Google Cloud Machine Learning - Beginner to Intermediate

Course Duration: 40 Hours **Course code: GCML-BI**

1. Course Overview

During this five-day course, learners explore the fundamentals and practical implementation of Machine Learning on Google Cloud Platform (GCP). The course covers core ML concepts, data preprocessing, model building, and deployment using Google Cloud services such as Vertex AI, BigQuery ML, and AutoML. Learners will gain hands-on experience in building, training, evaluating, and deploying machine learning models for real-world use cases.

2. What you'll learn?

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

- Understand core machine learning concepts and workflows
- Explore and preprocess data for ML models
- Build and train ML models using Vertex AI
- Use BigQuery ML for SQL-based machine learning
- Implement AutoML for no-code/low-code ML solutions
- Evaluate and improve model performance
- Deploy and monitor ML models in production
- Work with structured and unstructured data
- Integrate ML models into applications
- Apply best practices for scalable ML solutions

3. Target Audience

Aspiring data scientists, data analysts, ML beginners, software developers, AI enthusiasts, and professionals transitioning into machine learning roles.

4. Pre-Requisites

Before taking this course, you should have:

- Basic understanding of Python programming
- Familiarity with statistics and linear algebra (basic level)
- Basic knowledge of SQL and data handling
- Understanding of cloud computing concepts (preferred)

5. Course content

Module 1: Course Introduction

- Introduction and course logistics
- Course objectives and roadmap
- Overview of AI and Machine Learning

Module 2: Introduction to Google Cloud AI & ML Services

- Overview of GCP AI/ML ecosystem
- Introduction to Vertex AI
- Understanding ML workflows in GCP
- Use cases of machine learning

Module 3: Machine Learning Fundamentals

- Types of machine learning (Supervised, Unsupervised)
- Regression and classification concepts
- Model training and evaluation basics
- Bias, variance, and overfitting

Module 4: Data Preparation and Exploration

- Data collection and ingestion
- Data cleaning and preprocessing

- Feature engineering basics
- Exploratory Data Analysis (EDA)

Module 5: Introduction to Vertex AI

- Vertex AI Workbench setup
- Managing datasets in Vertex AI
- Training ML models
- Using pre-built and custom models

Module 6: Building ML Models

- Training models using Python (scikit-learn basics)
- Classification and regression models
- Model evaluation techniques
- Hyperparameter tuning basics

Module 7: AutoML for Beginners

- Introduction to AutoML
- Training models without coding
- Evaluating AutoML models
- Use cases for AutoML

Module 8: BigQuery ML

- Introduction to BigQuery ML
- Creating ML models using SQL
- Running predictions in BigQuery
- Use cases for SQL-based ML

Module 9: Model Deployment and Prediction

- Deploying models using Vertex AI endpoints
- Online vs batch predictions

- Integrating models into applications
- Managing model versions

Module 10: Working with Unstructured Data

- Image, text, and video data basics
- Using pre-trained APIs (Vision, NLP)
- Introduction to generative AI concepts
- Real-world use cases

Module 11: Monitoring and Managing ML Models

- Model monitoring and logging
- Detecting model drift
- Retraining strategies
- Performance tracking

Module 12: MLOps Fundamentals

- Introduction to MLOps
- ML pipelines in Vertex AI
- Automating workflows
- Version control and reproducibility

Module 13: Security and Ethics in ML

- Data privacy and security
- Responsible AI principles
- Bias and fairness in ML models
- Compliance considerations

Module 14: Integration with Google Cloud Services

- Using Cloud Storage with ML
- Integration with BigQuery and Dataflow

- Using APIs in ML workflows
- End-to-end ML architecture

Module 15: Capstone Project and Best Practices

- End-to-end ML project implementation
- Model optimization techniques
- Best practices for ML on GCP
- Course summary and career guidance