Training Course on Prompt Engineering and Large Language Models Optimization

Professional Development Training Course Outline

Category	Data Science	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Training Course on Prompt Engineering & LLM Optimization: Advanced Techniques for Maximizing LLM Performance is designed to equip professionals with the **cutting-edge skills** required to master **prompt engineering** and **Large Language Model (LLM) optimization**. In today's rapidly evolving AI landscape, the ability to craft effective prompts and fine-tune LLM performance is paramount for unlocking transformative business value, driving innovation, and gaining a significant competitive advantage. Participants will delve into advanced techniques beyond basic prompt creation, focusing on **strategic LLM interaction**, **bias mitigation**, **cost efficiency**, and **scalable deployment**.

This comprehensive program moves beyond theoretical concepts, emphasizing hands-on application and real-world scenarios. Through practical exercises, case studies, and expert-led sessions, attendees will learn to harness the full potential of **Generative AI**, understand the intricacies of **LLM architecture**, implement **advanced prompting strategies** like Chain-of-Thought and RAG, and optimize models for **speed, accuracy, and reduced inference costs**. This course is crucial for anyone looking to elevate their proficiency in the **AI development lifecycle** and become a leader in the era of **Intelligent Automation**.

Programme Curriculum

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Course Objectives

1. Master Advanced Prompt Crafting for optimal LLM response generation.
2. Implement Contextual Prompting and Multi-turn Conversations for enhanced dialogue flow.
3. Apply Zero-shot, Few-shot, and Chain-of-Thought (CoT) Prompting to complex problem-solving.
4. Understand and mitigate LLM Hallucinations and Bias Detection for reliable AI outputs.
5. Optimize LLMs for Inference Speed and Cost Reduction through techniques like quantization and pruning.
6. Utilize Retrieval Augmented Generation (RAG) for factual accuracy and up-to-date information.
7. Develop Prompt Chaining and Agentic Workflows for complex task automation.
8. Implement Ethical AI Principles in prompt design and LLM deployment.
9. Evaluate LLM Performance Metrics and establish robust testing methodologies.
10. Explore Fine-tuning and Knowledge Distillation for custom LLM applications.
11. Design Meta-Prompts for self-improving and adaptive LLM interactions.
12. Leverage LLM Observability and Prompt Management Systems for collaborative development.
13. Drive Business Innovation and Process Automation using optimized LLM solutions.

Organizational Benefits

- Streamline workflows and automate complex tasks with highly optimized LLM applications.
- Gain deeper insights from data through accurate and reliable LLM outputs.
- Optimize LLM inference, leading to significant savings on computational resources.
- Deliver more relevant, accurate, and personalized AI interactions.
- Reduce the incidence of hallucinations and biases, ensuring more trustworthy AI deployments.
- Empower teams to rapidly prototype and deploy sophisticated AI-powered solutions.
- Stay ahead in the AI arms race by mastering advanced LLM optimization techniques.
- Build LLM applications that can scale efficiently to meet growing demands.

Target Audience

1. AI/ML Engineers & Data Scientists

2. Software Developers
3. Product Managers.
4. Business Analysts.
5. Researchers & Academics.
6. Technical Architects
7. UX/UI Designers (with technical interest).
8. AI Enthusiasts & Innovators

Course Outline

Module 1: Foundations of Advanced Prompt Engineering

- Deep Dive into LLM Mechanics & Architectures (e.g., Transformers, Attention Mechanisms)
- Understanding Prompt Dynamics: Beyond Basic Inputs
- The Role of Context, Persona, and Style in Prompt Design
- Introduction to Prompt Evaluation Metrics
- Case Study: Optimizing Customer Service Chatbots for Empathetic Responses.

Module 2: Advanced Prompt Crafting Techniques

- Zero-shot, Few-shot, and One-shot Learning in Practice
- Mastering Chain-of-Thought (CoT) and Tree-of-Thought (ToT) Prompting
- Implementing Self-Consistency and Self-Correction Strategies
- Instruction Tuning and Reinforcement Learning from Human Feedback (RLHF) for Prompt Refinement
- Case Study: Improving Code Generation Accuracy for specific programming languages.

Module 3: Retrieval Augmented Generation (RAG) Implementation

- Architecting RAG Systems: Indexing, Retrieval, and Generation
- Choosing and Optimizing Vector Databases for RAG
- Strategies for Chunking and Embedding External Knowledge
- Handling Query Ambiguity and Enhancing Retrieval Relevance
- Case Study: Building a Domain-Specific Q&A System for Legal Documents.

Module 4: LLM Optimization for Performance & Efficiency

- Understanding LLM Inference: Speed vs. Quality Trade-offs
- Quantization Techniques (e.g., 8-bit, 4-bit) for Model Compression
- Pruning and Sparsity for Reduced Model Size
- Batching and Parallel Processing for High Throughput
- Case Study: Reducing Inference Latency in a Real-time Translation Application.

