Educator Guide

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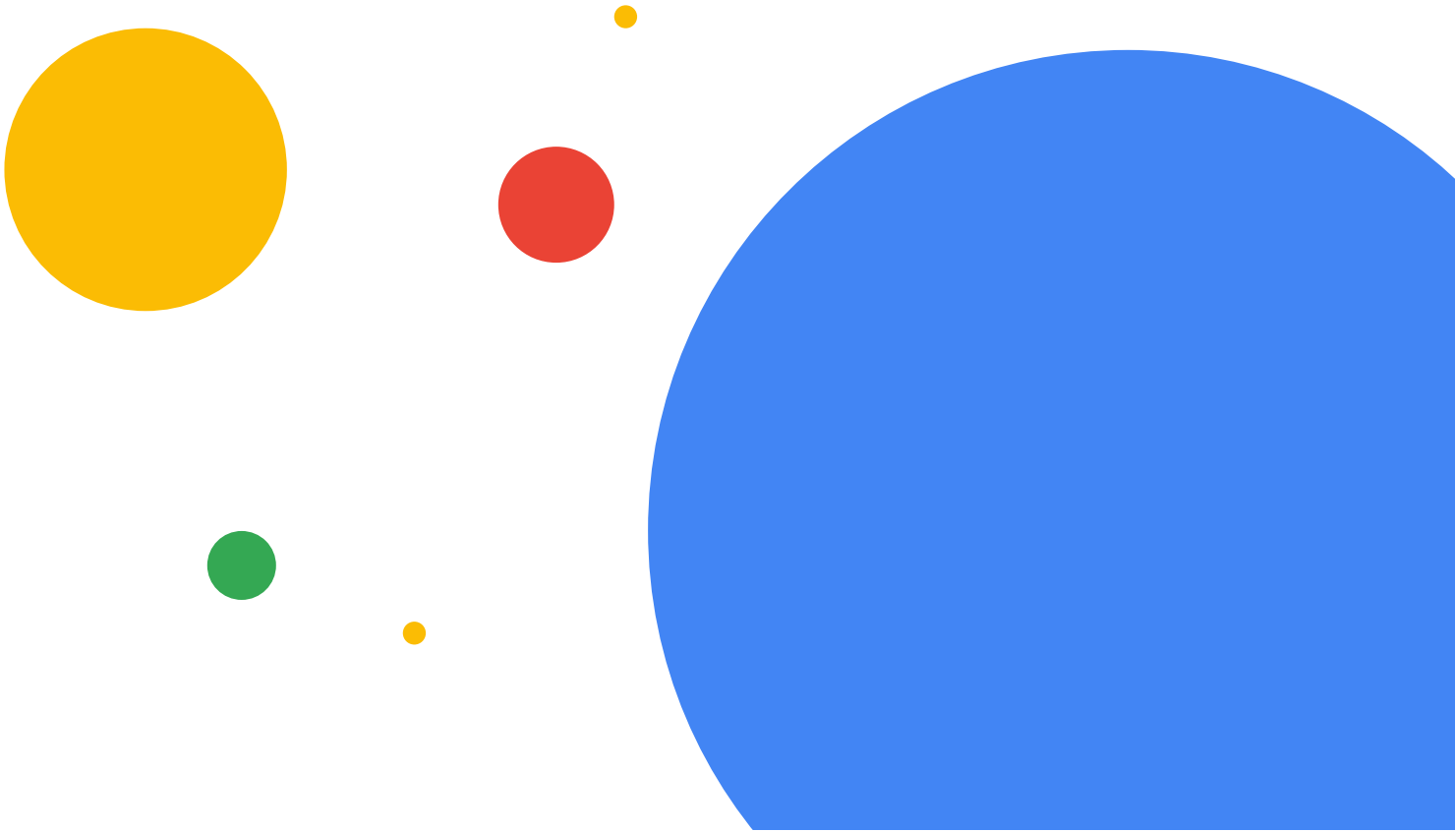
This guide provides an overview of the Google Cloud Engineering Certificate and directions for integrating the program into your curriculum.



About the Program

This learning path consists of a curated collection of on-demand courses, self-paced labs, and skill badges that provide authentic, hands-on experience using Google Cloud technologies that are essential to the cloud engineer role. A cloud engineer plans, configures, sets up, and deploys cloud solutions.

Completion of this path helps learners prepare for the Google Associate Cloud Engineer certification.

11 weeks to complete

Certificate Overview & Pacing

Learners will complete **six courses and four skill badges**. Each course contains multiple weeks of material and consists of several modules. Below is an overview of the course sequencing, including estimates of how much time each course will take based on the quantity and difficulty of the content. However, note that learners may progress at different speeds. Click on the course name to jump directly to the course description within this document.

