

Generative AI Engineer, they need a Combination of **programming, machine learning, deep learning, and LLM knowledge**. Below is a **clear step-by-step roadmap**.

1 Learn Programming (Foundation)

Start with **Python**, because most AI tools use it.

Topics to learn:

- Variables, loops, functions
- Object-Oriented Programming
- File handling
- APIs
- Virtual environments

Useful libraries:

- **NumPy**
 - **Pandas**
 - **Matplotlib**
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2 Learn Math for AI

You don't need PhD-level math but understand:

- **Linear Algebra**
- **Probability Theory**
- **Statistics**
- **Calculus**

These help understand how models learn.

3 Learn Machine Learning

Start with **Scikit-learn**.

Algorithms to learn:

- **Linear Regression**
- **Logistic Regression**
- **Decision Tree**
- **Random Forest**

Concepts:

- Training / testing
 - Overfitting
 - Feature engineering
 - Model evaluation
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4 Learn Deep Learning

Generative AI mainly uses **deep learning**.

Frameworks:

- **PyTorch**
- **TensorFlow**

Concepts:

- Neural Networks
 - Backpropagation
 - CNN
 - RNN
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5 ☐ Learn NLP (Natural Language Processing)

Important topics:

- Tokenization
- Embeddings
- Attention
- Transformers

Models to study:

- **BERT**
 - **GPT**
 - **T5**
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6 ☐ Learn Transformers & LLMs

Main library used in industry:

- **Hugging Face Transformers**

You should learn:

- Loading pretrained models
 - Fine-tuning models
 - Tokenizers
 - Text generation
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7 ☐ Learn Generative AI Models

Important model types:

- **GPT-4**
- **LLaMA**
- **Stable Diffusion**

Tasks:

- Text generation
 - Image generation
 - Code generation
 - Chatbots
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8 Learn Prompt Engineering

Prompt engineering means **designing instructions for LLMs**.

Learn:

- Few-shot prompting
- Chain-of-thought prompting
- Context engineering

Used with:

- **LangChain**
 - **LlamaIndex**
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9 Build Real Projects

Examples:

- AI chatbot
- AI document summarizer
- AI coding assistant
- AI image generator
- AI voice assistant

Use tools like:

- **Streamlit**
- **FastAPI**

- **Docker**
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☐ **Deploy AI Applications**

Learn deployment:

- **Hugging Face Hub**
 - **AWS**
 - **Google Cloud**
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☐ **Skills of a Good Generative AI Engineer**

- ✓ Python programming
 - ✓ Deep learning
 - ✓ Transformers
 - ✓ LLM fine-tuning
 - ✓ Prompt engineering
 - ✓ AI deployment
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☐ **Typical Learning Timeline**

Stage	Time
Programming + ML	2–3 months
Deep Learning	2 months
Transformers	1–2 months

Generative AI projects 2 months

Total: **6–8 months** with practice.

