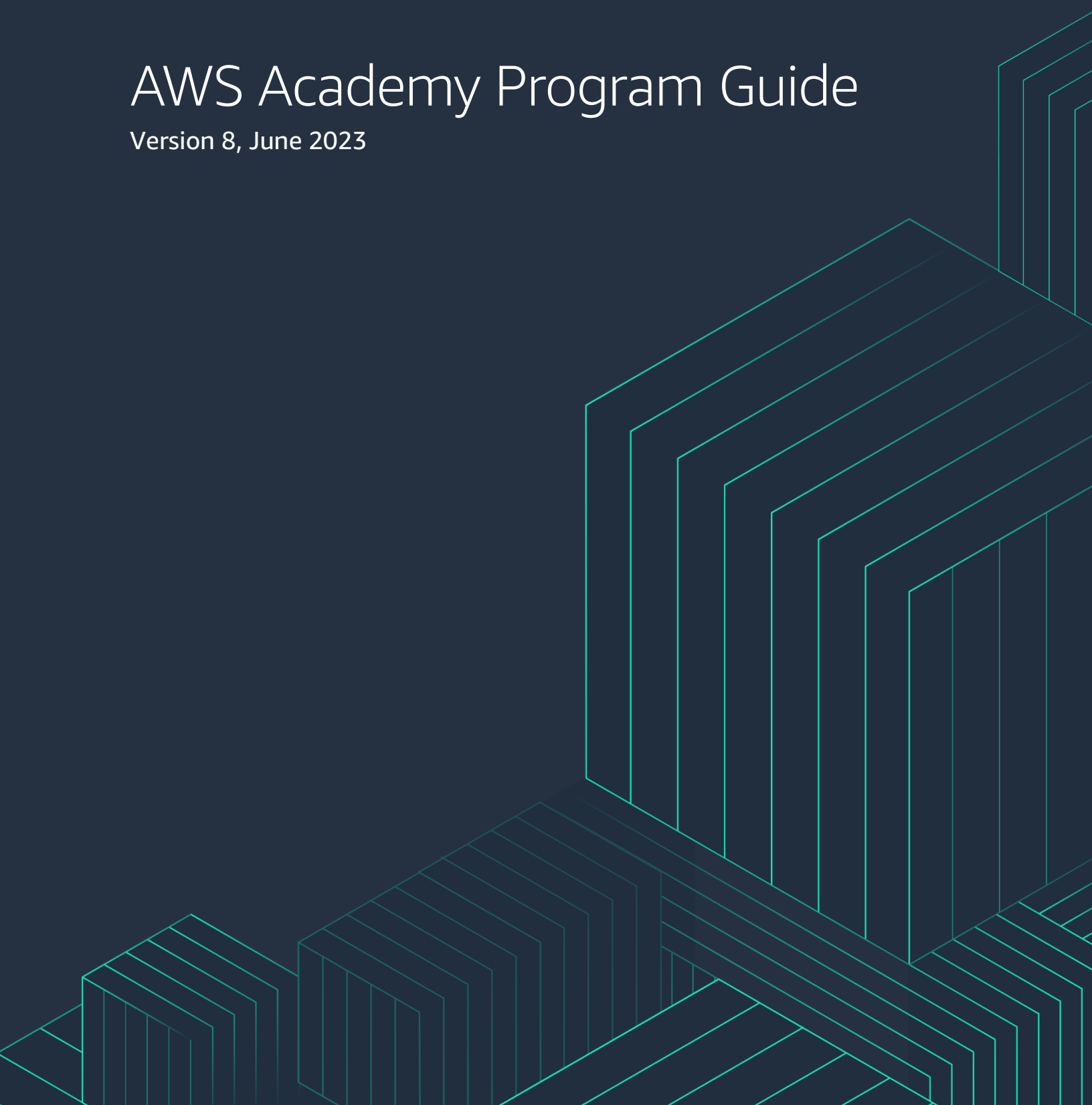
aws academy

AWS Academy Program Guide

Version 8, June 2023



Welcome

Introduction

AWS Academy is a global program that provides educational institutions (collectively, "institutions") with access to AWS-authored curricula so they can offer cloud computing learning content to their students. By participating in AWS Academy, institutions can help students become proficient in Amazon Web Services (AWS) technology and gain industry-recognized AWS Certifications.

This Program Guide provides an overview of AWS Academy, including curricula, program benefits, requirements, and information about how to participate. In addition to the Program Guide, please read the AWS Academy Terms & Conditions, located on the AWS Academy Portal and any successor or related locations designated by AWS Academy, which govern your participation in the program.

AWS develops and maintains AWS Academy curricula and learning resources. AWS Academy content aligns to the skills needed for the top in-demand early career cloud computing jobs. AWS Academy content may be delivered to students as educator-led synchronous or asynchronous learning through in-person, blended, or fully online courses.

AWS Academy curricula are designed to help students prepare for early career cloud computing jobs and AWS Certifications. AWS Academy provides students with access to certification-style practice questions, additional study resources, and an opportunity for students 18+ to join the Emerging Talent Community. There are two types of AWS Academy curricula: introductory/foundation and intermediate/associate-level courses. All AWS Academy educators, after completing the required Getting Started with AWS Academy course, are considered approved educators and can deliver any AWS Academy curricula as well as access the AWS Academy Learner Lab environment.

Requirements for Delivery

Member institutions and AWS Academy educators must:

- Comply with the AWS Academy Terms & Conditions, located on the AWS Academy Portal, and any successor or related locations designated by AWS Academy and all requirements described in this AWS Academy Program Guide.
- Deliver AWS Academy curricula only to students enrolled at AWS Academy member institutions.
- Use the most recent versions of the AWS Academy curricula and AWS Academy Learner Labs.
- Deliver AWS Academy content to students as synchronous or asynchronous learning through in-person, blended, or fully online courses.

Note: Institutions can request to integrate the AWS Academy courseware into their Learning Management System (LMS) through Learning Tools Interoperability (LTI) version 1.3. Member requests for LTI 1.3 integration should be sent to AWS Academy Customer Support. Institutions must strictly adhere to the guidelines for content usage as defined in the AWS Academy Terms & Conditions, located on the AWS Academy Portal, and any successor or related locations designated by AWS Academy.

AWS Academy Membership

As an AWS Academy member, your institution has access to AWS Academy curricula and the AWS Academy Learner Lab that can be delivered to students by AWS Academy approved educators.

How Institutions Can Apply

Membership in AWS Academy is open to academic institutions at the secondary and higher education level. More information about how to apply is available at aws.amazon.com/training/awsacademy.

Requirements for Institutions

To participate in AWS Academy, individuals authorized by the institution must:

- Acknowledge the AWS Academy Terms & Conditions within 14 days of submitting an institution application, located on the AWS Academy Portal, and any successor or related locations designated by AWS Academy and all requirements described in the AWS Academy Program Guide.
- Agree to deliver AWS Academy content only to learners who meet the minimum age requirements listed in the AWS Learner Terms and Conditions. These age minimums are subject to change to comply with data privacy laws. Always reference the AWS Learner Terms and Conditions for the most recent age minimums.
- Agree to appoint an institutional Program Administrator (formerly Central Point of Contact (CPOC)) responsible for overseeing all AWS Academy program requirements and activities within the educational institution and the institution's communications with AWS. This includes nominating educators into the program.
- Be a direct employee of the institution and not adjunct faculty or third-party providers, and must register with an institution email domain address. If the academic institution does not provide institutional domain email addresses, please inform AWS Academy by using the "Contact Us" field on the AWS Academy home page.
- Nominate qualified educator(s) within 14 days of signing the AWS Academy Terms & Conditions. Qualified educators are educators employed at the institution with teaching credentials, a teaching assistant of the educator, or contracted faculty hired by the institution as adjunct faculty.
- Agree to deliver a minimum of one course or Learner Lab every 18 months to five or more students, for each educator to avoid deactivation. An "approved" educator is an educator whose nomination is accepted, and the educator has acknowledged the Program Guide and completed the mandatory educator onboarding course, Getting Started with AWS Academy.
- Agree to notify your AWS Academy contact if you leave, educators stop teaching or leave institution employment.
- Agree that any contracted faculty or contracted Learning Management System (LMS) providers sign the AWS Academy Terms and Conditions and abide by all program requirements. Contract faculty or LMS providers may only use AWS Academy resources for enrolled students at an AWS Academy approved member institution. Violation of this requirement is grounds for permanent removal from the program.
- Agree to use the AWS Academy name, logos and branding materials as per the Public Relations (PR) and brand guidelines. To learn more about the PR guidelines, review the Getting Started

Course available within the AWS Academy LMS and see the Logos and Marketing Assets section of this Program Guide.

- Agree to have any contracted learning management system (LMS) provider or contracted faculty, who require access to AWS Academy content for purposes of LMS integration or delivery to students, sign and abide by the AWS Academy Terms and Conditions.
- Agree that classes and AWS Academy Learner Labs should only be opened for the duration of the academic term (recommended maximum of 6 months).
- Agree that Program Administrators and educators retain control of their AWS Academy credentials at all times and do not share them with anyone, including Teacher's Assistants.
- Agree to leverage the AWS Academy Forums to learn more about the program, upcoming changes, new course releases, etc.

AWS Academy will review each member institution annually to determine whether it continues to meet program compliance requirements. AWS Academy reserves the right to terminate the membership of AWS Academy institutions that do not meet the requirements set forth in the AWS Academy Terms & Conditions, located on the AWS Academy Portal, and the AWS Acceptable Use, as well as any successor or related locations designated by AWS Academy and the Program Guide.

Upon termination of an institution's participation in AWS Academy as set forth in the AWS Academy Terms & Conditions, the institution must cease all activity related to participation in AWS Academy, including:

- Ceasing to identify as a participant in AWS Academy.
- Removing the AWS Academy logo from all the institution's websites and marketing materials.
- Discontinuing use of AWS Academy program benefits and resources.