Preparing for your Associate Cloud Engineer Journey	8 hours
Google Cloud Fundamentals: Core Infrastructure	6 hours
Essential Google Cloud Infrastructure: Foundation	10 hours
Essential Google Cloud Infrastructure: Core Services	9 hours
Elastic Google Cloud Infrastructure: Scaling and Automation	9.5 hours
Getting Started with Google Kubernetes Engine	7 hours
Implement Load Balancing on Compute Engine	3.5 hours
Set Up an App Dev Environment on Google Cloud	4 hours
Develop your Google Cloud Network	6 hours
Build Infrastructure with Terraform on Google Cloud	5 hours

Certificate Target Skills

- ★ Access Google Cloud and use basic Google Cloud features: Projects, Resources, IAM users, Roles, Permissions and APIs
- ★ Define Google Core Infrastructure
- ★ Explain and use Google Cloud Compute Engine
- ★ Interact with Google Cloud Services
- ★ Describe the scope of successful cloud operations, including managing compute, storage, and networking resources, as well as monitoring and logging tasks
- ★ Use core Google Cloud storage products: Cloud Storage, Cloud Bigtable, Cloud SQL, Cloud Spanner, and Firestore
- ★ Use Google Cloud methods for development in the cloud, including Cloud Source Repositories, Cloud Functions, and Terraform
- ★ Use Google Cloud Infrastructure core services to manage Google Cloud solutions
- ★ Use scaling and automation tools with the elastic Google Cloud infrastructure
- ★ Use Google Kubernetes Engine and related cloud services
- ★ Administer Identity and Access Management (IAM) for resources
- ★ Create and manage Google Kubernetes Engine clusters using the Google Cloud console and gcloud/kubectl commands
- ★ Connect infrastructure to Google Cloud
- ★ Create virtual machines using compute engine
- ★ Create VPC networks and other networking objects

Getting Started

Equipment needed	All learners must have a computer with reliable internet to access course content. Reliable internet access is necessary to complete hands-on course activities. Headphones are also useful for learners who are working in a noisy environment.
Educator expectations	The Google Associate Cloud Engineer Certificate supplements existing training. Learners can watch videos, access documents, and complete assessments at their own pace while educators provide opportunities for group discussion and assist with course completion. Educators do not need to complete the program to facilitate the learning pathway, but they should be familiar with the course content and concepts to better support learners with certificate completion. Additional guidance can be found in the Best Practices section of this guide.

Learner expectations	Before enrolling in the certificate program, learners should be interested in learning more about planning, configuring, setting up, and deploying cloud solutions or pursuing a cloud engineer role as a potential career path. This is a self-directed course, and learners may move at different speeds. The recommendations in this guide will help you keep learners on track.

Types of Course Assets

Videos

Videos led by Google instructors present each course's lecture content. Videos are typically 3-5 minutes long and consist of instructional content, career support, interview preparation, and inspirational personal stories from Google specialists.

Supplemental Activities

Recommended supplemental activities and documents build on the topics discussed in the videos and introduce related concepts.

Discussions

Discussion prompts explore course topics to help learners better understand the material and encourage learners to interact with their peers in the program.

Course Overview

Course 1

View planning ↓

Preparing for Your Associate Cloud Engineer Journey

8h | 7 Modules

Prerequisites

Prior to taking this course, learners should have familiarity with:

- Google Cloud
- The Linux Command line
- Web servers
- Text editors

Summary

In this course, learners create a study plan for the Associate Cloud Engineer (ACE) certification exam. Learners explore the breadth and scope of the domains covered in the exam and assess their exam readiness.

Objectives

1. List the five domains covered on the Associate Cloud Engineer certification exam.
2. Identify gaps in knowledge and skills for each domain.
3. Create a study plan.

Course 2

View planning ↓

Google Cloud Fundamentals: Core Infrastructure

6h | 8 Modules

Prerequisites

Prior to taking this course, learners should have familiarity with:

- Application development
- Linux operating systems
- Systems operations
- Data analytics
- Machine learning

Summary

In this course, learners are introduced to important concepts and terminology they'll need to know to work with Google Cloud. By watching videos and completing hands-on labs, learners will learn about many of Google Cloud's computing and storage services, along with important resource and policy management tools.

Objectives

1. Identify the purpose and value of Google Cloud products and services.
2. Interact with Google Cloud Services.
3. Choose among, and use, application deployment environments on Google Cloud: App Engine, Google Kubernetes Engine, and Compute Engine.
4. Choose among, and use, Google Cloud's storage options: Cloud Storage, Cloud SQL, Cloud Bigtable, and Firestore.

