



COURSE SYLLABUS

Forward Deployed AI Engineer

3-Month Industry-Oriented Program

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01 Course Overview

The Forward Deployed AI Engineer is a 3-month industry-oriented program designed to develop professionals who can build, integrate, deploy, and optimize AI solutions for real-world business problems.

The program covers the complete AI engineering journey, from Python and Generative AI fundamentals to LLM applications, RAG, AI Agents, Agentic AI, enterprise integrations, cloud deployment, AI evaluation, security, and production systems.

Learners will also develop essential Forward Deployment skills such as customer requirement analysis, AI use-case identification, solution architecture, technical scoping, POC development, production deployment, and business impact measurement.

02 Learning Outcomes

- 1 Build LLM-powered AI applications
- 2 Develop enterprise RAG systems
- 3 Build AI Agents and Agentic AI workflows
- 4 Integrate AI with APIs and enterprise systems
- 5 Design scalable AI architectures
- 6 Deploy AI applications on cloud
- 7 Evaluate, secure, monitor, and optimize AI systems
- 8 Convert business problems into practical AI solutions

03 Detailed Course Curriculum

Module Overview

Module	Title
01	Python & Software Engineering
02	AI & Generative AI Fundamentals
03	LLM Application Engineering
04	AI Application Development
05	Retrieval-Augmented Generation (RAG)
06	Advanced RAG Engineering
07	AI Agents & Agentic AI
08	Advanced Agentic AI
09	AI Frameworks & MCP
10	AI Evaluation, Guardrails & Security
11	Databases & Enterprise Integrations
12	Docker, Cloud & DevOps
13	Kubernetes & Production AI
14	Forward Deployment Engineering
15	AI Solution Architecture & Technical Scoping
16	Enterprise AI Deployment & Adoption

MODULE 01

Python & Software Engineering

No.	Topic
1.1	Python Fundamentals
1.2	Advanced Python
1.3	Object-Oriented Programming
1.4	Exception Handling
1.5	File Handling
1.6	Modules & Packages

No.	Topic
1.7	Virtual Environments
1.8	Async Programming
1.9	Logging & Debugging
1.10	Type Hints & Dataclasses
1.11	Git & GitHub
1.12	Software Development Best Practices

MODULE 02

AI & Generative AI Fundamentals

No.	Topic
2.1	Artificial Intelligence Fundamentals
2.2	Machine Learning Overview
2.3	Deep Learning Overview
2.4	NLP Fundamentals
2.5	Generative AI
2.6	Foundation Models
2.7	Large Language Models

No.	Topic
2.8	Multimodal AI
2.9	LLM Capabilities & Limitations
2.10	Transformer Architecture
2.11	Attention Mechanism
2.12	Tokens & Tokenization
2.13	Context Windows
2.14	Model Inference

MODULE 03

LLM Application Engineering

No.	Topic
3.1	LLM APIs
3.2	API Authentication
3.3	Model Parameters
3.4	Prompt Engineering
3.5	Prompt Templates
3.6	Few-Shot Prompting
3.7	Context Engineering
3.8	Prompt Chaining

No.	Topic
3.9	Structured Outputs
3.10	JSON & JSON Schema
3.11	Pydantic Validation
3.12	Function Calling
3.13	Model Selection
3.14	Token & Cost Optimization
3.15	Prompt Security

MODULE 04

AI Application Development

No.	Topic
4.1	AI Application Architecture
4.2	FastAPI Fundamentals
4.3	REST APIs
4.4	Request & Response Handling
4.5	Pydantic
4.6	API Validation
4.7	Authentication
4.8	Authorization

No.	Topic
4.9	JWT
4.10	API Documentation
4.11	Async APIs
4.12	Streaming Responses
4.13	Server-Sent Events
4.14	WebSockets
4.15	AI Backend Architecture

MODULE 05

Retrieval-Augmented Generation (RAG)

No.	Topic
5.1	RAG Fundamentals
5.2	RAG Architecture
5.3	Document Processing
5.4	PDF & DOCX Processing
5.5	Data Cleaning
5.6	Document Ingestion
5.7	Chunking Strategies
5.8	Metadata Management