Benefits for Member Institutions

AWS Academy members receive benefits that are solely for the use of institutions, educators, and their students participating in AWS Academy, including:

- Access to AWS Academy content and AWS Academy Learner Lab environment developed and maintained by AWS Academy.
- Content updates that reflect new AWS releases and best practices.
- Listing in the AWS Academy directory of participating institutions on the AWS Academy website after delivering a class.
- Access to AWS Academy logos and branding, which must be used in adherence with the PR and brand guidelines, found on the AWS Academy Portal.
- Access to certification-style practice questions and 50% discount vouchers for AWS Academy approved educators. Institutions can purchase certification vouchers at 50% off. Instructions are found on the AWS Academy Portal under Educator Resources on the Resources tab.
- Invitation to AWS Academy events, such as AWS Academy conferences and webinars. AWS Academy events are also posted to the AWS Academy Forums. Please join your regional group(s) in the Forums to receive updates on AWS Academy opportunities.

AWS Academy Educators

To deliver AWS Academy content, you must become an AWS Academy approved educator and possess prerequisite knowledge as defined in the course outlines.

How to Become an AWS Academy Approved Educator

To become an AWS Academy approved educator, you must be nominated by an AWS Academy member institution Program Administrator (formerly Central Point of Contact (CPOC)). AWS Academy reviews each nomination to determine whether candidates meet program requirements.

Educator candidates who successfully complete the required Getting Started with AWS Academy course will gain approval to teach the course(s) at their respective AWS Academy member institution.

AWS Academy will confirm approval of your status as an AWS Academy approved educator in writing to both you and the AWS Academy Program Administrator at the sponsoring member institution. All educators must be approved before delivering AWS Academy courses, including educators at LTI-integrated institutions.

If you do not successfully complete the above steps, AWS Academy will provide you with feedback on any areas that need correction or improvement, as well as any steps that may be taken to continue the approval process.

Benefits for Educators

AWS Academy educators receive the following program benefits:

- Access to AWS Academy content and learning resources.
- Access to the AWS Academy Learner Lab environment developed and maintained by AWS Academy.
- Content updates reflecting new AWS releases and best practices.
- 50% off discount for certification exams.
- Access to the AWS Academy Educator logo.
- Access to the AWS Academy Educator badge to the lead educator in a team taught course.
- Access to the AWS Academy Certified Educator badge for AWS certified educators who have taught an AWS Academy course.
- Access to additional resources that include certification-style practice questions through AWS Skill Builder and hundreds of hours of self-paced training and resources via AWS Educate.
- Awareness of AWS Academy events, webinars, and other opportunities.
- Technical support for AWS Academy courses, lab, and learning resources.
- Access to the AWS Academy Forums.

Requirements for Educators

AWS Academy educators must:

- Be nominated by an approved AWS Academy member institution Program Administrator to become an AWS Academy educator.
- Have a contractual relationship with the AWS Academy member institution.

- Acknowledge the Program Guide in the AWS Academy Portal no later than 7 days after nomination is accepted (link to acknowledge the Program Guide will expire after 7 days).
- Complete the required Getting Started with AWS Academy course within 30 days of acknowledging the Program Guide.
- Comply with the AWS Academy Terms & Conditions located on the AWS Academy Portal, and any successor or related locations designated by AWS Academy and all requirements described in the AWS Academy Program Guide.
- Agree to use the AWS Academy name, logos and branding materials as per the PR and brand guidelines found on the AWS Academy Portal.
- Agree that AWS Academy content and/or services will not be used for crypto mining, network packet analysis (network "sniffing"), penetration testing, or ethical hacking.
- Agree to secure your AWS Academy credentials and not share them with any other user.
- Agree to create a new class for each new cohort of students.
- Deliver AWS Academy content only from the AWS Academy member institutions you are approved to teach at, and within the country that is on the member institution's profile.
- Agree that AWS Academy Learner Lab courses are not to be used as a hosting platform to teach non-AWS technology subjects or used for research purposes.
- Deliver AWS Academy content to 5 or more students within an institutional course at least every 18 months.
- Courses should be no longer than the academic term, with a recommended 6 month maximum duration.
- Stay current on AWS services and the AWS Academy courses the educator chooses to deliver.
- Provide a current institution email address (if available) to accept all AWS Academy-related communications from AWS.

AWS Academy Certification Exam Vouchers

The AWS Academy Program offers a discounted voucher for certification exams corresponding to several AWS Academy courses. Educators can use the voucher request form under Resources on the AWS Academy Portal to request 50% off certification exams. The average time to deliver vouchers is 3-5 business days. Students can earn discounted vouchers through the Emerging Talent Community once they receive a badge. All student badge earners will receive an email invitation to join the Emerging Talent Community once they qualify. For inquiries regarding the Emerging Talent Community, students can submit a customer support form.

AWS Academy Marketing Guidelines

Logos and Marketing Assets

AWS Academy logos and other digital marketing materials can be accessed by member institutions and approved educators in the AWS Academy Portal under the Resources tab, which are subject to change at any time by AWS. Logos and branding may be used per the AWS Trademark Guidelines and the brand guidelines. Below, please find some examples of the assets we provide to member institutions.

Program and Member Institution Logos

The AWS Academy logo and the member institution logo may be used in digital or print media to:

- Promote the program and associated courses.
- Promote an institution's or educator's participation in the program.
- Acknowledge that AWS Academy provided the course material your institution teaches.

Please review the brand guidelines in detail for instructions and restrictions.

AWS Academy Educator and AWS Academy Certified Educator logo

The AWS Academy Educator badge is awarded directly after completing the AWS Academy educator orientation course (Getting Started with AWS Academy). To maintain the badge, an educator must teach at least one AWS Academy course in the next 18 months.

The AWS Academy Certified Educator badge is awarded directly after completing the Getting Started with AWS Academy course. To maintain the badge, an educator must teach at least one AWS Academy course in the next 18 months and hold at least one AWS certification. These badges can be used in:

- A digital or print educator profile (e.g., faculty bio, LinkedIn, email signature).
- Conjunction with promotion of the program and associated course(s) being taught by the educator.

Please refer to the brand guidelines for additional instructions and restrictions.

Other Marketing Assets

AWS Academy offers a number of marketing resources that member institutions can use online or in print, including flyers and social media ads. Institutions can access these materials in AWS Academy Portal. They must be used in compliance with the brand guidelines.

Program Name and Titles

Use the approved names and titles below in all marketing and promotions.

Item	Approved	Do not use
Program name	AWS Academy	Academy
Approved educator	AWS Academy approved educator	AWS accredited educator AWS accredited instructor AWS academy educator AWS academy instructor AWS authorized educator AWS authorized instructor
Courses	AWS Academy Data Engineering AWS Academy Cloud Architecting AWS Academy Cloud Developing AWS Academy Cloud Foundations AWS Academy Cloud Operations AWS Academy Cloud Security Foundations AWS Academy Data Center Technician AWS Academy Engineering Operations Technicians AWS Academy Introduction to Cloud Semester 1 AWS Academy Introduction to Cloud Semester 2 AWS Academy Learner Lab AWS Academy Machine Learning Natural Language Processing AWS Academy Machine Learning Foundations Getting Started with AWS Academy	Academy Data Engineering Academy Cloud Architecting Academy Cloud Developing Academy Cloud Foundations Academy Cloud Operations Academy Cloud Security Foundations Academy Data Center Technician Academy Engineering Operations Technicians Academy Introduction to Cloud Semester 1 Academy Introduction to Cloud Semester 2 Academy Learner Lab Academy Machine Learning Natural Language Processing Academy Machine Learning Foundations AWS Learner Lab …or any variation thereof

Involvement in AWS Academy

We are grateful for your institution's participation in AWS Academy. Following is some information about AWS Academy that may be shared with students.

About AWS Academy	AWS Academy provides secondary and higher education institutions with free, ready-to-teach cloud computing curriculum developed and maintained by AWS. With professional development opportunities and courses aligned to AWS Certifications, AWS Academy empowers educators to deliver hands-on learning experiences that prepare students for industry-recognized certifications and in-demand cloud jobs.
About the curriculum	The AWS Academy curricula is designed to help students develop technical expertise in cloud computing, help them prepare for AWS Certification, and upskill and prepare them for in-demand cloud jobs.
About AWS Certification	Upon successful completion of an AWS Academy course, students can receive access to certification-style practice questions and earn discounted vouchers through the Emerging Talent Community. AWS Certifications recognize individuals with the technical skills and expertise to design, deploy, and operate applications and operations on AWS.

Course Outline

AWS Academy Cloud Foundations

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Course version

This course outline applies to version 2.0 of *AWS Academy Cloud Foundations* in English. Details of changes from version 1.0 are available in the Instructor Guide.

Description

AWS Academy Cloud Foundations is intended for students who seek an overall understanding of cloud computing concepts, independent of specific technical roles. It provides a detailed overview of cloud concepts, AWS core services, security, architecture, pricing, and support.

Curriculum objectives

Upon completion of this course, students will be able to do the following:

- Define the AWS Cloud
- Explain the AWS pricing philosophy
- Identify the global infrastructure components of AWS
- Describe the security and compliance measures of the AWS Cloud, including AWS Identity and Access Management (IAM)
- Create a virtual private cloud (VPC) by using Amazon Virtual Private Cloud (Amazon VPC)
- Demonstrate when to use Amazon Elastic Compute Cloud (Amazon EC2), AWS Lambda, and AWS Elastic Beanstalk
- Differentiate between Amazon Simple Storage Service (Amazon S3), Amazon Elastic Block Store (Amazon EBS), Amazon Elastic File System (Amazon EFS), and Amazon Simple Storage Service Glacier (Amazon S3 Glacier)
- Demonstrate when to use AWS database services, including Amazon Relational Database Service (Amazon RDS), Amazon DynamoDB, Amazon Redshift, and Amazon Aurora
- Explain the architectural principles of the AWS Cloud
- Explore key concepts related to Elastic Load Balancing, Amazon CloudWatch, and Amazon EC2 Auto Scaling

Duration

Approximately 20 hours, when delivered synchronously by an educator. Detailed timings are provided below. Actual delivery times will vary from class to class and depending on the delivery format. AWS Academy Cloud Foundations must be delivered over a period of at least two weeks.

Intended audience

This introductory-level course is intended for students attending AWS Academy member institutions.

Student prerequisites

To ensure success in this course, students should have the following:

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- General IT technical knowledge
- General IT business knowledge

Delivery methods

This course can be delivered in person with synchronous lectures or with digital training models that students can complete independently.