Course 3

View planning ↓

Essential Google Cloud Infrastructure: Foundation

10h | 5 Modules

Prerequisites

Prior to taking this course, learners should have:

- Completed the second course in this program, Google Cloud Fundamentals: Core Infrastructure
- Basic proficiency with command-line tools
- Basic proficiency with Linux operating system environments
- Experience with systems operations, including deploying and managing applications, either on-premises or in a public cloud environment

Summary

In this course, learners explore the comprehensive and flexible infrastructure and platform services provided by Google Cloud, with a focus on Compute Engine.

Learners understand how to use Cloud Shell, create virtual machines (VMs), build projects, work with IP addresses, and implement Private Google Access and Cloud Network Address Translation (NAT).

Objectives

1. Interact with the Google Cloud console and Cloud Shell.
2. Deploy solutions using Google Cloud Marketplace.
3. Implement VPC networks and firewall rules.
4. Create and customize VM instances using Compute Engine.

Course 4

View planning ↓

Essential Google Cloud Infrastructure: Core Services

9h | 6 Modules

Prerequisites

Prior to taking this course, learners should have:

- Completed course two of this program, Google Cloud Fundamentals: Core Infrastructure
- Basic proficiency with command-line tools
- Basic proficiency with Linux operating system environments
- Experience with systems operations, including deploying and managing applications, either on-premises or in a public cloud environment

Summary

In this course, learners explore Identity and

Objectives

1. Administer Identity and Access Management

Access Management (IAM), data storage services in Google Cloud, resource management, and resource monitoring.

Learners practice deploying practical solutions, including customer-supplied encryption keys, security and access management, quotas and billing, and monitoring.

(IAM) for resources.
2. Implement data storage services in Google Cloud.
3. Manage and examine billing of Google Cloud.
4. Monitor resources using Google Cloud's operations suite.

Course 5

View planning ↓

Elastic Google Cloud Infrastructure: Scaling and Automation

9.5h | 6 Modules

Prerequisites

Prior to taking this course, learners should have:

- Completed the second course in this program, Google Cloud Fundamentals: Core Infrastructure
- Basic proficiency with command-line tools
- Basic proficiency with the Linux operating system environment
- Experience with systems operations experience, including deploying and managing applications, either on premises or in a public cloud environment

Summary

In this course, learners explore and deploy solution elements, including securely interconnecting networks, load balancing, autoscaling, infrastructure automation, and managed services.

Learners investigate options for interconnecting networks to enable them to connect infrastructure to Google Cloud. They learn about load balancing, autoscaling, infrastructure automation services, and other managed services.

Objectives

1. Connect infrastructure to Google Cloud.
2. Configure load balancers and autoscaling for VM instances.
3. Automate the deployment of Google Cloud infrastructure services.
4. Leverage manages services in Google Cloud.

Course 6

View planning ↓

Getting Started with Google Kubernetes Engine

7h | 6 Modules

Prerequisites

Prior to taking this course, learners should have:

- Basic proficiency in web server technologies, such as Nginx.
- Basic proficiency with command-line tools and Linux operating system environments.
- (Recommended) Experience with systems operations, including deploying and managing applications, either on-premises or in a public cloud environment.

Summary

In this course, learners gain the ability to interact with Google Kubernetes Engine (GKE). They will understand how to containerize workloads, deploy them to Kubernetes clusters, and scale those workloads to handle increased traffic.

Objectives

1. Discuss Kubernetes components and architecture.
2. Store container images in Container Registry.
3. Explain how pod networking works in GKE.
4. Create and manage Kubernetes Engine clusters using the Google Cloud Console and gcloud/kubectl commands.

Skill badge course 1

View planning ↓

Implement Load Balancing on Compute Engine

3.5h | 4 Labs

Summary

Over the course of four labs, learners practice how to write gcloud commands in the Cloud Shell, create and deploy virtual machines in Compute Engine, run containerized applications on Google Kubernetes Engine, and configure network and HTTP load balancers.

After completing the quest, learners will receive an Implement Load Balancing on Compute Engine skill badge credential.

Objectives

1. Become familiar with Google Hands-on Labs.
2. Create a virtual machine with both the Cloud Console and the gcloud command line, and deploy a web server to a virtual machine.
3. Launch a Windows Server instance in Compute Engine and use Remote Desktop Protocol (RDP) to connect to it.
4. Connect to computing resources hosted on Google Cloud via the web.
5. Deploy a containerized application with GKE.

Skill badge course 2

View planning ↓

Set Up an App Dev Environment on Google Cloud

4h | 6 Labs

Summary

Over the course of 6 labs, learners practice how to build and connect storage-centric cloud infrastructure using the basic capabilities of Cloud Storage, Identity and Access Management, Cloud Functions, and Pub/Sub technologies.

After completing this quest, learners will receive a Set Up an App Dev Environment on Google Cloud skill badge credential.

