Google Cloud AI and ML Fundamentals

Course Duration: 24 Hours **Course code: GCP-VERT-AI-AB**

1. Course Overview

This course introduces the core concepts of Artificial Intelligence (AI) and Machine Learning (ML) using Google Cloud Platform (GCP). It is designed to help learners understand how AI/ML works, how to use Google Cloud AI services, and how to build, train, and deploy basic ML models. The course combines theoretical foundations with hands-on experience using tools like Vertex AI, AutoML, and BigQuery ML.

2. What you'll learn?

By the end of the course, you will be able to:

- Understand the fundamentals of AI, ML, and Deep Learning
- Differentiate between supervised, unsupervised, and reinforcement learning
- Use Google Cloud AI/ML services such as Vertex AI and AutoML
- Build, train, and evaluate ML models
- Work with datasets using BigQuery and Cloud Storage
- Apply pre-trained APIs for vision, speech, and language tasks
- Understand model deployment and monitoring basics
- Implement responsible AI practices

3. Target Audience

- Beginners in AI and Machine Learning
- Cloud Engineers and Developers
- Data Analysts and Data Engineers
- Students and IT Professionals
- Business professionals exploring AI

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4. Pre-Requisites

Before taking this course, you should have:

- Basic understanding of cloud computing
- Familiarity with programming (Python recommended)
- Basic knowledge of statistics (helpful but not mandatory)

5. Course content

Module 1: Course Introduction

- Course overview and objectives
- Introduction to AI and ML in Google Cloud
- Industry use cases and trends

Module 2: Fundamentals of Artificial Intelligence

- What is AI and ML
- Types of AI (Narrow, General, Generative)
- Real-world AI applications
- AI lifecycle overview

Module 3: Machine Learning Basics

- Supervised vs unsupervised learning
- Regression and classification
- Clustering concepts
- Model training and evaluation basics

Module 4: Introduction to Google Cloud AI/ML Services

- Overview of GCP AI/ML ecosystem
- Vertex AI platform introduction
- AutoML capabilities
- Pre-trained APIs overview

Module 5: Data Preparation and Management

- Importance of data in ML
- Data collection and cleaning
- Using Google Cloud Storage
- Data processing with BigQuery

Module 6: Building ML Models with Vertex AI

- Introduction to Vertex AI Workbench
- Training ML models
- Feature engineering basics
- Model evaluation techniques

Module 7: Using AutoML

- Overview of AutoML
- Training models without coding
- Image, text, and tabular data models
- Evaluating AutoML models

Module 8: Pre-trained AI APIs

- Vision API (image recognition)
- Natural Language API (text analysis)
- Speech-to-Text and Text-to-Speech
- Translation API

Module 9: Introduction to BigQuery ML

- What is BigQuery ML
- Creating ML models using SQL
- Training and evaluating models
- Use cases for BigQuery ML

Module 10: Model Deployment

- Deploying models using Vertex AI
- Creating endpoints
- Real-time vs batch predictions
- API integration

Module 11: Model Monitoring and Optimization

- Monitoring model performance
- Detecting model drift
- Improving model accuracy
- Logging and debugging

Module 12: Responsible AI and Ethics

- Bias and fairness in AI
- Explainable AI concepts
- Data privacy and governance
- Ethical considerations

Module 13: Introduction to MLOps

- What is MLOps
- CI/CD for ML models
- Versioning and pipelines
- Automation in ML workflows

Module 14: Advanced Topics Overview

- Introduction to Deep Learning
- Neural networks basics
- Generative AI overview
- Future trends in AI/ML

Module 15: Real-World Use Cases and Capstone Project

- Industry use cases (Healthcare, Retail, Finance)
- End-to-end ML project
- Best practices and deployment strategies
- Final project and evaluation

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