Educator prerequisites

This course does not have any prerequisites for educators. However, prior to facilitating this course, educators are recommended to complete this course, complete the AWS Academy Cloud Foundations course, and pass the AWS Certified Cloud Practitioner exam.

Learning resources

- Lecture materials
- Online multiple-choice knowledge checks
- Lab exercises
- Digital training (optional)
- Video introductions
- Video demos
- Example solutions

Course timing

This table provides the suggested durations for all course activities. Note that the total classroom time for all the modules in this course is 1,200 (20 hours). Items that are not applicable are marked NA.

Module Title	Lecture (Minutes)	Activity/Lab/ Demo (Minutes)	Knowledge Check (Minutes)	Total Module (Minutes)
Course Introduction	35	NA	NA	35
Module 1: Cloud Concepts Overview	45	5	10	60
Module 2: Cloud Economics and Billing	45	45	10	100
Module 3: AWS Global Infrastructure Overview	25	35	10	70
Module 4: Cloud Security	45	60	10	115
Module 5: Networking and Content Delivery	60	60	10	130
Module 6: Compute	80	135	10	225

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Module Title	Lecture (Minutes)	Activity/Lab/ Demo (Minutes)	Knowledge Check (Minutes)	Total Module (Minutes)
Module 7: Storage	45	75	10	130
Module 8: Databases	60	60	10	130
Module 9: Cloud Architecture	40	65	10	115
Module 10: Automatic Scaling and Monitoring	35	45	10	90
Total Course Time	515	585	100	1,200

Module sections

This section lists the module sections in this course.

Course Introduction

- Course objectives and overview
- AWS Certification exam information
- AWS documentation

Module 1: Cloud Concepts Overview

- Introduction to cloud computing
- Advantages of the cloud
- Introduction to AWS
- Moving to the AWS Cloud
- Activity: Sample Exam Question
- Knowledge check

Module 2: Cloud Economics and Billing

- Fundamentals of pricing
- Total cost of ownership
- Activity: Simple Monthly Calculator
- Delaware North case study
- AWS Organizations
- AWS billing and cost management
- Billing dashboards
- Technical support models
- Activity: Support Plan Scavenger Hunt
- Activity: Sample Exam Question
- Knowledge check

Module 3: AWS Global Infrastructure Overview

- AWS global infrastructure
- Demo: AWS global infrastructure

- AWS services and service categories
- Activity: AWS Management Console Clickthrough
- Activity: Sample Exam Question
- Knowledge check

Module 4: Cloud Security

- AWS shared responsibility model
- Activity: AWS Shared Responsibility Model
- AWS IAM
- Demo: AWS IAM Console
- Securing a new AWS account
- Lab: Introduction to AWS IAM
- Securing accounts
- Securing data
- Working to ensure compliance
- Activity: Sample Exam Question
- Knowledge check

Module 5: Networking and Content Delivery

- Networking basics
- Amazon VPC
- VPC networking
- Activity: Label This diagram
- Demo: Amazon VPC Console
- VPC security
- Activity: Design a VPC
- Lab: Build a VPC and Launch a Web Server
- Route 53
- CloudFront
- Activity: Sample Exam Question
- Knowledge check

Module 6: Compute

- Compute services overview
- Amazon EC2 part 1
- Amazon EC2 part 2
- Amazon EC2 part 3
- Demo: Amazon EC2
- Lab: Introduction to Amazon EC2
- Activity: Amazon EC2 Versus Managed Services
- Demo: Amazon EC2 Part Console
- Amazon EC2 cost optimization
- Container services
- Introduction to AWS Lambda
- Activity: AWS Lambda

- Introduction to AWS Elastic Beanstalk
- Activity: AWS Elastic Beanstalk
- Activity: Sample Exam Question
- Knowledge check

Module 7: Storage

- AWS EBS
- Demo: Amazon Elastic Block Store Console
- Lab: Working with EBS
- AWS S3
- Demo: AWS S3 Console
- AWS EFS
- Demo: AWS EFS Console
- AWS S3 Glacier
- Demo: AWS S3 Glacier Console
- Activity: Storage Technology Selection
- Activity: Sample Exam Question
- Knowledge check

Module 8: Databases

- Amazon RDS
- Demo: Amazon RDS Console
- Lab: Build a Database Server
- Amazon DynamoDB
- Demo: Amazon DynamoDB
- Amazon Redshift
- Amazon Aurora
- Activity: Database case study
- Activity: Sample Exam Question
- Knowledge check

Module 9: Cloud Architecture

- AWS Well-Architected Framework design principles
- Activity: AWS Well-Architected Framework Design Principles
- Operational excellence
- Security
- Reliability
- Performance efficiency
- Cost optimization
- Reliability & high availability
- AWS Trusted Advisor
- Activity: Interpret AWS Trusted Advisor Recommendations
- Activity: Sample Exam Question
- Knowledge check

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Module 10: Automatic Scaling and Monitoring

- Elastic Load Balancing
- Activity: Elastic Load Balancing
- Amazon CloudWatch
- Activity: Amazon CloudWatch
- Amazon EC2 auto scaling
- Lab: Scale & Load Balance your Architecture
- Activity: Sample Exam Question
- Knowledge check

Course Outline

AWS Academy Introduction to Cloud: Semester 1

Course Version

This course outline applies to version 1.0 of *AWS Academy Introduction to Cloud: Semester 1* in English.

Description

AWS Academy Introduction to Cloud: Semester 1 is an exploration of cloud computing. In this course, students explore cloud computing services, applications, and use cases. Students dive deeply into cloud computing best practices and learn how cloud computing helps users develop a global infrastructure to support use cases at scale while also developing and inventing innovative technologies.

This course provides students with classroom instruction that introduces cloud computing skills and accelerates students toward the next steps in their educational journey. The content of this course is aligned to the K–12 Computer Science Framework Practices including computational thinking. The seven core practices of computer science describe the behaviors and ways of thinking that computationally literate students use to fully engage in today's data-rich and interconnected world.

Course Objectives

Upon completion of this course, students will be able to do the following:

- Describe what a cloud service provider (CSP) is and the value they bring to computing
- Describe basic security and compliance aspects of the AWS platform and the shared security model
- Define the billing, account management, and pricing models
- Identify sources of documentation or technical assistance, for example, whitepapers or support tickets
- Describe basic or core characteristics of deploying and operating in the AWS Cloud
- Identify situations where a company should choose the cloud, and why
- Differentiate between on-premises and cloud infrastructure
- Identify how to migrate resources from on-premises infrastructure to cloud infrastructure

These outcomes are consistent with those of the AWS Certified Cloud Practitioner exam.

Duration

The course duration is approximately 60 hours when delivered synchronously by an educator.

Intended Audience

This is an introductory-level course intended for students of AWS Academy member institutions who seek an overall understanding of cloud computing skills.

Student Prerequisites

This is an entry-level course, but students should possess the following:

- General IT technical knowledge
- General IT business knowledge

Delivery Methods

Learning materials are provided to support synchronous, instructor-led delivery in person or online.

Educator Prerequisities

There are no prerequisities to facilitate this course. However, prior to facilitating this course, educators are recommended to complete the *AWS Academy Cloud Foundations* course, pass the AWS Certified Cloud Practitioner exam, and participate in an AWS "Ready-to-Teach" Webinar Series.

This course utilizes the AWS Academy Learner Labs environment to provide students with hands-on practical lab activities that utilize AWS services to explore and build cloud technologies. Educators are recommended to familiarize themselves with the lab environment.

Learning Resources

- Educator guide
- Student guide
- Activity worksheets
- Lab exercises
- Module quizzes
- End-of-course assessment

Course Contents

The following table includes all course content and activities with suggested durations.

Unit 1: Cloud Structure and Features (2 weeks)
Module 1: Global Infrastructure
Lecture and discussion
Activity: Introduction to Cloud Computing
Activity: Using Cloud Services
Module quiz
Module 2: Structures of the Cloud
Lecture and discussion
Activity: Visualizing the AWS Global Infrastructure
Activity: Types of Cloud Services
Module quiz
Unit 2: Storing and Sharing Content in the Cloud (4 weeks)
Module 3: AWS Console
Lecture and discussion
Activity: Learning the AWS Core Services
Activity: AWS Service Case Studies
Module quiz
Module 4: Virtual Servers
Lecture and discussion
Activity: All About Amazon EC2, Amazon S3, and DNS
Lab: Launching an EC2 Instance
Lab: Creating an S3 Bucket
Module quiz
Module 5: Content Delivery
Lecture and discussion
Activity: Content Distribution
Lab: Using CloudFront as a CDN for a Website
Module quiz
Module 6: Virtual Storage
Lecture and discussion
Activity: All About Amazon EBS
Activity: Amazon EBS Use Cases
Lab: Attaching an EBS Volume
Module quiz

Unit 3: Securing and Monitoring in the Cloud (3 weeks)
Module 7: Security I
Lecture and discussion
Activity: Overview of IAM
Activity: Cybersecurity and Society
Module quiz
Module 8: Security II
Lecture and discussion
Activity: AWS Cloud Security Basics
Activity: AWS Artifact and Compliance Hunt
Lab: Introduction to IAM
Module quiz
Module 9: Monitoring the Cloud
Lecture and discussion
Activity: CloudTrail, CloudWatch, and AWS Config
Lab: Creating a CloudWatch Alarm That Initiates an Amazon SNS Message
Module quiz
Unit 4: Data Management (3 weeks)
Module 10: Databases
Lecture and discussion
Activity: Database Engineers
Lab: Creating an Amazon RDS Database Instance
Module quiz
Module 11: Load Balancers and Caching
Lecture and discussion
Activity: ElastiCache and ELB Advertisement
Lab: Using Load Balancers
Module quiz
Module 12: Elastic Beanstalk and CloudFormation
Lecture and discussion
Activity: What Are Elastic Beanstalk and CloudFormation?
Lab: Using Elastic Beanstalk and CloudFormation
Module quiz

Unit 5: Managing and Optimizing Cloud Features (4 weeks)
Module 13: Emerging Technologies in the Cloud
Lecture and discussion
Activity: AI, Cloud Computing, and Society
Activity: Emerging Technologies and the Cloud
Module quiz
Module 14: Billing and Support
Lecture and discussion
Activity: AWS Support Plans and AWS Organizations
Lab: AWS Simple Monthly Calculator
Module quiz
Module 15: Other Cloud Features
Lecture and discussion
Activity: AWS Services Experts
Activity: Blockchain Discussion
Module quiz
Module 16: Optimizing the Cloud with the AWS CDK
Lecture and discussion
Activity: AWS CDK Infomercial
Activity: AWS CDK Demo
Module quiz
End-of-Course Assessment

Module Objectives

The following table includes course objectives for each module.