Objectives

1. Perform basic tasks in Cloud Storage using the Google Cloud Console or using the gsutil command-line tool.
2. Use Google Cloud IAM to unify access control for Cloud Performance services into a single system to present a consistent set of operations.
3. Monitor a Google Compute Engine VM instance with Cloud Monitoring.
4. Create or deploy a Cloud Function using the Cloud Platform Console or the Cloud Platform Command Line.
5. Publish and consume messages with a pull subscriber, using the Google Cloud Platform Console, the Cloud Google command line, or a Python script.

Skill badge course 3

View planning ↓

Develop your Google Cloud Network

6h | 6 Labs

Summary

Over the course of six labs, learners practice multiple ways to deploy and monitor applications, such as exploring IAM roles, adding and removing project access, creating VPC networks, deploying and monitoring Compute Engine VMs, writing SQL queries, and deploying applications using Kubernetes with multiple deployment approaches.

After completing this quest, learners will receive a Develop your Google Cloud Network skill

Objectives

1. Use Google Cloud IAM to unify access control for Cloud Platform services into a single system to present a consistent set of operations.
2. Learn fundamental SQL clauses and get hands-on practice running structured queries on BigQuery and Cloud SQL.
3. Create VPC networks and VM instances and test connectivity across networks.
4. Monitor a Google Compute Engine VM instance with Cloud Monitoring.

badge credential.

5. Learn DevOps best practices to make use of multiple deployments for managing application deployment scenarios, practice scaling and managing containers to accomplish common scenarios where multiple heterogeneous deployments are used with Google Kubernetes Engine.

Skill badge course 4

View planning ↓

Build Infrastructure with Terraform on Google Cloud

5h | 5 Labs

Summary

Over the course of five labs, learners practice how to write infrastructure code with Terraform; how to build, change, and destroy infrastructure; how to manage local and remote states; how to import infrastructure; and how to build their own modules.

After completing this quest, learners will receive an Build Infrastructure with Terraform on Google Cloud skill badge credential.

Objectives

1. Create a virtual machine instance infrastructure using Terraform.
2. Build, change, provision, and destroy infrastructure using Terraform in the cloud environment.
3. Create and use terraform modules to organize a cloud configuration.
4. Import existing infrastructure, write Terraform configuration that matches that infrastructure, and manipulate state storage with Terraform.

Curriculum Lesson Planning

Week 1	Course 1 Elastic Google Cloud Infrastructure: Scaling and Automation	7h 38m total time
Module 1	Introduction	38m module time

In this module, learners are introduced to the Associate Cloud Engineer role, the certificate program, the benefits of being certified, how to study for ACE, and the workbook that will be used throughout the entire course.

Items	5 Videos	--	1 Document	--

Module 2 Setting Up a Cloud Solution Environment

1hr 19m module time

In this module, learners explore the scope of tasks involved in setting up a cloud solution environment, corresponding to the first section of the Associate Cloud Engineer exam guide. Learners set up a cloud environment that includes the hierarchy and assign proper roles.

Items	4 Videos	--	1 Document	2 Quizzes

Module 3 Planning and Configuring a Cloud Solution

1hr 18m module time

In this module, learners explore the scope of the tasks involved in planning and configuring the cloud solutions for an organization. This module corresponds to the second section of the Associate Cloud Engineer exam guide.

Items	4 Videos	--	1 Document	2 Quizzes

Module 4 Deploying and Implementing a Cloud Solution

1hr 18m module time

In this module, learners are introduced to the scope of tasks involved in deploying and implementing cloud solutions, including data structures and Compute and Kubernetes Engines. This module corresponds with the third section of the Associate Cloud Engineer exam guide.

Items	4 Videos	--	1 Document	2 Quizzes

Module 5 Ensuring Successful Operation of a Cloud Solution

1hr 16m module time

In this module, learners explore the scope of ensuring successful cloud operations. They also learn solutions for successful operations, including load balancing and Google Cloud's Operation Suite.

Items	4 Videos	--	1 Document	2 Quizzes

Module 6 Configuring Access and Security

1hr 16m module time

In this module, learners explore the scope of configuring access and security for the cloud, which involves managing IAM accounts and knowing where to assign access. This module corresponds to the fifth and final section of the Associate Cloud Engineer Exam Guide.

Items	4 Videos	--	1 Document	2 Quizzes

Module 7 Your next steps

33m module time

In this module, learners will prepare their individualized study plans and learn time management skills and tips to stay on track.

Items	4 Videos	--	1 Document	2 Quizzes

Week 1 Preparing for your Associate Cloud Engineer Journey

Discussion & activity suggestions

- What are some ways you interact with the cloud in your professional life? In your personal life?
- Part of your job as an associate cloud engineer is to assign roles and responsibilities to members of your organization. What type of IAM access should you assign to members of the organization? What are some IAM best practices that you can incorporate in your security strategy? [Course 2, Module 2, Video 2]

Week 2 Course 2 Google Cloud Fundamentals: Core Infrastructure

5h 39m total time

Module 0 Course Introduction

1m module time

In this module, learners are introduced to the Google Cloud Fundamentals: Core Infrastructure course with an overview of the course structure and goals.

