

# Machine Learning on Google Cloud

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<b>Code:</b>	GCP-ML
<b>Length:</b>	5 days
<b>URL:</b>	<a href="#">View Online</a>

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This course introduces the artificial intelligence (AI) and machine learning (ML) offerings on Google Cloud that support the data-to-AI lifecycle through AI foundations, AI development, and AI solutions. It explores the technologies, products, and tools available to build an ML model, an ML pipeline, and a generative AI project. You learn how to build AutoML models without writing a single line of code; build BigQuery ML models using SQL, and build Vertex AI custom training jobs by using Keras and TensorFlow. You also explore data preprocessing techniques and feature engineering.

## Skills Gained

This series of courses teaches participants the following skills:

- Describe the technologies, products, and tools to build an ML model, an ML pipeline, and a Generative AI project.
- Understand when to use AutoML and BigQuery ML.
- Create Vertex AI-managed datasets.
- Add features to the Vertex AI Feature Store.
- Describe Analytics Hub, Dataplex, and Data Catalog.
- Describe how to improve model performance.
- Create Vertex AI Workbench user-managed notebook, build a custom training job, and deploy it by using a Docker container.
- Describe batch and online predictions and model monitoring.
- Describe how to improve data quality and explore your data.
- Build and train supervised learning models.
- Optimize and evaluate models by using loss functions and performance metrics.
- Create repeatable and scalable train, eval, and test datasets.
- Implement ML models by using TensorFlow or Keras.
- Understand the benefits of using feature engineering.
- Explain Vertex AI Model Monitoring and Vertex AI Pipelines.

## Who Can Benefit

This class is intended for the following participants:

- Aspiring machine learning data analysts, data scientists, and data engineers
- Learners who want exposure to ML and use Vertex AI, AutoML, BigQuery ML, Vertex AI Feature Store, Vertex AI

# Prerequisites

To get the most out of this specialization, participants should have:

- Some familiarity with basic machine learning concepts
- Basic proficiency with a scripting language, preferably Python

## Course Details

### Course Outline

Introduction to AI and Machine Learning on Google Cloud

- Recognize the AI/ML framework on Google Cloud.
- Identify the major components of Google Cloud infrastructure.
- Define the data and ML products on Google Cloud and how they support the data- to-AI lifecycle.
- Build an ML model with BigQueryML to bring data to AI.
- Define different options to build an ML model on Google Cloud.
- Recognize the primary features and applicable situations of pre-trained APIs, AutoML, and custom training.
- Use the Natural Language API to analyze text.
- Define the workflow of building an ML model.
- Describe MLOps and workflow automation on Google Cloud.
- Build an ML model from end-to-end by using AutoML on Vertex AI.
- Define generative AI and large language models.
- Use generative AI capabilities in AI development.
- Recognize the AI solutions and the embedded generative AI features.

Launching into Machine Learning

- Describe how to improve data quality.
- Perform exploratory data analysis.
- Build and train supervised learning models.
- Describe AutoML and how to build, train, and deploy an ML model without writing a single line of code.
- Describe BigQuery ML and its benefits.
- Optimize and evaluate models by using loss functions and performance metrics.
- Mitigate common problems that arise in machine learning.
- Create repeatable and scalable training, evaluation, and test datasets.

TensorFlow on Google Cloud

- Create TensorFlow and Keras machine learning models.
- Describe the TensorFlow main components.
- Use the tf.data library to manipulate data and large datasets.

- Build a ML model that uses tf.keras preprocessing layers.
- Use the Keras Sequential and Functional APIs for simple and advanced model creation.
- Train, deploy, and productionalize ML models at scale with the Vertex AI Training Service.

## Feature Engineering

- Describe Vertex AI Feature Store.
- Compare the key required aspects of a good feature.
- Use tf.keras.preprocessing utilities for working with image data, text data, and sequence data.
- Perform feature engineering by using BigQuery ML, Keras, and TensorFlow.

## Machine Learning in the Enterprise

- Understand the tools required for data management and governance.
- Describe the best approach for data preprocessing: From providing an overview of Dataflow and Dataprep to using SQL for preprocessing tasks.
- Explain how AutoML, BigQuery ML, and custom training differ and when to use a particular framework.
- Describe hyperparameter tuning by using Vertex AI Vizier to improve model performance.
- Explain prediction and model monitoring and how Vertex AI can be used to manage ML models.
- Describe the benefits of Vertex AI Pipelines.
- Describe best practices for model deployment and serving, model monitoring, Vertex AI Pipelines, and artifact organization.

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