Module Title	Learning Objectives
Module 1: Global Infrastructure	• Define cloud computing and its impacts • Identify the benefits of cloud computing • Compare the major services offered by cloud computing providers
Module 2: Structures of the Cloud	• Recognize the types of cloud computing • Compare types of cloud computing • Explain the purpose of a Region, Availability Zone, and edge location • Identify connections among Regions, Availability Zones, and edge locations
Module 3: AWS Console	• Identify features and functions of commonly used AWS services • Access and navigate to commonly used AWS services • Analyze how AWS services are used in real-world industries

Module Title	Learning Objectives
Module 4: Virtual Servers	• Explain how an S3 bucket and EC2 instance interact to allow for website hosting • Explain the functions of DNS • Create an S3 bucket • Create an EC2 instance that hosts a simple website
Module 5: Content Delivery	• Recognize the benefits of a CDN • Explain the uses of a CDN • Configure a CloudFront distribution and attach it to a website
Module 6: Virtual Storage	• Recognize the benefits, features, and use cases of the four types of EBS volumes • Analyze a use case and recommend the best type of virtual storage for the particular situation • Create an EBS volume and attach it to an EC2 instance
Module 7: Security I	• Recognize best practices for IAM • Analyze the cultural and societal impacts of cloud security • Differentiate among a role, user, and policy in cloud security • Use a process to resolve vulnerabilities in a web server
Module 8: Security II	• Compare the uses of Shield and AWS WAF • Identify the best cloud security service for a given scenario • Explain functions and features of Amazon Inspector and AWS Artifact
Module 9: Monitoring the Cloud	• Use CloudWatch to set up a text alert event • Compare CloudTrail and CloudWatch
Module 10: Databases	• Compare online transaction processing (OLTP) and online analytic processing (OLAP) • Compare relational and nonrelational databases
Module 11: Load Balancers and Caching	• Describe the benefits of caching data • Explain the purpose of Amazon ElastiCache • Attach a load balancer to a webpage • Evaluate the performance of a load balancer • Describe features and benefits of load balancing
Module 12: Elastic Beanstalk and CloudFormation	• Describe features and uses of Elastic Beanstalk and CloudFormation • Create an application using Elastic Beanstalk • Use a template and CloudFormation to build a virtual private cloud (VPC)
Module 13: Emerging Technologies in the Cloud	• Define machine learning • Discuss the impact of machine learning on cloud computing • Identify potential use cases for emerging technology in the cloud
Module 14: Billing and Support	• Use the AWS Simple Monthly Calculator to estimate the cost of a cloud architecture • Recommend the best AWS Support plan for a given situation • Identify the benefits of using AWS Organizations and consolidated billing both for cost savings and easier IAM permissions management

Module Title	Learning Objectives
Module 15: Other Cloud Features	• Identify cloud services that can analyze and protect data, and manage networks • Explain benefits of blockchain technologies
Module 16: Optimizing the Cloud with the AWS CDK	• Explain the infrastructure of the AWS CDK • Use the AWS CDK to create an application

Course Outline

AWS Academy Introduction to Cloud: Semester 2

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Course Version

This course outline applies to version 1.0 of *AWS Academy Introduction to Cloud: Semester 2* in English.

Description

AWS Academy Introduction to Cloud: Semester 2 is an exploration of cloud computing. In this course, students explore cloud computing services, applications, and use cases. Students dive into cloud computing best practices and learn how cloud computing helps users develop a global infrastructure to support use cases at scale while also developing and inventing innovative technologies.

This course is an extension of *AWS Academy Introduction to Cloud: Semester 1*. The course provides students with classroom instruction that introduces cloud computing skills and accelerates students toward the next steps in their educational journey. The content of this course is aligned to the K–12 Computer Science Framework Practices including computational thinking. The seven core practices of computer science describe the behaviors and ways of thinking that computationally literate students use to fully engage in today's data-rich and interconnected world.

Course Objectives

Upon completion of this course, students will be able to do the following:

- Describe what the AWS Cloud is and the basic global infrastructure
- Describe basic AWS Cloud architectural principles
- Describe the AWS Cloud value preposition
- Describe key services on the AWS platform and their common use cases (for example, compute and analytics)
- Use key services in lab activities for hands-on practice, including but not limited to the following:
    - Amazon Simple Storage Service (Amazon S3)
    - Amazon CloudFront
    - AWS Lambda
    - Amazon Elastic Compute Cloud (Amazon EC2)
    - Amazon Virtual Private Cloud (Amazon VPC)
    - Amazon Comprehend
    - AWS DeepRacer
    - AWS CloudFormation

Duration

The course duration is approximately 60 hours and designed to be delivered synchronously by an educator.

Intended Audience

This is an introductory-level course intended for students of AWS Academy member institutions who seek an overall understanding of cloud computing skills.

Student Prerequisites

It is highly recommended that students complete *AWS Academy Introduction to Cloud: Semester 1* prior to this course.

This is an entry-level course, but students should possess the following:

- General IT technical knowledge
- General IT business knowledge

Delivery Methods

Learning materials are provided to support synchronous, instructor-led delivery in person or online.

Educator Prerequisities

There are no prerequisities to facilitate this course. However, prior to facilitating this course, educators are recommended to complete the *AWS Academy Cloud Foundations* course, pass the AWS Certified Cloud Practitioner exam, participate in an AWS "Ready-to-Teach" Webinar Series, and facilitate the *AWS Academy Introduction to Cloud: Semester 1* course.

This course utilizes the AWS Academy Learner Labs environment to provide students with hands-on practical lab activities that utilize AWS services to explore and build cloud technologies. Educators are recommended to familiarize themselves with the lab environment.

Learning Resources

- Educator guide
- Student guide
- Activity worksheets
- Lab exercises
- Module quizzes
- End-of-course assessment

Course Contents

The following table includes all course content and activities with suggested durations.

Unit 1: Managing Efficiency and Security	3 weeks
Module 1: AWS Security Models	
Lecture and discussion	50 minutes
Activity: Whose Responsibility Is It?	25 minutes
Module quiz	15 minutes
Module 2: Shared Security	
Lecture and discussion	50 minutes
Activity: Resolving Security Threats	30 minutes
Activity: Comparing Trusted Advisor and Amazon Inspector	30 minutes
Module quiz	15 minutes
Module 3: Cloud Services and Instance States	
Lecture and discussion	50 minutes
Activity: Instance and Animal Lifecycles	25 minutes
Activity: Most Likely Instance State	20 minutes
Activity: Which Instance Billing Option Is the Most Cost-Efficient?	25 minutes
Module quiz	15 minutes
Unit 2: Creating Cloud Environments to Scale	**4 weeks**
Module 4: Dynamic Web Servers I	
Lecture and discussion	50 minutes
Activity: Static or Dynamic?	45 minutes
Lab: Setting Up a Static Website	30 minutes
Module quiz	15 minutes
Module 5: Dynamic Web Servers II	
Lecture and discussion	50 minutes
Activity: Reviewing CloudFront Distributions	30 minutes
Lab: Creating a CloudFront Distribution	40 minutes
Module quiz	15 minutes
Module 6: Lambda	
Lecture and discussion	50 minutes
Activity: Instance Lifecycles	20 minutes
Activity: Instance State Situations	20 minutes
Activity: Instance Purchasing Scenarios	30 minutes
Lab: Creating a Lambda Function	30 minutes
Module quiz	15 minutes

Module 7: Auto Scaling in Cloud Environments	
Lecture and discussion	50 minutes
Activity: Developing a Plan to Monitor Auto Scaling Groups	60 minutes
Lab: Creating Launch Templates and Auto Scaling Groups	45 minutes
Module quiz	15 minutes
Unit 3: Emerging Technology	**6 weeks**
Module 8: Artificial Intelligence Capabilities	
Lecture and discussion	50 minutes
Activity: Selecting the Best AI Product	30 minutes
Activity: Using AI to Solve Issues	30 minutes
Lab: Using AI for Text Analysis	50 minutes
Module quiz	15 minutes
Module 9: Impact of Artificial Intelligence	
Lecture and discussion	50 minutes
Activity: Debating AI in Society	60 minutes
Activity: Using AI in Today's World	30 minutes
Module quiz	15 minutes
Module 10: Machine Learning	
Lecture and discussion	50 minutes
Activity: Machine Learning Scenarios	45 minutes
Lab: Reinforcement Learning with AWS DeepRacer	40 minutes
Module quiz	15 minutes
Module 11: AWS Machine Learning Applications	
Lecture and discussion	50 minutes
Activity: Using Machine Learning in My Business	45 minutes
Activity: Deep Learning Case Studies	45 minutes
Module quiz	15 minutes
Module 12: Internet of Things	
Lecture and discussion	50 minutes
Activity: Visual Representation of the IoT	30 minutes
Activity: IoT Skit	80 minutes
Module quiz	15 minutes
Module 13: CloudFormation Templates	
Lecture and discussion	50 minutes
Activity: Getting to Know CloudFormation	45 minutes
Lab: Creating an Environment with CloudFormation	60 minutes
Module quiz	15 minutes

Unit 4: Big Data and Cryptocurrency	3 weeks
Module 14: Big Data	
Lecture and discussion	50 minutes
Activity: Introduction to Big Data	30 minutes
Activity: Big Data Pros and Cons	60 minutes
Module quiz	15 minutes
Module 15: Big Data Processing Cycle	
Lecture and discussion	50 minutes
Activity: Introduction to the Big Data Processing Cycle	45 minutes
Activity: Big Data Processing Cycle Challenges	45 minutes
Module quiz	15 minutes
Module 16: Blockchain and Cryptocurrency	
Lecture and discussion	50 minutes
Activity: Blockchain Improv	60 minutes
Activity: Exploring Blockchain Solutions	45 minutes
Module quiz	15 minutes
End-of-Course Assessment	**45 minutes**

Module Objectives

The following table includes course objectives for each module.