Items	1 Video	--	--	--

Module 1 Introducing Google Cloud

32m module time

In this module, learners explore some key benefits of using Google Cloud, the components of Google's network infrastructure, and the differences between Infrastructure-as-a-Service (IaaS) and Platform-as-a-Service (PaaS).

Items	7 Videos	--	--	1 Quiz

Module 2 Resources and Access in the Cloud

54m module time

In this module, learners explore how resources are organized within projects, and how access to those resources are shared to certain parts of a workforce using a tool called Identity and Access Management (IAM).

Items	5 Videos	1 Lab	--	1 Quiz

Module 3 Virtual Machines and Networks in the Cloud

1h 15m module time

In this module, learners explore how Google Compute Engine works, concentrating on virtual networking.

Items	7 Videos	1 Lab	--	1 Quiz

Module 4 Storage in the Cloud

1h 22m module time

In this module, learners explore Google Cloud's five core storage products: Cloud Storage, Cloud Bigtable, Cloud SQL, Cloud Spanner, and Firestore.

Items	8 Videos	1 Lab	--	1 Quiz

Module 5 Containers in the Cloud

18m module time

In this module, learners explore containers and how they can be managed with Kubernetes and Google Kubernetes Engine.

Items	3 Videos	--	--	1 Quiz

Module 6 Applications in the Cloud

44m module time

In this module, learners will explore developing applications in the cloud and delving into App Engine, two API management tools (Apigee Edge and Cloud Endpoints), and Cloud Run.

Items	2 Videos	1 Lab	--	1 Quiz

Module 7 Course Summary

33m module time

In this module, learners review the concepts covered in course 2.

Items	1 Video	--	1 Document	--

Week 2 Google Cloud Fundamentals: Core Infrastructure

Discussion & activity suggestions

- Why is the cloud model such a compelling option for cloud developers? [Course 1, Module 1, Video 1]
- What are IaaS and PaaS? What are the differences between the two, and what are their individual benefits? [Course 1, Module 1, Video 2]
- How does Google Cloud reduce the environmental impact of cloud computing? [Course 1, Module 1, Video 4]

- Your organization has asked you to make sure the cloud budget stays under $20,000. How would you budget for storage, Compute Engine, API Tools, Kubernetes Engine, and Data Tools? What are some Google Tools you would use to avoid going over your Google Cloud budget? [Course 1, Module 1, Video 7]
- What are the advantages of using virtual machines instead of physical machines? What business value can the Google Compute Engine provide? [Course 1, Module 3, Videos 1 and 5]

Week 3	Course 3 Essential Google Cloud Infrastructure: Foundation	5h 56m total time

Module 0 Course Introduction

38m module time

In this module, learners are introduced to the Essential Google Cloud Infrastructure: Foundation course with an overview of the course structure and goals.

Items	1 Video	--	1 Document	--

Module 1 Interacting with Google Cloud

1h 13m module time

In this module, learners are introduced to Google Cloud and how to interact with it. Learners deploy a solution from the GCP marketplace without having to manually configure the Virtual Machine instances, storage, network settings, or software.

Items	8 Videos	2 Labs	--	1 Quiz

Module 2 Virtual Networks

4h 5m module time

In this module, learners explore virtual networks in Google Cloud and its software defined network. The module introduces Virtual Private Cloud (VPC) components of the network, including projects, networks, subnetworks, IP addresses, routes, firewall rules, and network pricing.

Items	15 Videos	2 Labs	1 Document	1 Quiz

Week 3	Essential Google Cloud Infrastructure: Foundation
Discussion & activity suggestions	• What are the four ways you can interact with GCP? How do you use them? [Course 3, Module 1, Video 2] • What are three types of networks, and how do they work? [Course 3, Module 2, Video 3] • How do firewalls work? What are some GCP firewall rules? [Course 3, Module 2, Video 8] • What are some common network designs? [Course 3, Module 2, Video 12]

Week 4	Course 3 Essential Google Cloud Infrastructure: Foundation	4h 1m total time

Module 3	Virtual Machines	3h 31m module time

In this module, learners will explore virtual machine (VM) instances. The module discusses different options provided by VMs and reviews the details for how virtual machines work on Google Cloud.

Items	16 Videos	2 Labs	1 Document	1 Quiz

Module 4	Course Resources	30m module time

In the final module of the course, learners review the materials for the course.