No.	Topic
5.9	Embeddings
5.10	Vector Representations
5.11	Similarity Search
5.12	Vector Databases
5.13	FAISS
5.14	Chroma
5.15	PostgreSQL + pgvector

MODULE 06

Advanced RAG Engineering

No.	Topic
6.1	Semantic Search
6.2	Keyword Search
6.3	Hybrid Search
6.4	Top-K Retrieval
6.5	Metadata Filtering
6.6	Reranking
6.7	Query Rewriting
6.8	Query Transformation

No.	Topic
6.9	Multi-Query Retrieval
6.10	Context Compression
6.11	Parent-Child Retrieval
6.12	Citation-Based RAG
6.13	Agentic RAG
6.14	RAG Optimization
6.15	RAG Evaluation

MODULE 07

AI Agents & Agentic AI

No.	Topic
7.1	AI Agent Fundamentals
7.2	LLM Applications vs Workflows vs Agents
7.3	Agent Architecture
7.4	Agent Planning
7.5	Agent Reasoning
7.6	Agent Execution
7.7	Tool Calling
7.8	Function Calling

No.	Topic
7.9	Tool Design
7.10	Tool Selection
7.11	Tool Execution
7.12	Agent State Management
7.13	Agent Control Flow
7.14	Agent Memory
7.15	Agent Error Handling

MODULE 08

Advanced Agentic AI

No.	Topic
8.1	Short-Term Memory
8.2	Long-Term Memory
8.3	Persistent Memory
8.4	Agent Workflows
8.5	Sequential Workflows
8.6	Parallel Workflows
8.7	Conditional Workflows
8.8	Routing

No.	Topic
8.9	Task Delegation
8.10	Human-in-the-Loop
8.11	Multi-Agent Systems
8.12	Supervisor & Worker Agents
8.13	Agent Coordination
8.14	Agent Reliability
8.15	Agent Evaluation

MODULE 09

AI Frameworks & MCP

No.	Topic
9.1	LangChain
9.2	LangGraph
9.3	OpenAI Agents SDK
9.4	Agent Orchestration
9.5	Model Context Protocol (MCP)
9.6	MCP Architecture

No.	Topic
9.7	MCP Clients
9.8	MCP Servers
9.9	MCP Tools
9.10	MCP Resources
9.11	Connecting Agents to External Systems
9.12	Tool & Resource Management

MODULE 10

AI Evaluation, Guardrails & Security

No.	Topic
10.1	AI Evaluation Fundamentals
10.2	Evaluation Datasets
10.3	Golden Datasets
10.4	Test Cases
10.5	Regression Testing
10.6	LLM Evaluation
10.7	RAG Evaluation
10.8	Agent Evaluation
10.9	Hallucination Detection
10.10	Faithfulness

No.	Topic
10.11	Response Quality
10.12	AI Guardrails
10.13	Input Validation
10.14	Output Validation
10.15	PII Protection
10.16	Prompt Injection
10.17	Jailbreak Prevention
10.18	Data Leakage
10.19	AI Security

MODULE 11

Databases & Enterprise Integrations

No.	Topic
11.1	SQL Fundamentals
11.2	PostgreSQL
11.3	Database Design
11.4	Relationships
11.5	Joins
11.6	Indexing
11.7	Transactions
11.8	PostgreSQL for AI Applications
11.9	pgvector
11.10	Redis

No.	Topic
11.11	Caching
11.12	Session Management
11.13	REST API Integration
11.14	Webhooks
11.15	OAuth Fundamentals
11.16	Enterprise API Integration
11.17	CRM Integration
11.18	Helpdesk Integration
11.19	Email & Communication APIs

MODULE 12

Docker, Cloud & DevOps

No.	Topic
12.1	Docker Fundamentals
12.2	Docker Images
12.3	Containers
12.4	Dockerfile
12.5	Docker Compose
12.6	Container Networking
12.7	Cloud Computing Fundamentals
12.8	AWS Fundamentals
12.9	IAM
12.10	EC2

No.	Topic
12.11	S3
12.12	RDS
12.13	VPC
12.14	Load Balancer
12.15	CloudWatch
12.16	Secrets Management
12.17	CI/CD
12.18	GitHub Actions
12.19	Application Deployment