Module Title	Learning Objectives
Module 1: AWS Security Models	• Describe the shared responsibility model • Differentiate between client and AWS security responsibilities for components of AWS Cloud architecture
Module 2: Shared Security	• Explain the role of AWS Trusted Advisor and Amazon Inspector in providing cloud security • Compare Amazon Inspector and Trusted Advisor • List the steps required to resolve a Trusted Advisor security alert
Module 3: Cloud Services and Instance States	• Describe the six instance states • Diagram the transitions between instance states from launch to termination • Indicate instance usage billing for each instance state • Determine the optimal instance state for a given situation
Module 4: Dynamic Web Servers I	• Recall the process for setting up a static website • Compare static and dynamic websites
Module 5: Dynamic Web Servers II	• Create an Amazon CloudFront distribution to increase the speed of your website
Module 6: Lambda	• Recall the process for deploying a function using the AWS Lambda console • Create a Lambda function using the Lambda console

Module Title	Learning Objectives
Module 7: Auto Scaling in Cloud Environments	• Recognize the three main functions of AWS Auto Scaling • Create a launch template and an Auto Scaling group • Develop a plan for monitoring an Auto Scaling instance or group
Module 8: Artificial Intelligence Capabilities	• Recognize capabilities of artificial intelligence (AI) • Determine an AI product that would help address a need or problem in a given situation
Module 9: Impact of Artificial Intelligence	• Appraise the value of emerging AI technology • Analyze the ethical implications of AI
Module 10: Machine Learning	• Recognize use cases for machine learning (ML) • Explain how ML can help address a need or problem in a given situation • Create an ML algorithm
Module 11: AWS Machine Learning Applications	• Evaluate how AI and ML support deep learning • Evaluate how AI and ML support enterprise and business intelligence
Module 12: Internet of Things	• Define Internet of Things (IoT) • Explain the relationship between cloud technology and the IoT • Determine how IoT products or services can address a given need or problem • Examine AWS customer stories to determine IoT use cases
Module 13: CloudFormation Templates	• Explain the functions of the AWS CloudFormation service • Determine the configuration of services by examining a CloudFormation template • Develop a CloudFormation template that addresses a given user need
Module 14: Big Data	• Define big data • Identify use cases for big data in various industries • Evaluate the pros and cons of big data
Module 15: Big Data Processing Cycle	• Define key terms related to big data processing • Describe the big data processing cycle
Module 16: Blockchain and Cryptocurrency	• Define blockchain and cryptocurrency • Explain how a blockchain ensures the validity and immutability of transactions • Explain how blockchain functions in the cloud • Evaluate the pros and cons of cryptocurrency • Evaluate the pros and cons of blockchain business applications

Course Outline

AWS Academy Cloud Architecting

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Course Version

This course outline applies to version 2.0 of *AWS Academy Cloud Architecting* in English.

Description

AWS Academy Cloud Architecting covers the fundamentals of building IT infrastructure on AWS. The course teaches students how to optimize use of the AWS Cloud by understanding AWS services and how they fit into cloud-based solutions.

Course Objectives

Upon completion of this course, students will be able to:

- Make architectural decisions based on AWS architectural principles and best practices
- Use AWS services to make infrastructure scalable, reliable, and highly available
- Use AWS managed services to enable greater flexibility and resiliency in an infrastructure
- Increase performance and reduce cost of a cloud infrastructure built on AWS
- Use the AWS Well-Architected Framework to improve architectures that use AWS solutions

Duration

Approximately 40 hours when delivered synchronously by an educator. Actual delivery times will vary from class to class and depending on delivery format. This course must be delivered over a period of at least six weeks.

Intended Audience

This intermediate-level course is intended for AWS Academy member institutions.

Student Prerequisites

To ensure success in this course, students should have:

- Completed *AWS Academy Cloud Foundations* (ACF) or have equivalent experience
- A working knowledge of distributed systems

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- Familiarity with general networking concepts
- A working knowledge of multi-tier architectures
- Familiarity with cloud computing concepts

Delivery Methods

This course can be delivered in person with synchronous lectures or with digital training modules that students can complete independently, or a combination of ILT and digital (flipped classroom model).

Educator prerequisites

This course does not have any prerequisites for educators. However, prior to facilitating this course, educators are recommended to complete this course, and pass the AWS Certified Solutions Architect - Associate exam.

Learning Resources

- Lecture materials with activities and demonstrations
- Online multiple-choice knowledge checks
- Lab exercises
- Lab assessments
- Digital lesson content
- Video demos
- Optional Capstone project
- Example solutions

Course Contents

		Lecture	Practical	Total
Module 1 – Welcome to AWS Academy Cloud Architecting		**30 min**		**30 min**
Lecture or Video	Course objectives and overview			
Lecture or Video	Café business case introduction			

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Lecture or Video	Roles in cloud computing			
Module 2 – Introducing Cloud Architecting		**55 min**	**10 min**	**65 min**
Lecture or Video	What is cloud architecting?			
Lecture or Video	The AWS Well-Architected Framework			
Lecture or Video	Best practices for building solutions on AWS			
Lecture or Video	AWS global infrastructure			
Discussion (Optional)	Course capstone project		5 min (optional)	
Knowledge Check	Cloud Architecting		10 min	
Module 3 – Adding a Storage Layer		**60 min**	**115 min**	**175 min**
Lecture or Video	The simplest architecture			
Lecture or Video	Using Amazon S3			
Demo	Demonstration: Amazon S3 Versioning		10 min	
Guided Lab	Guided Lab: Hosting a Static Website		20 min	
Lecture or Video	Storing data in Amazon S3			
Lecture or Video	Moving data to and from Amazon S3			
Demo	Demonstration: Amazon S3 Transfer Acceleration		10 min	
Lecture or Video	Choosing Regions for your architecture			
Challenge Lab	Challenge Lab: Creating a Static Website for the Café		60 min	

Knowledge Check	Storage Layer		10 min	
Sample Question	Sample Exam Question		5 min	

Module 4 – Adding a Compute Layer		**85 min**	**125 min**	**210 min**
Lecture or Video	Architectural need			
Lecture or Video	Adding compute with Amazon EC2			
Lecture or Video	Choosing an Amazon Machine Image (AMI) to launch an Amazon EC2 instance			
Lecture or Video	Selecting an Amazon EC2 instance type			
Lecture or Video	Using user data to configure an EC2 instance			
Demo	Demonstration: Configuring an EC2 Instance with User Data		20 min	
Lecture or Video	Adding storage to an Amazon EC2 instance			
Guided Lab	Guided Lab: Introducing Amazon Elastic File System (Amazon EFS)		20 min	
Lecture or Video	Amazon EC2 pricing options			
Demo	Demonstration: Reviewing the Spot Instance History Page		10 min	
Lecture or Video	Amazon EC2 considerations			
Challenge Lab	Challenge Lab: Creating a Dynamic Website for the Café		60 min	
Knowledge Check	Compute Layer		10 min	

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Sample Question	Sample Exam Question		5 min	
Module 5 – Adding a Database Layer		**75 min**	**135 min**	**210 min**
Lecture or Video	Architectural need			
Lecture or Video	Database layer considerations			
Lecture or Video	Amazon Relational Database Service (Amazon RDS)			
Guided Lab	Guided Lab: Creating an Amazon RDS database		20 min	
Demo	Demonstration: Amazon RDS Automated Backup and Read Replicas		15 min	
Lecture or Video	Amazon DynamoDB			
Discussion	Which database should the café use?		5 min	
Lecture or Video	Database security controls			
Lecture or Video	Migrating data into AWS databases			
Challenge Lab	Challenge Lab: Migrating a Database to Amazon RDS		80 min	
Knowledge Check	Database Layer		10 min	
Sample Question	Sample Exam Question		5 min	

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Module 6 – Creating a Networking Environment		**65 min**	**165 min**	**230 min**
Lecture or Video	Architectural need			
Lecture or Video	Creating an AWS networking environment			
Lecture or Video	Connecting your AWS networking environment to the internet			
Demo	Demonstration: Creating a Virtual Private Cloud Using the AWS Console		30 min	
Demo (Optional)	Demonstration: Creating a Virtual Private Cloud Using the AWS CLI		30 min (optional)	
Lecture or Video	Securing your AWS networking environment			
Guided Lab	Guided Lab: Creating a Virtual Private Cloud		30 min	
Challenge Lab	Challenge Lab: Creating a VPC Networking Environment for the Café		90 min	
Knowledge Check	Networking Environment		10 min.	
Sample Question	Sample Exam Question		5 min	
Module 7 – Connecting Networks		**75 min**	**50 min**	**125 min**
Lecture or Video	Architectural need			
Lecture or Video	Connecting your remote network with AWS Site-to-Site VPN			
Lecture or Video	Connecting your remote network with AWS Direct Connect			
Lecture or Video	Connecting virtual private clouds (VPCs) in AWS with VPC peering			

Guided Lab	Guided Lab: Creating a VPC Peering Connection		20 min	
Lecture or Video	Scaling your VPC network with AWS Transit Gateway			
Activity	AWS Transit Gateway		15 min	
Lecture or Video	Connecting your VPC to supported AWS services			
Knowledge Check	Connecting Networks		10 min	
Sample Question	Sample Exam Question		5 min	
Module 8 – Securing User and Application Access		**80 min**	**125 min**	**205 min**
Lecture or Video	Architectural need			
Lecture or Video	Account users and AWS Identity and Access Management (IAM)			
Activity	Examining IAM policies		15 min	
Lecture or Video	Organizing users			
Lecture or Video	Federating users			
Demo	Demonstration: EC2 Instance Profile		15 min	
Lecture or Video	Multiple accounts			
Challenge Lab	Challenge Lab: Controlling Account Access by Using IAM		80 min	
Knowledge Check	User and Application Access		10 min	
Sample Question	Sample Exam Question		5 min	