Items	--	--	1 Document	--

Week 4	Essential Google Cloud Infrastructure: Foundation
Discussion & activity suggestions	• What is Compute Engine, and how does it work? [Course 3, Module 3, Video 2] • What are the four Compute Engine machine families? When would you use each? [Course 3, Module 3, Video 7] • When are some instances that you would need special compute configurations? [Course 3, Module 3, Video 8]

- What are some common actions you can perform with Compute Engine? [Course 3, Module 3, Video 12]
- When do you use the general-purpose Compute Engine machine family? [Course 3, Module 3, Video 7]
- When you choose a boot disk image, what should this image include? [Course 3, Module 3, Video 10]

Week 5	Course 4 Essential Google Cloud Infrastructure: Core Services	8h 47m total time

Module 0 Course Introduction

38m module time

In this module, learners are introduced to the Essential Google Cloud Infrastructure: Core Services course with an overview of the course structure and goals.

Items	1 Video	--	1 Document	--

Module 1 Identity and Access Management

1h 33m module time

In this module, learners explore Identity and Access Management (IAM) in the Cloud. They also practice determining which team member can perform a particular action on a resource to better understand cloud security.

Items	12 Videos	1 Lab	--	1 Quiz

Module 2 Storage and Database Services

3h 18m module time

In this module, learners explore storage and database services in Google Cloud. This module introduces Cloud storage, Filestore, Cloud SQL, Cloud Spanner, Cloud Firestore, and Cloud Bigtable.

Items	15 Videos	2 Labs	--	1 Quiz

Module 3	Resource Management	1h 8m module time

In this module, learners will explore managing resources in Google Cloud to control the cost of resources and prevent overconsumption.

Items	9 Videos	1 Lab	--	1 Quiz

Module 4	Resource Monitoring	1h 40m module time

In this module, learners will review Google Cloud's resource monitoring options, including Stackdriver's monitoring, logging, and diagnostics for applications.

Items	11 Videos	1 Lab	1 Document	1 Quiz

Module 5	Course Resources	30m module time

In this final module, learners will review the materials for the course.

Items	--	--	1 Document	--

Week 5	Essential Google Cloud Infrastructure: Core Services	

Discussion & activity suggestions

What are the responsibilities of the organization admin role? [Course 4, Module 1, Video 3]

Week 6	Course 5 Elastic Google Cloud Infrastructure: Scaling and Automation	9h 28m total time

Module 0	Introduction	38m module time

In this module, learners are introduced to the Essential Google Cloud Infrastructure: Scaling and Automation course with an overview of the course structure and goals.

Items	1 Video	--	1 Document	--

Module 1 Interconnecting Networks

2h 35m module time

In this module, learners explore interconnecting networks and multiple ways to connect infrastructure to Google Cloud through Cloud VPN, Cloud Interconnect, and peering.

Items	9 Videos	1 Lab	1 Document	1 Quiz

Module 2 Load Balancing and Autoscaling

3h 13m module time

In this module, learners explore the scope of the tasks involved in planning and configuring the cloud solutions for an organization.

Items	17 Videos	2 Labs	--	1 Quiz

Module 3 Infrastructure Automation

1h 38m module time

In this module, learners explore how to automate the deployment of Google Cloud Infrastructure, use Terraform to automate the deployment of infrastructure, and use Google Cloud Marketplace to launch infrastructure solutions.

Items	7 Videos	1 Lab	--	1 Quiz

Module 4 Managed Services

54m module time

In this module, learners explore how to ensure successful cloud operations using load balancing and Google Cloud's Operation Suite.

Items	8 Videos	--	1 Document	1 Quiz

Module 5	Course Resources	30m module time

In the final module of the course, learners access the materials for the course.

Items							
	--		--		1 Document		--

Week 6	Elastic Google Cloud Infrastructure: Scaling and Automation	

Discussion & activity suggestions

- What is the organization node? [Course 5, Module 1, Video 3]
- What does an HA VPN provide, and how does it work? [Course 4, Module 1, Video 2]
- What are Layer 2 and Layer 3 connections, and what connectivity and access do they provide? [Course 5, Module 1, Video 4, Video 7]
- How does HTTPS load balancing work, and why is it used? [Course 5, Module 2, Video 4]

Week 7	Course 6 Getting Started with Google Kubernetes Engine	6h 54m total time

Module 0	Course introduction	31m module time

In this module, learners are introduced to the Getting Started with Google Kubernetes Engine course with an overview of the course structure and goals.

Items							
	1 Video		--		1 Document		--

Module 1	Introduction to Google Cloud	1h 42m module time

In this module, learners review the fundamentals of cloud computing; explore how to organize Google Cloud's resources; and learn about the tools that connect to Google Cloud and allocate, change, and release resources.

Items	8 Videos	1 Lab	--	1 Quiz

Module 2 Introduction to Containers and Kubernetes

1h 34m module time

In this module, learners explore software containers and their benefits for application deployment, configure and build containers, and study the functions and benefits of the container management solution Google Kubernetes Engine.

