are modular, reliable and able to remember.

It focuses on LangGraph workflows, structured validation with Pydantic-AI, memory with Mem0, and a capstone Research Assistant Agent - 28 videos, 13 readings and 17 assignments in all.

WHO IT'S FOR

Python developers
Adding agent architecture and memory to their code.

AI & ML engineers
Turning models into agents that reason and remember.

Software engineers moving into AI
Applying modular design to agentic systems.

Tech leads & architects
Choosing the right agent framework for a project.

WHAT YOU'LL LEARN

01 **Design modular agent architectures** Module 1
Design perception, reasoning and action workflows with LangGraph

02 **Build structured, reliable agents** Module 2
Implement structured input and output validation with Pydantic-AI

03 **Give agents memory** Module 3
Integrate Mem0 for short-term, long-term and contextual memory

04 **Build a Research Assistant Agent** Module 4
Integrate and test a full agent, and compare LangGraph, LangChain and Agno

02 SYLLABUS

Four modules, foundations to capstone.

2 weeks to complete at 10 hours a week. Flexible schedule - learn at your own pace.

01 Foundations of Agentic AI Architecture

5 hours
10 videos

Careers, the agent lifecycle, modular design, and graph-based reasoning

BY THE END OF THIS MODULE YOU CAN

- Describe careers, trends and in-demand skills in agentic AI
- Map the perception-reasoning-action model to real tasks
- Compare modular and monolithic agent architectures
- Build a simple graph-based workflow in LangGraph

CONTENTS: 10 videos (55 min) · 4 readings (90 min) · 5 assignments (180 min)

TOPICS: Career Scope in Agentic AI · Understanding the Agent Lifecycle · Modular vs. Monolithic Architectures · Graph-Based Reasoning with LangGraph

You'll leave with: a clear mental model of how agents work, and your first LangGraph workflow.

02 Building Structured and Reliable Agents

4 hours
7 videos

Runtime validation with Pydantic-AI, LangGraph workflows, Email-to-Task agent

BY THE END OF THIS MODULE YOU CAN

- Enforce validation at runtime with Pydantic-AI
- Design reasoning nodes and integrate I/O with LangGraph
- Debug dependencies in agent workflows
- Build extraction, classification and storage nodes

CONTENTS: 7 videos (32 min) · 3 readings (45 min) · 4 assignments (150 min)

TOPICS: Structured Data in Agents · Implementing LangGraph Workflows · Hands-On: Email-to-Task Agent

You'll leave with: a working Email-to-Task agent whose inputs and outputs you can trust.

03 Memory and Persistence in Agents

Memory types, memory state, trade-offs, and persistent memory with Mem0

4 hours
4 videos

BY THE END OF THIS MODULE YOU CAN

- Compare short-term, long-term and contextual memory
- Apply memory to real-world agent use cases
- Manage memory state and persist memory with Mem0
- Evaluate the trade-off between performance and context

CONTENTS: 4 videos (19 min) · 3 readings (45 min) · 4 assignments (150 min)

TOPICS: Understanding Memory Models · Persistent Memory with Mem0 · Evaluating Memory Performance

You'll leave with: agents that remember what matters across conversations, without slowing down.

04 Building and Evaluating the Research Assistant Agent

A full agent build, and LangGraph vs. LangChain vs. Agno

4 hours
7 videos

BY THE END OF THIS MODULE YOU CAN

- Design the architecture of a Research Assistant Agent
- Implement summarization and recall
- Integrate and test the agent with research documents
- Compare LangGraph, LangChain and Agno, and choose one

CONTENTS: 7 videos (30 min) · 3 readings (45 min) · 4 assignments (150 min)

TOPICS: System Integration and Testing · Building the Research Assistant Agent · Framework Evaluation and Reflection

You'll leave with: a Research Assistant Agent you built end to end, and a clear view of which framework fits which job.

03 TOOLS & SKILLS

The frameworks that run through the course.

LangGraph Module 1

Graph-based workflows for agent reasoning.
In this course: Used from the first workflow to the capstone.

Pydantic-AI Module 2

Schemas that validate agent inputs and outputs.
In this course: Runtime validation in an Email-to-Task agent.

Mem0 Module 3

Short-term, long-term and contextual memory.
In this course: Persistent memory and its performance trade-offs.

LangChain & Agno Module 4

Alternative agent frameworks.
In this course: Compared with LangGraph to choose the right fit.

SKILLS YOU LEAVE WITH

Agent architecture

- Agentic systems
- Software architecture
- Modular design
- AI orchestration

Reliability

- Data validation
- Structured output
- Workflow debugging
- Testing agents

Memory & integration

- Memory management
- Data persistence
- Systems integration
- Framework selection

04 CERTIFICATE & CAREER

Finish with a shareable certificate.

Add it to LinkedIn
Add this credential to your LinkedIn profile, resume, or CV.

Share it anywhere
Share it on social media and in your performance review.

Earned, not attended
Awarded on completion of the graded quizzes in all four modules.

Course 1 of 3
The first course of the Building and Deploying AI Agents Specialization.

WHERE THESE SKILLS ARE IN DEMAND

AI Agent Developer · AI Engineer · LLM Application Developer · Machine Learning Engineer · AI Solutions Architect · AI Product Engineer

Board Infinity

Instructor · Offered on Coursera

Intermediate level · Taught in English · Flexible schedule

Ready to architect real AI agents?

Enrollment, lessons, grading and the certificate all happen on Coursera.

Enroll on Coursera

Course page: coursera.org/learn/ai-agent-architecture-reasoning-memory-and-langgraph

Want a coach alongside the course?

Board Infinity 1:1 coaching is a separate, optional Board Infinity offering - it is not part of the Coursera course. Details: https://www.boardinfinity.com/career-coaching/

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