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Module 9 - Implementing Elasticity, High Availability, and Monitoring		**85 min**	**225 min**	**310 min**
Lecture or Video	Architectural need			
Lecture or Video	Scaling your compute resources			
Demo	Demonstration: Creating Scaling Policies for Amazon EC2 Auto Scaling		30 min	
Lecture or Video	Scaling your databases			
Lecture or Video	Designing an environment that's highly available			
Demo	Demonstration: Creating a Highly Available Web Application		30 min	
Demo	Demonstration: Amazon Route 53		20 min	
Guided Lab	Guided Lab: Creating a Highly Available Environment		40 min	
Lecture or Video	Monitoring			
Challenge Lab	Challenge Lab: Creating a Scalable and Highly Available Environment for the Café		90 min	
Knowledge Check	Elasticity, High Availability and Monitoring		10 min	
Sample Question	Sample Exam Question		5 min	
Module 10 – Automating Your Architecture		**80 min**	**145 min**	**225 min**
Lecture or Video	Architectural need			
Lecture or Video	Reasons to automate			
Lecture or Video	Automating your infrastructure			

Demo	Demonstration: Analyzing AWS CloudFormation Template Structure and Creating a Stack		20 min	
Guided Lab	Guided Lab: Automating Infrastructure Deployment with AWS CloudFormation		20 min	
Lecture or Video	Automating deployments			
Lecture or Video	AWS Elastic Beanstalk			
Challenge Lab:	Challenge Lab: Automating Infrastructure Deployment		90 min	
Knowledge Check	Automation		10 min	
Sample Question	Sample Exam Question		5 min	
Module 11 – Caching Content		**65 min**	**45 min**	**110 min**
Lecture or Video	Architectural need			
Lecture or Video	Overview of caching			
Lecture or Video	Edge caching			
Guided Lab	Guided Lab: Streaming Dynamic Content Using Amazon CloudFront		30 min	
Lecture or Video	Caching web sessions			
Lecture or Video	Caching databases			
Knowledge Check	Caching Content		10 min	
Sample Question	Sample Exam Question		5 min	

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Module 12 – Building Decoupled Architectures		**60 min**	**15 min**	**75 min**
Lecture or Video	Architectural need			
Lecture or Video	Decoupling your architecture			
Lecture or Video	Decoupling with Amazon Simple Queue Service (Amazon SQS)			
Lecture or Video	Decoupling with Amazon Simple Notification Service (Amazon SNS)			
Lecture or Video	Sending messages between cloud applications and on-premises with Amazon MQ			
Knowledge Check	Decoupled Architecture		10 min	
Sample Question	Sample Exam Question		5 min	
Module 13 – Building Microservices and Serverless Architectures		**90 min**	**190 min**	**280 min**
Lecture or Video	Architectural need			
Lecture or Video	Introducing microservices			
Lecture or Video	Building microservice applications with AWS container services			
Guided Lab (Optional)	*Guided Lab: Breaking a Monolithic Node.js Application into Microservices*		180 min (optional)	
Lecture or Video	Introducing serverless architectures			
Lecture or Video	Building serverless architectures with AWS Lambda			
Demo	Demonstration: Creating an AWS Lambda Function		15 min	

Demo	Demonstration: Using AWS Lambda with Amazon S3		30 min	
Guided Lab	Guided Lab: Implementing a Serverless Architecture on AWS		40 min	
Lecture or Video	Extending serverless architectures with Amazon API Gateway			
Lecture or Video	Orchestrating microservices with AWS Step Functions			
Challenge Lab	Challenge Lab: Implementing a Serverless Architecture for the Café		90 min	
Knowledge Check	Microservices and Serverless		10 min	
Sample Question	Sample Exam Question		5 min	
Module 14 – Planning for Disaster		**60 min**	**60 min**	**120 min**
Lecture or Video	Architectural need			
Lecture or Video	Disaster planning strategies			
Lecture or Video	Disaster recover patterns			
Guided Lab	Guided Lab: Hybrid Storage and Data Migration with AWS Storage Gateway File Gateway		45 min	
Knowledge Check	Disaster Planning		10 min	
Sample Question	Sample Exam Question		5 min	

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Module 15 – Bridging to Certification		**30 min**		**30 min**
Lecture or Video	Certification exam resources			
Lecture or Video	Additional resources			
Discussion (Optional)	Course capstone project		5 min (optional)	
Capstone Project (Optional)	*Capstone Project*		300 min (optional)	

Module Objectives

Module Title	**Learning Objectives**
Module 1: **Welcome to AWS Academy Cloud Architecting**	• Identify course prerequisites and objectives • Recognize the café business case • Indicate the role of cloud architects
Module 2: **Introducing Cloud Architecting**	• Define cloud architecture • Define how to design and evaluate architectures using the AWS Well-Architected Framework • Explain best practices for building solutions on AWS • Describe how to make informed decisions on where to place AWS resources
Module 3: **Adding a Storage Layer**	• Recognize the problems that Amazon S3 can solve • Describe how to store content efficiently using Amazon S3 • Recognize the various Amazon S3 storage classes and cost considerations • Describe how to move data to and from Amazon S3 • Describe how to choose a Region

	• Create a static website
Module 4: **Adding a Compute Layer**	• Identify how Amazon EC2 can be used in an architecture • Explain the value of using Amazon Machine Images (AMIs) to accelerate the creation and repeatability of infrastructure • Differentiate between the EC2 instance types • Recognize how to configure Amazon EC2 instances with user data • Recognize storage solutions for Amazon EC2 • Describe EC2 pricing options • Determine the placement group given an architectural consideration • Launch an Amazon EC2 instance
Module 5: **Adding a Database Layer**	• Compare database types • Differentiate between managed versus unmanaged services • Explain when to use Amazon RDS • Explain when to use Amazon DynamoDB • Describe available security controls • Describe how to migrate data into AWS databases • Deploy a database server

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Module 6: **Creating a Networking Environment**	• Explain the foundational role of a VPC in AWS Cloud networking • Identify how to connect your AWS networking environment to the internet • Describe how to isolate resources within your AWS networking environment • Create a VPC with subnets, an internet gateway, route tables, and a security group
Module 7: **Connecting Networks**	• Describe how to connect an on-premises network to the AWS Cloud • Describe how to connect VPCs in the AWS Cloud • Connect VPCs in the AWS Cloud by using VPC peering • Describe how to scale VPCs in the AWS Cloud • Describe how to connect VPCs to supported AWS services
Module 8: **Securing User and Application Access**	• Explain the purpose of AWS IAM users, groups, and roles • Describe how to allow user federation within an architecture to increase security • Recognize how AWS Organizations service control policies (SCPs) increase security within an architecture • Describe how to manage multiple AWS accounts • Configure IAM users
Module 9: **Implementing Elasticity, High Availability, and Monitoring**	• Use Amazon EC2 Auto Scaling within an architecture to promote elasticity • Explain how to scale your database resources • Deploy an Application Load Balance to create a highly available environment • Use Amazon Route 53 for Domain Name System (DNS) failover • Create a highly available environment

	• Design architectures that use Amazon CloudWatch to monitor resources and react accordingly
Module 10: **Automating Your Architecture**	• Recognize when to automate and why • Identify how to model, create, and manage a collection of AWS resources using AWS CloudFormation • Use the Quick Start AWS CloudFormation templates to set up an architecture • Indicate how to use AWS Systems Manager and AWS OpsWorks for infrastructure and deployment automation • Indicate how to use AWS Elastic Beanstalk to deploy simple applications
Module 11: **Caching Content**	• Identify how caching content can improve application performance and reduce latency • Identify how to design architectures using edge locations for distribution and distributed denial of service (DDoS) protection • Create architectures that use Amazon CloudFront to cache content • Recognize how session management relates to caching • Describe how to design architectures that use Amazon ElastiCache
Module 12: **Building Decoupled Architectures**	• Differentiate between tightly and loosely coupled architectures • Identify how Amazon SQS works and when to use it • Identify how Amazon SNS works and when to use it • Describe Amazon MQ

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Module 13: **Building Microservices and Serverless Architectures**	• Indicate the characteristics of microservices • Refactor a monolithic application into microservices and use Amazon ECS to deploy the containerized microservices • Explain serverless architecture • Implement a serverless architecture with AWS Lambda • Describe a common architecture for Amazon API Gateway • Describe types of workflows that AWS Step Functions supports
Module 14: **Planning for a Disaster**	• Identify strategies for disaster planning • Define recovery point objective (RPO) and recovery time objective (RTO) • Describe four common patterns for backup and disaster recovery and how to implement them • Use Amazon Storage Gateway for on-premises-to-cloud backup solutions
Module 15: **Bridging to Certification**	• Identify how to prepare for the AWS Certified Solutions Architect – Associate Certification • Identify where to find resources

Course Outline

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Course version

This course outline applies to version 2.0 of AWS Academy Cloud Developing in English.

Description

AWS Academy Cloud Developing is an AWS Academy course designed to help students develop technical expertise in development using cloud technologies. The curriculum is delivered through instructor-led classes, digital videos, knowledge checks, and hands-on labs. Throughout the course, students will explore a scenario that provides opportunities to build a variety of infrastructures through a guided, hands-on approach. Students have access to course manuals, online knowledge checks, hands-on labs, a free practice certification exam, and a discount voucher for the certification exam.

Curriculum objectives

Upon completion of this course, students will be able to do the following:

- Recall cloud computing services and models
- Describe developing on AWS
- Write code that interacts with Amazon S3 by using AWS SDKs
- Explain the role of AWS IAM
- Write code that interacts with Amazon DynamoDB by using AWS SDKs
- Explain caching with Amazon CloudFront and Amazon ElastiCache
- Configure containers
- Develop solutions with SQS and SNS
- Write code that interacts with Aws Lambda by using AWS SDKs
- Create a REST API by suing Amazon API Gateway
- Describe the use of AWS Step Functions
- Explain how to build secure applications
- Identify best practice for deploying applications

Duration

Approximately 40 hours. AWS Academy Cloud Developing is designed to be delivered over a semester. Actual delivery times will vary from class to class and depending on delivery format. This course must be delivered over a period of at least 4 weeks.

Intended audience

Undergraduate, graduate, or professional students who are seeking cloud developing expertise, and who must understand the scope of cloud architectures. This intermediate (level 200) course is intended for students attending AWS Academy member institutions.