Items	6 Videos	1 Lab	--	1 Quiz

Module 3 Kubernetes Architecture

1h 33m module time

In this module, learners explore the components of a Kubernetes cluster and how they work together, deploy a Kubernetes cluster using Google Kubernetes Engine, and deploy Pods to a GKE cluster.

Items	6 Videos	1 Lab	--	1 Quiz

Module 4 Kubernetes Operations

1h 33m module time

In this module, learners explore the components that are used to manage Kubernetes workloads, learn about the kubectl command, and create Kubernetes workloads called deployments.

Items	4 Videos	1 Lab	--	1 Quiz

Module 5 Course Summary

1m module time

In the final module of the course, learners access the printable lecture materials for the course.

Items	1 Video	--	--	--

Week 7 Getting Started with Google Kubernetes Engine

Discussion & activity suggestions

- What tools does Google provide that help organizations avoid high Google Cloud Service costs? As an associate cloud engineer, how will you use those tools? [Course 6, Module 1, Video 4]
- What is Kubernetes? What are the benefits of using Kubernetes? [Course 6, Module 2, Video 6]
- What are the key features of containers, and what are the advantages of using them for application deployment? [Course 6, Module 2, Video 2]
- What are three ways you can create a deployment? [Course 6, Module 4, Video 4]
- What are some best practices to use when managing Kubernetes objects? [Course 6, Module 3, Video 5]

Week 8	**Skill Badge 1** **Implement Load Balancing on Compute Engine** [Note: For this Skill Badge, learners choose 4 of the 5 labs to complete.]	**3h 25m total time**
Lab 1 Option 1	**Creating a Virtual Machine** In this hands-on lab, learners practice creating a Google Compute Engine virtual machine and understand zones, regions, and machine types.	40m lab time
Lab 1 Option 2	**Compute Engine: Qwik Start - Windows** In this hands-on lab, learners create a Windows Server instance in the Google Compute Engine and access it with RDP.	40m lab time
Lab 2	**Getting Started with Cloud Shell and gcloud** In this hands-on lab, learners connect to computing resources hosted on Google Cloud Platform via the web. Then, they learn how to use Cloud Shell and the Cloud SDK gcloud command.	45m lab time
Lab 3	**Set Up Network and HTTP Load Balancers** In this hands-on lab, learners set up both network load balancers and HTTP load balancers for an application running in Compute Engine virtual machines.	1h lab time
Lab 4	**Implement Load Balancing on Compute Engine: Challenge Lab** In this challenge lab, learners demonstrate the skills and knowledge they have gained from the labs in this Skill Badge.	1h lab time
Week 9	**Skill Badge 2** **Set Up an App Dev Environment on Google Cloud** [Note: For this Skill Badge, learners choose 6 of the 10 labs to complete.]	**4h 5m total time**

Lab 1 Option 1	**Cloud Storage: Qwik Start - Cloud Console** In this hands-on lab, learners perform basic tasks in Cloud Storage using the Google cloud Console.	30m lab time
Lab 1 Option 2	**Cloud Storage: Qwik Start - CLI/SDK** In this hands-on lab, learners perform basic tasks in Cloud Storage using the gsutil command-line tool.	30m lab time
Lab 2	**Cloud IAM: Qwik Start** In this hands-on lab, learners unify access control for Cloud Platform services into a single system using Google Cloud IAM to present a consistent set of operations.	45m lab time
Lab 3	**Cloud Monitoring: Qwik Start** In this hands-on lab, learners monitor a Google Compute Engine VM instance with Cloud Monitoring.	50m lab time
Lab 4 Option 1	**Cloud Functions: Qwik Start - Console** In this hands-on lab, learners create and deploy a Cloud Function using the Cloud Platform Console.	20m lab time
Lab 4 Option 2	**Cloud Functions: Qwik Start - Command Line** In this hands-on lab, learners create and deploy a Cloud Function using the Cloud Platform Command Line.	30m lab time
Lab 5 Option 1	**Google Cloud Pub/Sub: Qwik Start - Console**	30m

lab time

In this hands-on lab, learners publish and consume messages with a pull subscriber using the Google Cloud Platform Console.

Lab 5 Option 2

Google Cloud Pub/Sub: Qwik Start - Command Line

30m lab time

In this hands-on lab, learners publish and consume messages with a pull subscriber using the Google Cloud Command Line.

Lab 5 Option 3

Google Cloud Pub/Sub: Qwik Start - Python

30m lab time

In this hands-on lab, learners create a topic and a subscriber with a Python script, then publish and view messages.

Lab 6

Set Up an App Dev Environment on Google Cloud: Challenge Lab

1hr lab time

In this challenge lab, learners demonstrate the skills and knowledge gained from the labs in this Skill Badge.