MODULE 13

Kubernetes & Production AI

No.	Topic	No.	Topic
13.1	Kubernetes Fundamentals	13.12	Availability
13.2	Kubernetes Architecture	13.13	Performance Optimization
13.3	Pods	13.14	Logging
13.4	Deployments	13.15	Monitoring
13.5	Services	13.16	Metrics
13.6	ConfigMaps	13.17	Tracing
13.7	Secrets	13.18	Observability
13.8	Scaling	13.19	AI Cost Optimization
13.9	Production Deployment	13.20	Latency Optimization
13.10	Scalability	13.21	Error Handling
13.11	Reliability	13.22	Retry & Fallback Strategies

MODULE 14

Forward Deployment Engineering

No.	Topic	No.	Topic
14.1	Introduction to Forward Deployment	14.9	Pain Point Identification
14.2	Role of a Forward Deployed AI Engineer	14.10	AI Use-Case Identification
14.3	Customer-Facing Engineering	14.11	AI Feasibility Analysis
14.4	Customer Discovery	14.12	Business Value Analysis
14.5	Stakeholder Identification	14.13	Technical Requirements
14.6	Requirement Gathering	14.14	Functional Requirements
14.7	Business Workflow Analysis	14.15	Non-Functional Requirements
14.8	Problem Definition		

MODULE 15

AI Solution Architecture & Technical Scoping

No.	Topic	No.	Topic
15.1	Solution Architecture	15.12	Technical Scoping
15.2	AI System Architecture	15.13	Project Scope
15.3	LLM Architecture	15.14	Dependencies
15.4	RAG Architecture	15.15	Assumptions
15.5	Agent Architecture	15.16	Constraints
15.6	Data Architecture	15.17	Risks
15.7	API Architecture	15.18	Acceptance Criteria
15.8	Integration Architecture	15.19	POC Development
15.9	System Design	15.20	MVP Planning
15.10	Data Flow Diagrams	15.21	POC to Production
15.11	AI Workflow Design		

MODULE 16

Enterprise AI Deployment & Adoption

No.	Topic	No.	Topic
16.1	Enterprise AI Deployment	16.11	AI Adoption
16.2	Production Rollout	16.12	Usage Monitoring
16.3	Integration Testing	16.13	Workflow Optimization
16.4	Performance Testing	16.14	Continuous Improvement
16.5	User Acceptance Testing	16.15	Business Impact Measurement
16.6	Customer Onboarding	16.16	Productivity Measurement
16.7	Technical Documentation	16.17	Automation Metrics
16.8	User Training	16.18	Cost Savings
16.9	Knowledge Transfer	16.19	ROI Measurement
16.10	Customer Feedback		

04 Tools and Technologies

Category	Tools / Technologies
Programming & Backend	Python, SQL, FastAPI, REST APIs, Pydantic
Generative AI & LLM	LLM APIs, Open-Source LLMs, Prompt Engineering, Structured Outputs, Function / Tool Calling, Embeddings, Multimodal AI
RAG & Vector Databases	LangChain, FAISS, Chroma, PostgreSQL, pgvector, Vector Databases, Semantic & Hybrid Search
Agentic AI	LangGraph, OpenAI Agents SDK, AI Agents, Multi-Agent Systems, Agent Memory, Tool Calling, MCP (Model Context Protocol)
Database & Integration	PostgreSQL, Redis, REST APIs, Webhooks, OAuth, CRM & Enterprise API Integration
Cloud & DevOps	Git & GitHub, Docker, GitHub Actions, AWS, EC2, S3, RDS, IAM, CloudWatch, Load Balancer, Kubernetes Fundamentals
Production AI	AI Evaluation, Guardrails, AI Security, Logging, Monitoring, Observability, Cost Optimization, Performance Optimization

05 Course Duration and Training Plan

Program Duration	3 months
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06 Career Opportunities

After completing the program, learners can explore career opportunities across AI engineering, applied AI, agentic systems, and AI deployment.

- Forward Deployed AI Engineer
- AI Engineer
- Generative AI Engineer
- LLM Engineer
- Applied AI Engineer
- AI Application Engineer
- Agentic AI Engineer
- AI Solutions Engineer
- RAG Engineer
- AI Automation Engineer
- AI Integration Engineer
- AI Platform Engineer
- AI Solutions Architect

07

Contact Us



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