Student prerequisites

AWS Academy Cloud Developing requires a strong foundation in IT concepts and skills. To ensure success in this course, students should have the following:

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- Completed the AWS Academy Cloud Foundations course or have equivalent experience
- Completed a unit in programming with Python, and have the ability to read and develop simple applications
- A working knowledge of distributed systems
- A working knowledge of general networking concepts
- A working knowledge of multi-tier architectures

Delivery methods

Learning materials are provided to support in-person or online synchronous delivery. Educators may record their lectures for asynchronous delivery.

Educator prerequisites

This course does not have any prerequisites for educators. However, prior to facilitating this course, educators are recommended to complete this course, and pass the AWS Certified Developer Associate exam.

Learning resources

- Recorded lectures
- Recorded demos
- Lecture materials
- Educator demo instructions
- Practical activities
- Lab exercises
- Instructor guide
- Student guide
- Knowledge checks

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Course timing

This table lists the module timing in this course. Note that the total classroom time for all the modules in this course is 2,400 minutes (40 hours).

Items that are not applicable are marked NA.

Module Title	Lecture (Minutes)	Exercise/Lab/ Demo (Minutes)	Knowledge Check (Minutes)	Total Classroom Timing	Digital Lecture (Minutes)
AWS Review (optional)	60	NA	NA	60	NA
Module 1: Welcome to AWS Academy Cloud Developing (ACD)	30	20	NA	50	18
Module 2: Introduction to Developing on AWS	65	45	10	120	35
Module 3: Developing Storage Solutions	60	60	10	130	27
Module 4: Securing Access to Cloud Resources	80	20	10	110	45
Module 5: Developing Flexible NoSQL Solutions	80	90	10	180	52
Module 6: Developing REST APIs	110	120	10	240	75
Module 7: Developing Event-Driven Serverless Solutions	90	105	10	205	35
Module 8: Introducing Containers and Container Services	95	180	10	285	40
Module 9: Caching Information for Scalability	95	180	10	285	42

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Module Title	Lecture (Minutes)	Exercise/Lab/ Demo (Minutes)	Knowledge Check (Minutes)	Total Classroom Timing	Digital Lecture (Minutes)
Module 10: Developing with Message	100	105	10	215	64
Module 11: Defining Workflows to Orchestrate Functions	70	100	10	180	24
Module 12: Developing Secure Applications on AWS	70	90	10	170	34
Module 13: Automating Deployment with CI/CD Pipelines	60	90	10	150	22
Module 14: Bridging to Certification	20	NA	NA	20	10
Total Course Timing	1075	1205	120	2400	

Module sections

This section lists the module sections in this course.

AWS Review (optional)

- Introduction to the AWS Cloud
- Overview of AWS Infrastructure
- Running Applications in the Cloud
- Introduction to Amazon EC2, Elastic Load Balancing, and Amazon EC2 Auto Scaling
- Introduction to Serverless Computing with AWS Lambda
- From Monoliths to Microservices
- Best Practices

Module 1: Welcome to AWS Academy Cloud Developing (ACD)

- Course Objectives and Overview
- Café Business Case Introduction
- Roles in Cloud Computing
- Class Exercise: AWS Documentation Scavenger Hunt

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Module 2: Introduction to Developing on AWS

- Introduction
- Systems Development Lifecycle
- Steps to Get Started Developing on AWS
- Demonstration: AWS Cloud9
- Fundamentals of Working with AWS SDKs
- Lab 2.1: Exploring AWS CloudShell and the AWS Cloud9 IDE
- Knowledge Check

Module 3: Developing Storage Solutions

- Introduction
- Introducing Amazon S3
- Creating S3 Buckets
- Working with S3 Objects
- Protecting Data and Managing Access to Amazon S3 Resources
- Lab 3.1: Working with Amazon S3
- Knowledge Check

Module 4: Securing Access to Cloud Resources

- Introduction
- Activity: Shared Responsibility Model
- Introducing AWS Identity and Access Management (IAM)
- Authenticating with IAM
- Demonstration: Configuring Cross-Account Access to AWS Resources
- Authorizing with IAM
- Demonstration: Creating IAM Users and IAM Groups
- Authorizing with IAM
- Knowledge Check

Module 5: Developing Flexible NoSQL Solutions

- Introduction
- Introducing AWS Database Options
- Key Concepts for Amazon DynamoDB
- Partitions and Data Distribution
- Secondary Indexes
- Read/Write Throughput
- Activity: Calculating RCU and WCU
- Streams and Global Tables
- Backup and Restore
- Basic Operations for Amazon DynamoDB Tables
- Lab 5.1: Working with Amazon DynamoDB
- Knowledge Check

Module 6: Developing REST APIs

- Introduction
- Introducing APIs

Course Outline

AWS Academy Cloud Developing

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- Introduction to Amazon API Gateway
- Creating a REST API
- Integrating with API Gateway
- Deploying an API
- Controlling Access to a REST API
- Monitoring a REST API
- Optimizing API Gateway
- Lab 6.1: Developing REST APIs with Amazon API Gateway
- Knowledge Check

Module 7: Developing Event-Driven Serverless Solutions

- Introduction
- Introducing Serverless Computing
- Introducing AWS Lambda
- Invoking Lambda Functions
- Setting Permissions for Lambda
- Authoring and Configuring Lambda Functions
- Deploying Lambda Functions
- Monitoring and Debugging Tools for Application Developers
- Demonstration: Using AWS X-Ray with Lambda
- Lab 7.1: Creating Lambda Functions Using the AWS SDK for Python
- Knowledge Check

Module 8: Introducing Containers and Container Services

- Introduction
- Introducing Containers
- Introducing Docker Containers
- Lab 8.1: Migrating a Web Application to Docker Containers
- Using Containers for Microservices
- Introducing AWS Container Services
- Deploying Applications with Elastic Beanstalk
- Lab 8.2: Running Containers on a Managed Service
- Knowledge Check

Module 9: Caching Information for Scalability

- Introduction
- Caching Overview
- Caching with Amazon ElastiCache
- Lab 9.1: Caching Application Data with ElastiCache
- Caching with Amazon CloudFront
- Caching Strategies
- Lab 9.2: Implementing CloudFront for Caching and Application Security
- Knowledge Check

Module 10: Developing with Messaging Services

- Introduction

Course Outline

AWS Academy Cloud Developing

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- Processing Requests Asynchronously
- Introducing Amazon SQS
- Working with Amazon SQS Messages
- Configuring Amazon SQS Queues
- Introducing Amazon SNS
- Developing with Amazon SNS
- Demonstration: Working with Amazon Messaging Services
- Introducing Kinesis Data Streams
- Lab 10.1: Implementing a Messaging System Using Amazon SNS and Amazon SQS
- Knowledge Check

Module 11: Defining Workflows to Orchestrate Functions

- Introduction
- Coordinating Tasks in Distributed Applications
- Introducing AWS Step Functions
- State Types
- Step Functions Use Cases
- Step Functions API
- Demonstration: Creating Simple Calculators Using Step Functions
- Lab 11.1: Orchestrating Serverless Functions with AWS Step Functions
- Knowledge Check

Module 12: Developing Secure Applications on AWS

- Introduction
- Securing Network Connections
- Authenticating with AWS STS
- Authenticating with Amazon Cognito
- Lab 12.1: Implementing Application Authentication Using Amazon Cognito
- Knowledge Check

Module 13: Automating Deployment Using CI/CD Pipelines

- Introduction
- Introducing DevOps
- Using AWS Code Services for CI/CD
- Deploying Applications with AWS CloudFormation
- Deploying Applications with AWS SAM
- Lab 13.1: Automating Application Deployment Using a CI/CD Pipeline

Module 14: Bridging to Certification

- Certifications and Resources
- Additional Resources

Optional: Instructor Sandbox

Lab: Sandbox

Course Outline

AWS Academy Data Engineering

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Course version

This course outline applies to version 1.0 of AWS Academy Data Engineering in English.

Description

AWS Academy Data Engineering is designed to help students learn about and get hands-on practice with the tasks, tools, and strategies that are used to collect, store, prepare, analyze, and visualize data for use in analytics and machine learning (ML) applications. Throughout the course, students will explore use cases from real-world applications, which will enable them to make informed decisions while building data pipelines for their particular applications.

Curriculum objectives

This course prepares students to do the following:

- Summarize the role and value of data science in a data-driven organization.
- Recognize how the elements of data influence decisions about the infrastructure of a data pipeline.
- Illustrate a data pipeline by using AWS services to meet a generalized use case.
- Identify the risks and approaches to secure and govern data at each step and each transition of the data pipeline.
- Identify scaling considerations and best practices for building pipelines that handle large-scale datasets.
- Design and build a data collection process while considering constraints such as scalability, cost, fault tolerance, and latency.
- Select a data storage option that matches the requirements and constraints of a given data analytics use case.
- Implement the steps to process structured, semistructured, and unstructured data formats in a data pipeline that is built with AWS.
- Explain the concept of MapReduce and how Amazon EMR is used in big data pipelines.
- Differentiate the characteristics of an ML pipeline and its specific processing steps.
- Analyze data by using AWS tools that are appropriate to a given use case.
- Implement a data visualization solution that is aligned to an audience and data type.

Duration

The course duration is approximately 40 hours when delivered synchronously by an educator. The course is designed to be delivered over one semester. Actual delivery times will vary from class to class and depending on delivery format. This course must be delivered over a period of at least 8 weeks.

Intended audience

This intermediate (level 200) course is intended for students at AWS Academy member institutions who seek expertise on the tasks, tools, and strategies that are used to collect, store, prepare, analyze, and visualize data for use in analytics and ML applications. This course is most aligned to a data engineer role but would also be appropriate for data analysts; data scientists; extract, transform, and

load (ETL) developers; or ML practitioners who want to understand how the data that they use in their analyses and predictions is prepared for analysis.

Student prerequisites

This course requires a strong foundation in IT concepts and skills. To ensure success in this course, students should have the following:

- Completed the AWS Academy Cloud Foundations course or have equivalent experience
- Worked with Structured Query Language (SQL)
- Worked with databases
- Introduced to general networking concepts
- Understanding of decision-making knowledge in math, probability, and statistics

Delivery methods

Learning materials are provided to support synchronous or asynchronous learning. Lecture slides and an instructor guide are provided for instructor-led training. Recorded lectures and demos are provided for independent learning. The educator can determine the preferred delivery method for each module.