Week 10	Skill Badge 3 Develop your Google Cloud Network	5h 45m total time

Lab 1	Cloud IAM: Qwik Start	45m lab time

In this hands-on lab, learners unify access control for Cloud Platform services into a single system using Google Cloud IAM.

Lab 2	Introduction to SQL for BigQuery and Cloud SQL	1h lab time

In this hands-on lab, learners explore fundamental SQL clauses and practice running structured queries on BigQuery and Cloud SQL.

Lab 3	Multiple VPC Networks	1h 10m lab time

In this hands-on lab, learners create several VPC networks and VM instances and test connectivity across networks.

Lab 4	Cloud Monitoring: Qwik Start	50m lab time

In this hands-on lab, learners monitor a Google Compute Engine VM instance with Cloud Monitoring

Lab 5	Managing Deployments Using Kubernetes Engine	1h lab time

In this hands-on lab, learners practice scaling and managing containers to solve multiple scenarios that use multiple heterogeneous deployments.

Lab 6	Develop your Google Cloud Network: Challenge Lab	1h lab time

In this challenge lab, learners demonstrate the skills and knowledge they have gained from the labs in this Skill Badge.

Week 11	Skill Badge 4 Build Infrastructure with Terraform on Google Cloud	5h 5m total time

Lab 1	Terraform Fundamentals In this hands-on lab, learners create infrastructure using Terraform in the cloud environment.	35m lab time
Lab 2	Infrastructure as Code with Terraform In this hands-on lab, learners build, change, and destroy infrastructure using Terraform in the cloud environment.	1h lab time
Lab 3	Interact with Terraform Modules In this hands-on lab, learners create and use Terraform modules to organize cloud configurations.	1h lab time
Lab 4	Managing Terraform State In this hands-on lab, learners import existing infrastructure, write Terraform configuration that matches that infrastructure, and manipulates state storage with Terraform.	1h lab time
Lab 5	Build Infrastructure with Terraform on Google Cloud: Challenge Lab In this challenge lab, learners demonstrate the skills and knowledge they have gained from the labs in this Skill Badge.	1h 30m lab time

Appendix

Types of Course Assessments

Formative assessments

Formative assessments give learners an opportunity to practice skills throughout the course and include ungraded practice quizzes, in-video questions, ungraded activities, and graded activities.

Practice quizzes encourage learners to check their understanding of key concepts and provide them with valuable feedback. While practice quizzes are optional and do not count toward completion of the course, they are strongly recommended to help learners better understand course concepts. There is no time limit or attempt limit on practice quizzes.

In-video questions are designed to help learners check their learning as they progress through each video.

Self-review activities give learners hands-on practice in applying the skills they are learning. Learners will assess their own work by comparing it to an exemplar.

Interactive plug-ins are highly visual activities that encourage learners to practice specific tasks and help them integrate the knowledge they have gained in the course.

Summative assessments

Summative assessments include graded quizzes that require a passing score of 80%. Learners need to pass graded quizzes to receive the Google Associate Cloud Engineer Certificate.

Graded quizzes allow learners to demonstrate their understanding of each of the main learning objectives in a course.

- All graded quizzes are required in order to complete each course. Learners must score 80% or higher to pass each quiz. Quizzes are automatically graded, and learners are given their results in real time in the Coursera platform.
- Graded quizzes are timed. Each question is allotted five minutes (e.g., a quiz with 10 questions has a 50-minute total time limit). The quiz timer starts when the learner opens the quiz item. Once the time limit has been reached, the quiz is automatically submitted.
- Learners are allowed to take each graded quiz three times per 24 hours; however, learners are required to score 80% or higher on the quiz before moving on in the

> course. Their highest-scoring attempt will be saved and will count as their final score for the quiz

Best Practices and Learner Considerations

Accessibility and connectivity challenges can make learning difficult for anyone. Having some strategies to implement on a regular basis can make learners feel comfortable and focus on course modules:

Discuss with all learners what accessibility features are available.
Encourage learners to share any additional resources or support needed to progress through the program.
All course videos have associated subtitles and transcripts of the speaker's text. Learners can turn on the subtitles by clicking on the speech bubble icon in the bottom right corner of the screen.
Consider recording group sessions, with approval from all learners in attendance, so learners unable to attend can rewatch at a more convenient time.
Brainstorm with your learners around how they prefer to stay engaged. Consider polls, chats, virtual white boards, screen shares, and other apps that allow learners to participate and collaborate.
Create a proactive communication strategy to stay ahead of learners' needs so you can check in with learners more frequently than your scheduled office hours.
Create a sense of community among learners. Come up with an icebreaker to get the conversations started and help learners feel comfortable. Set up a group chat so learners can get to know each other, ask questions, and provide feedback to one another.
Identify and build various touch points into your program design where learners can share their career goals, and you can connect them with additional resources.
Seek feedback. Ask learners what's working and what isn't.