

# Developing Generative AI Applications on AWS

AWS Classroom Training

## Course description

This course is designed to introduce generative AI to software developers interested in leveraging large language models without fine-tuning. The course provides an overview of generative AI, planning a generative AI project, getting started with Amazon Bedrock, the foundations of prompt engineering, and the architecture patterns to build generative AI applications using Amazon Bedrock and LangChain.

- Course level: Advanced
- Duration: 2 days

## Activities

This course includes presentations, demonstrations, and group exercises.

## Course objectives

In this course, you will learn to:

- Describe generative AI and how it aligns to machine learning
- Define the importance of generative AI and explain its potential risks and benefits
- Identify business value from generative AI use cases
- Discuss the technical foundations and key terminology for generative AI
- Explain the steps for planning a generative AI project
- Identify some of the risks and mitigations when using generative AI
- Understand how Amazon Bedrock works
- Familiarize yourself with basic concepts of Amazon Bedrock
- Recognize the benefits of Amazon Bedrock
- List typical use cases for Amazon Bedrock
- Describe the typical architecture associated with an Amazon Bedrock solution
- Understand the cost structure of Amazon Bedrock
- Implement a demonstration of Amazon Bedrock in the AWS Management Console
- Define prompt engineering and apply general best practices when interacting with FMs
- Identify the basic types of prompt techniques, including zero-shot and few-shot learning
- Apply advanced prompt techniques when necessary for your use case
- Identify which prompt-techniques are best-suited for specific models
- Identify potential prompt misuses
- Analyze potential bias in FM responses and design prompts that mitigate that bias
- Identify the components of a generative AI application and how to customize a foundation model (FM)
- Describe Amazon Bedrock foundation models, inference parameters, and key Amazon Bedrock APIs
- Identify Amazon Web Services (AWS) offerings that help with monitoring, securing, and governing your Amazon Bedrock applications
- Describe how to integrate LangChain with large language models (LLMs), prompt templates, chains, chat models, text embeddings models, document loaders, retrievers, and Agents for Amazon Bedrock
- Describe architecture patterns that can be implemented with Amazon Bedrock for building generative AI applications
- Apply the concepts to build and test sample use cases that leverage the various Amazon Bedrock models, LangChain, and the Retrieval Augmented Generation (RAG) approach

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## Intended audience

This course is intended for:

- Software developers interested in leveraging large language models without fine-tuning

## Prerequisites

We recommend that attendees of this course have:

- *AWS Technical Essentials*
- Intermediate-level proficiency in Python

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## Course outline

### Day 1

#### Module 1: Introduction to Generative AI - Art of the Possible

- Overview of ML
- Basics of generative AI
- Generative AI use cases
- Generative AI in practice
- Risks and benefits

#### Module 2: Planning a Generative AI Project

- Generative AI fundamentals
- Generative AI in practice
- Generative AI context
- Steps in planning a generative AI project
- Risks and mitigation

#### Module 3: Getting Started with Amazon Bedrock

- Introduction to Amazon Bedrock
- Architecture and use cases
- How to use Amazon Bedrock
- Demonstration: Setting Up Bedrock Access and Using Playgrounds

#### Module 4: Foundations of Prompt Engineering

- Basics of foundation models
- Fundamentals of prompt engineering
- Basic prompt techniques
- Advanced prompt techniques
- Demonstration: Fine-Tuning a Basic Text Prompt
- Model-specific prompt techniques
- Addressing prompt misuses
- Mitigating bias
- Demonstration: Image Bias-Mitigation

### Day 2

#### Module 5: Amazon Bedrock Application Components

- Applications and use cases
- Overview of generative AI application components
- Foundation models and the FM interface
- Working with datasets and embeddings
- Demonstration: Word Embeddings
- Additional application components
- RAG
- Model fine-tuning
- Securing generative AI applications
- Generative AI application architecture

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## Module 6: Amazon Bedrock Foundation Models

- Introduction to Amazon Bedrock foundation models
- Using Amazon Bedrock FMs for inference
- Amazon Bedrock methods
- Data protection and auditability
- Demonstration: Invoke Bedrock Model for Text Generation Using Zero-Shot Prompt

## Module 7: LangChain

- Optimizing LLM performance
- Integrating AWS and LangChain
- Using models with LangChain
- Constructing prompts
- Structuring documents with indexes
- Storing and retrieving data with memory
- Using chains to sequence components
- Managing external resources with LangChain agents
- Demonstration: Bedrock with LangChain Using a Prompt that Includes Context

## Module 8: Architecture Patterns

- Introduction to architecture patterns
- Text summarization
- Demonstration: Text Summarization of Small Files with Anthropic Claude
- Demonstration: Abstractive Text Summarization with Amazon Titan Using LangChain
- Question answering
- Demonstration: Using Amazon Bedrock for Question Answering
- Chatbots
- Demonstration: Conversational Interface – Chatbot with AI21 LLM
- Code generation
- Demonstration: Using Amazon Bedrock Models for Code Generation
- LangChain and agents for Amazon Bedrock
- Demonstration: Integrating Amazon Bedrock Models with LangChain Agents