



Machine Learning on Google Cloud

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.

**DURATION**

5 days
of instructor-led
training

**LEVEL**

Introductory
Intermediate

**FORMAT**

On-demand
Instructor led

What you'll learn

- 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.

Overview	53 Modules · 14 Labs · 4 classroom activities
Who this course is for	<p>This class is primarily intended for the following participants:</p> <ul style="list-style-type: none">• 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 Workbench, Dataflow, Vertex AI Vizier for hyperparameter tuning, and TensorFlow/Keras
Products	<ul style="list-style-type: none">• Vertex AI• AutoML• BigQuery ML• Vertex AI Pipelines• TensorFlow• Model Garden• Generative AI Studio• Large language model (LLM) APIs• Natural Language API• Vertex AI Workbench• Vertex AI Feature Store• Vizier• Dataplex• Analytics Hub• Data Catalog• TensorFlow• Vertex AI TensorBoard• Dataflow• Dataprep• Vertex AI Pipelines
Prerequisite	<p>To get the most out of this course, participants should have:</p> <ul style="list-style-type: none">• Some familiarity with basic machine learning concepts• Basic proficiency with a scripting language, preferably Python
Not covered	Cloud concepts and fundamentals, networking, security.

Course 01**Introduction to AI and Machine Learning on Google Cloud****Objectives**

- 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.

Activities

- Hands-On Labs
- Module Quizzes
- Module Readings

Course 02**Launching into Machine Learning****Objectives**

- 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.

Activities

- Hands-On Labs
- Module Quizzes
- Module Readings

Course 03**TensorFlow on Google Cloud****Objectives**

- Create TensorFlow and Keras machine learning models.
- Describe the TensorFlow main components.

Objectives	<ul style="list-style-type: none">• 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.
Activities	<ul style="list-style-type: none">• Hands-On Labs• Module Quizzes• Module Readings

Course 04 Feature Engineering

Objectives	<ul style="list-style-type: none">• 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.
Activities	<ul style="list-style-type: none">• Hands-On Labs• Module Quizzes• Module Readings

Course 05 Machine Learning in the Enterprise

Objectives	<ul style="list-style-type: none">• 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.
Activities	<ul style="list-style-type: none">• Hands-On Labs• Module Quizzes• Module Readings