

This **Generative AI Engineering course** is designed to equip participants with **intermediate-level skills** equivalent to 2–3 years of experience. It focuses on building, deploying, and optimizing generative AI models like GPT, DALL-E, and Stable Diffusion for real-world applications. The curriculum covers foundational concepts, practical engineering techniques, advanced use cases, and integration into production environments.

Week	Topic	Key Concepts	Hands-On Activities
1	Introduction to Generative AI	Overview of generative AI, types of models (text, image, audio), ethical considerations.	Exploring ChatGPT and DALL-E for generating outputs.
2	Foundations of Neural Networks	Basics of neural networks, activation functions, and training mechanisms.	Training a simple neural network using TensorFlow or PyTorch.
3	Introduction to Transformer Models	Understanding the architecture of transformers, attention mechanism, and their role in LLMs.	Building a basic transformer using Hugging Face.
4	Pretrained Models and Transfer Learning	Fine-tuning vs. training from scratch, Hugging Face transformers.	Fine-tuning GPT or BERT for a text generation task.
5	Generative Text Models	Exploring GPT, text completion, summarization, translation, and Q&A generation.	Writing prompts and fine-tuning a GPT-based model.
6	Generative Image Models	Basics of GANs (Generative Adversarial Networks) and diffusion models like DALL-E and Stable Diffusion.	Generating images using Stable Diffusion.
7	Generative Audio and Video Models	Introduction to generative audio (WaveNet, Jukebox) and video synthesis.	Generating audio clips with WaveNet or similar tools.
8	Ethical AI and Bias Mitigation	Understanding bias in generative AI models, responsible AI principles.	Identifying and mitigating bias in model outputs.
9	Fine-Tuning Text Models	Dataset preparation, tokenization, and training strategies for custom tasks.	Fine-tuning GPT models for domain-specific applications.
10	Fine-Tuning Image Models	Dataset curation, augmentations, and transfer learning for generative image models.	Training a GAN or diffusion model for a specific use case.
11	Generative AI for Multimodal Tasks	Exploring multimodal models like CLIP and GPT-4; text-to-image and image-to-text tasks.	Implementing a text-to-image pipeline using CLIP.
12	Model Evaluation and Metrics	Techniques for evaluating generative AI models: BLEU, ROUGE, FID, and human feedback.	Evaluating text and image outputs with appropriate metrics.

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13	Advanced Prompt Engineering	Few-shot and zero-shot learning, role-specific prompting, and iterative refinement.	Crafting advanced prompts for GPT models.
14	Real-Time Applications of Generative AI	Use cases in customer support, content generation, and personalization.	Building a chatbot using GPT for a real-time use case.
15	API Integration	Using OpenAI API and other generative AI platforms for scalable applications.	Developing an API-based application for text or image generation.
16	Generative AI in Cloud Environments	Deploying generative AI models on AWS, Azure, or GCP.	Hosting a fine-tuned GPT or DALL-E model on a cloud platform.
17	Optimization Techniques	Reducing latency, quantization, and pruning for generative AI models.	Implementing quantization to optimize a deployed model.
18	CI/CD Pipelines for Generative AI	Building CI/CD pipelines for model deployment and updates.	Automating deployment with GitHub Actions or Jenkins.
19	Real-Time Stream Processing	Using generative AI for real-time applications (streaming chat, interactive content).	Building a real-time AI assistant with GPT and WebSocket's.
20	Security in Generative AI Applications	Addressing adversarial attacks, model poisoning, and data privacy.	Implementing security features in a generative AI deployment.
21	Industry-Specific Applications	Customizing generative AI for healthcare, finance, retail, and education use cases.	Designing a generative AI solution for a chosen industry.
22	Emerging Trends and Research	Exploring the latest advancements in generative AI, including foundation models and AutoGPT.	Researching and presenting on a recent generative AI innovation.
23	Capstone Project Development	Planning and implementing a real-world generative AI solution.	Developing an end-to-end generative AI application.
24	Capstone Presentation	Presenting the capstone project	Showcasing the project.
25-36	Live Project	3 Month Experience on Live Project	