MERCURY

Professional AI Engineering Course

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Introduction

This Professional AI Engineering course introduces the foundational and advanced principles of building intelligent systems. It focuses on how modern AI systems are designed, trained, and deployed in real environments. Participants explore how to engineer machine learning models for scalability and performance. The program explains how generative AI and large language models will integrate into applications. It develops an understanding of AI system architecture and end-to-end engineering workflows. Learners gain a structured view of AI engineering training aligned with industry demands.

Targeted Groups

This Professional AI Engineering training targets professionals seeking knowledge and skills:

- Software developers move into AI engineering roles.
- Data analysts aiming to build machine learning systems.
- IT professionals working on AI integration projects.
- Engineers interested in AI system architecture design.
- Technical managers overseeing AI-driven solutions.
- Students pursuing machine learning engineering careers.
- DevOps engineers focusing on MLOps pipelines.
- Business analysts exploring AI-powered decision systems.

Course Objectives

Participants will achieve the following objectives by completing the Professional AI Engineering course:

- Understand core principles of AI engineering and system design.
- Build structured knowledge of machine learning engineering workflows.
- Apply AI model deployment techniques in real environments.
- Design a scalable AI system architecture for business use cases.
- Develop skills in MLOps pipeline creation and automation.
- Integrate large language models into practical applications.
- Analyze data engineering requirements for AI solutions.
- Evaluate generative AI systems for enterprise deployment.
- Strengthen problem-solving in AI-driven projects.
- Improve technical decision-making in AI development cycles.

Targeted Competencies

Participants will gain the following competencies during the Professional AI Engineering program:

- AI system design and architecture planning skills.
- Machine learning engineering and model lifecycle management.
- Practical experience in AI model deployment processes.
- Ability to build and manage MLOps pipelines.

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- Competence in working with LLM applications.
- Understanding of generative AI engineering principles.
- Skills in data engineering for AI workflows.
- Capability to optimize AI system performance and scalability.

Studying Scenarios

In this Professional AI Engineering training, participants develop skills through the following scenarios:

- Designing scalable AI systems for enterprise applications.
- Building machine learning models for predictive analytics tasks.
- Deploying AI models into production environments using structured workflows.
- Developing MLOps pipelines for continuous integration and delivery.
- Integrating large language models into business automation systems.
- Creating generative AI solutions for content and decision support.
- Managing data pipelines for AI model training and evaluation.
- Optimizing AI system performance under real-world constraints.

Course Content

Unit 1: Foundations of Professional AI Engineering

- Introduction to Professional AI Engineering concepts and scope.
- Overview of AI engineering training and industry expectations.
- Understanding AI system architecture and design principles.
- Basics of machine learning engineering workflows and stages.
- Role of data engineering in AI system development.
- Introduction to model lifecycle management processes.
- Core components of AI-driven software systems.
- Understanding structured AI development environments.
- Overview of AI applications in modern industries.

Unit 2: Machine Learning Engineering Fundamentals

- Fundamentals of machine learning engineering pipelines.
- Data preprocessing techniques for AI model training.
- Feature engineering strategies for model improvement.
- Model selection techniques for different use cases.
- Training workflows for supervised and unsupervised learning.
- Model evaluation metrics and performance analysis.
- Hyperparameter tuning and optimization methods.
- Building reusable ML components for production systems.
- Transition from prototype models to production-ready systems.

Unit 3: AI System Architecture and Design

- Designing scalable AI system architecture frameworks.
- Structuring distributed AI systems for enterprise use.
- Integrating APIs into AI-powered applications.
- Designing modular AI components for flexibility.
- Ensuring reliability in AI system design.

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- Managing compute resources for AI workloads.
- Building secure AI architecture for data protection.
- Aligning AI systems with business requirements.
- Planning end-to-end AI solution architecture.

Unit 4: MLOps and AI Model Deployment

- Introduction to MLOps pipeline concepts and practices.
- Continuous integration for machine learning systems.
- Continuous deployment strategies for AI models.
- Model versioning and tracking techniques.
- Automation of AI workflows in production environments.
- Monitoring AI model performance over time.
- Managing drift detection in deployed models.
- Scalable deployment of machine learning services.
- Maintaining AI systems in the production lifecycle.

Unit 5: Generative AI and LLM Applications

- Fundamentals of generative AI systems and models.
- Working with large language models in applications.
- Prompt engineering techniques for AI interaction.
- Building LLM-powered business solutions.
- Integrating generative AI into enterprise workflows.
- Fine-tuning models for domain-specific tasks.
- Developing AI-driven content generation systems.
- Evaluating the performance of generative AI outputs.
- Future trends in AI engineering and automation.

Final Insights & Key Takeaways

This Professional AI Engineering course builds a strong foundation in modern AI system development and deployment. It prepares learners to design, build, and manage scalable AI solutions across diverse real-world environments.