Module 5: Fine-tuning and Customization

- Parameter-Efficient Fine-Tuning (PEFT) techniques like LoRA and QLoRA
- Data Preparation and Curation for Fine-tuning Datasets
- Strategies for Adapting Pre-trained LLMs to Specific Tasks
- Evaluating Fine-tuned Model Performance
- Case Study: Customizing an LLM for Niche Industry Jargon in Healthcare.

Module 6: Mitigating Bias and Hallucinations

- Identifying and Analyzing Sources of Bias in LLMs

- Techniques for Debiasing Prompt Responses
- Strategies for Detecting and Correcting Hallucinations
- Ethical Considerations in Prompt Engineering and LLM Deployment
- Case Study: Ensuring Fairness in AI-driven Recruitment Tools.

Module 7: Prompt Chaining and Agentic Workflows

- Designing Multi-step Prompt Sequences for Complex Tasks
- Building Autonomous Agents with LLMs for Workflow Automation
- Integrating LLMs with External Tools and APIs
- Error Handling and Fallback Mechanisms in Agentic Systems
- Case Study: Automating Research and Content Synthesis for Marketing Campaigns.

Module 8: Advanced Context Management

- Managing Long Context Windows and Context Overflow
- Techniques for Summarizing and Condensing Information for Prompts
- Dynamic Context Injection and Retrieval
- Memory and State Management in Conversational AI
- Case Study: Enhancing Long-form Dialogue in a Virtual Assistant.

Module 9: Prompt Engineering for Specific Use Cases

- Creative Content Generation (Storytelling, Poetry, Marketing Copy)
- Code Generation and Debugging with LLMs
- Data Analysis and Insights Extraction
- Personalized Recommendations and Customer Engagement
- Case Study: Generating Hyper-Personalized Product Descriptions for E-commerce.

Module 10: LLM Observability and Monitoring

- Key Metrics for LLM Performance Monitoring (Latency, Throughput, Quality)
- Logging and Tracing LLM Interactions
- Identifying and Debugging Prompt Failures
- A/B Testing Prompt Variations and Model Versions
- Case Study: Setting up an Observability Dashboard for an LLM-powered Application.

Module 11: Prompt Management and Version Control

- Establishing Best Practices for Prompt Organization
- Versioning Prompts and Tracking Changes
- Collaborative Prompt Development Workflows
- Integrating Prompt Management with MLOps Pipelines
- Case Study: Managing a Large Library of Prompts for an Enterprise-wide AI Solution.

Module 12: Meta-Prompting and Self-Improving LLMs

- Understanding the Concept of Meta-Prompts
- Using LLMs to Generate and Refine Prompts
- Automated Prompt Optimization Techniques
- Iterative Improvement of Prompt Performance
- Case Study: Developing a Self-Optimizing Content Generation System.

Module 13: Security and Privacy in LLM Applications

- Protecting Sensitive Data in Prompts and Outputs
- Mitigating Prompt Injection Attacks
- Ensuring Data Governance and Compliance with LLMs
- Anonymization and De-identification Techniques
- Case Study: Securing an LLM for Financial Data Analysis.

Module 14: Scaling LLM Deployment & Infrastructure

- Deployment Strategies for Optimized LLMs (On-premise, Cloud, Edge)
- Load Balancing and Auto-scaling for LLM Services
- Containerization and Orchestration (Docker, Kubernetes) for LLMs
- Cost Management and Resource Allocation for LLM Inference
- Case Study: Deploying a High-Traffic LLM-powered Search Engine.

Module 15: Future Trends & Advanced Research

- The Latest in LLM Architectures and Breakthroughs
- Emerging Prompt Engineering Paradigms (e.g., Cognitive Architectures)
- Multimodal LLMs and Their Applications
- The Future of AI Agents and Autonomous Systems
- Case Study: Exploring the Potential of LLMs in Scientific Discovery.

Training Methodology

This course employs a **blended learning approach** combining:

- **Interactive Lectures:** Concise presentations of core concepts and advanced theories.
- **Hands-on Workshops:** Practical coding exercises and prompt crafting sessions using leading LLM platforms (e.g., OpenAI, Anthropic, Hugging Face models).
- **Live Demonstrations:** Expert-led walkthroughs of complex prompt engineering and optimization techniques.
- **Case Study Analysis:** In-depth discussion and problem-solving based on real-world industry applications.
- **Group Discussions & Peer Learning:** Collaborative problem-solving and knowledge sharing.
- **Individual & Team Projects:** Application of learned skills to develop practical LLM solutions.
- **Q&A Sessions:** Dedicated time for addressing participant queries and fostering deeper understanding.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now