Educator prerequisites

This course does not have any prerequisites for educators. However, prior to facilitating this course, educators are recommended to complete this course, complete the AWS Academy Cloud Foundations course, and pass the AWS Certified Cloud Practitioner exam.

Learning resources

- Lecture slides
- Student guide
- Instructor guide
- Practical activities
- Lab exercises
- Instructor lab sandbox environment
- Recorded lectures
- Recorded demos
- Module knowledge checks
- Course assessment
- Capstone project

Course timing

This table provides the suggested durations for all course activities. Note that the total classroom time for all the modules in this course is 2,400 minutes (40 hours). Items that are not applicable are marked NA.

Title	Lecture (Minutes)	Activity/Lab /Demo (Minutes)	Knowledge Check (Minutes)	Total Classroom Timing (Minutes)	Digital Lecture (Minutes)
Module 1: Welcome to AWS Academy Data Engineering	30	NA	NA	30	NA
Module 2: Data-Driven Organizations	75	70	10	155	25
Module 3: The Elements of Data	75	30	10	115	30
Module 4: Design Principles and Patterns for Data Pipelines	85	130	10	225	33
Module 5: Securing and Scaling the Data Pipeline	90	NA	10	100	52
Module 6: Ingesting and Preparing Data	90	NA	10	100	40
Module 7: Ingesting by Batch or by Stream	115	100	10	225	54
Module 8: Storing and Organizing Data	85	100	10	195	32
Module 9: Processing Big Data	105	200	10	315	44
Module 10: Processing Data for ML	140	65	10	215	53
Module 11: Analyzing and Visualizing Data	75	120	10	205	23
Module 12: Automating the Pipeline	50	130	10	190	18

Title	Lecture (Minutes)	Activity/Lab /Demo (Minutes)	Knowledge Check (Minutes)	Total Classroom Timing (Minutes)	Digital Lecture (Minutes)
Module 13: Bridging to Certification	30	NA	NA	30	NA
Capstone Project	NA	240	NA	240	NA
Course Assesment	NA	NA	60	60	NA
Total Course Timing	**1,045**	**240**	**170**	**2,400**	**404**

Module sections

This section lists the module sections in this course.

Module 1: Welcome to AWS Academy Data Engineering

- Course prerequisites and objectives
- Course overview

Module 2: Data-Driven Organizations

- Data-driven decisions
- The data pipeline – infrastructure for data-driven decisions
- The role of the data engineer in data-driven organizations
- Modern data strategies
- Lab: Accessing and Analyzing Data by Using Amazon S3
- Knowledge check

Module 3: The Elements of Data

- The five Vs of data – volume, velocity, variety, veracity, and value
- Volume and velocity
- Variety – data types
- Variety – data sources
- Veracity and value
- Activities to improve veracity and value
- Activity: Planning Your Pipeline
- Knowledge check

Module 4: Design Principles and Patterns for Data Pipelines

- AWS Well-Architected Framework and Lenses
- Activity: Using the Well-Architected Framework
- The evolution of data architectures
- Modern data architecture on AWS
- Modern data architecture pipeline: Ingestion and storage
- Modern data architecture pipeline: Processing and consumption
- Streaming analytics pipeline
- Lab: Querying Data by Using Athena
- Knowledge check

Module 5: Securing and Scaling the Data Pipeline

- Cloud security review
- Security of analytics workloads
- ML security
- Scaling: An overview
- Creating a scalable infrastructure
- Creating scalable components
- Knowledge check

Module 6: Ingesting and Preparing Data

- ETL and ELT comparison
- Data wrangling introduction
- Data discovery
- Data structuring
- Data cleaning
- Data enriching
- Data validating
- Data publishing
- Knowledge check

Module 7: Ingesting by Batch or by Stream

- Comparing batch and stream ingestion
- Batch ingestion processing
- Purpose-built ingestion tools
- AWS Glue for batch ingestion processing
- Scaling considerations for batch processing
- Lab: Performing ETL on a Dataset by Using AWS Glue
- Kinesis for stream processing
- Scaling considerations for stream processing
- Ingesting IoT data by stream
- Knowledge check

Module 8: Storing and Organizing Data

- Storage in the modern data architecture
- Data lake storage
- Data warehouse storage
- Purpose-built databases
- Storage in support of the pipeline
- Securing storage
- Lab: Storing and Analyzing Data by Using Amazon Redshift
- Knowledge check

Module 9: Processing Big Data

- Big data processing concepts
- Apache Hadoop
- Apache Spark
- Amazon EMR
- Managing your Amazon EMR clusters
- Lab: Processing Logs by Using Amazon EMR
- Apache Hudi

- Lab: Updating Dynamic Data in Place
- Knowledge check

Module 10: Processing Data for ML

- ML concepts
- The ML lifecycle
- Framing the ML problem to meet the business goal
- Collecting data
- Applying labels to training data with known targets
- Activity: Labeling with SageMaker Ground Truth
- Preprocessing data
- Feature engineering
- Developing a model
- Deploying a model
- ML infrastructure on AWS
- SageMaker
- Demo: Preparing Data and Training a Model with SageMaker
- Demo: Preparing Data and Training a Model with SageMaker Canvas
- AI/ML services on AWS
- Knowledge check

Module 11: Analyzing and Visualizing Data

- Considering factors that influence tool selection
- Comparing AWS tools and services
- Demo: Analyzing and Visualizing Data with AWS IoT Analytics and QuickSight
- Selecting tools for a gaming analytics use case
- Lab: Analyzing and Visualizing Streaming Data with Kinesis Data Firehose, OpenSearch Service, and OpenSearch Dashboards
- Knowledge check

Module 12: Automating the Pipeline

- Automating infrastructure deployment
- CI/CD
- Automating with Step Functions
- Lab: Building and Orchestrating ETL Pipelines by Using Athena and Step Functions
- Knowledge check

Module 13: Bridging to Certification

- AWS Certification overview

IoT Use Case (Optional)

This supplemental PowerPoint deck presents a sample use case for building an Internet of Things (IoT) data pipeline. The PowerPoint file includes sections for each of the main pipeline layers (ingestion and processing, storage, and analysis and visualization).

Capstone Project

The Capstone Project provides an integrative project-based learning experience that reinforces technical skills that are taught in this course. The capstone offers students an opportunity to demonstrate critical thinking, problem solving, the software development lifecycle, and communication skills.

Course Outline

AWS Academy Machine Learning Foundations

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Course Version

This course outline applies to version 1.0 of *AWS Academy Machine Learning Foundations* in English.

Description

AWS Academy Machine Learning Foundations introduces students to the concepts and terminology of Artificial Intelligence and machine learning. By the end of this course, students will be able to select and apply machine learning services to resolve business problems. They will also be able to label, build, train, and deploy a custom machine learning model through a guided, hands-on approach.

Course Objectives

Upon completion of this course, students will be able to:

- Describe machine learning (ML)
- Implement a machine learning pipeline using Amazon SageMaker
- Use managed Amazon ML services for forecasting
- Use managed Amazon ML services for computer vision
- Use managed Amazon ML services for natural language processing

Duration

Approximately 20 hours when delivered synchronously by an educator.

Intended Audience

This introductory course is intended for students at AWS Academy member institutions interested in pursuing a career in data science, ML, and AI.

Student Prerequisites

To ensure success in this course, students should have:

- Completed *AWS Academy Cloud Foundations* (or another introductory cloud computing course)
- Experience scripting with Python or equivalent
- A basic understanding of statistics

Delivery Methods

This course can be delivered in person with synchronous lectures or with digital training modules that students can complete independently, or a combination of in-person and digital instruction (flipped-classroom model).

Course Outline

AWS Academy Machine Learning Foundations

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Educator Prerequisites

This course does not have any prerequisites for educators. However, prior to facilitating this course, educators are recommended to complete this course, complete the AWS Academy Cloud Foundations course, and pass the AWS Certified Cloud Practitioner exam.

Learning Resources

- Lecture materials
- Online multiple-choice knowledge checks
- Lab exercises
- Digital training
- Lecture or video introductions
- Lecture or video demos
- Example solutions
- S documentation and frameworks

Course Contents

		# Slides/ Lecture & Demo Duration	Lab Duration	Total Duration
Module 1 – Welcome to AWS Academy Machine Learning Foundations		**21/30 min.**		**30 min.**
Lecture or Video	Course prerequisites and objectives			
Lecture or Video	Machine learning job roles			
Lecture or Video	Resources, documentation, and whitepapers			
Module 2 – Introducing Machine Learning		**48/120 min.**		**120 min.**
Lecture or Video	What is Machine Learning?			
Lecture or Video	Business problems solved with Machine Learning			
Lecture or Video	Machine Learning process			

Course Outline

AWS Academy Machine Learning Foundations

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		# Slides/ Lecture & Demo Duration	Lab Duration	Total Duration
Lecture or Video	Machine Learning tools overview			
Lecture or Video	Machine Learning challenges			
Demo	Demonstration: Introducing Amazon SageMaker	10 min.		
Knowledge Check	Machine Learning Concepts	10 min.		
Module 3 – Implementing a Machine Learning pipeline with Amazon SageMaker		**132/230 min.**	**200 min.**	**430 min.**
Lecture or Video	Scenario introduction			
Lecture or Video	Collecting and securing data			
Guided Lab	Exploring Amazon SageMaker		30 min.	
Lecture or Video	Evaluating your data			
Guided Lab	Visualizing Data		30 min.	
Lecture or Video	Feature engineering			
Guided Lab	Encoding Categorical Variables		30 min.	
Lecture or Video	Training			
Demo	Demonstration: Training a Model Using Amazon SageMaker	10 min.		
Guided Lab	Splitting Data and Training a Model using XGBoost		30 min.	
Lecture or Video	Hosting and using the model			
Guided Lab	Hosting and Consuming a Model on AWS		20 min.	

Course Outline

AWS Academy Machine Learning Foundations

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		# Slides/ Lecture & Demo Duration	Lab Duration	Total Duration
Lecture or Video	Evaluating the accuracy of the model			
Guided Lab	Evaluating Model Accuracy		30 min.	
Lecture or Video	Hyperparameter and model tuning			
Demo	Demonstration: Optimizing Amazon SageMaker Hyperparameters	10 min.		
Demo	Demonstration: Running Amazon SageMaker Autopilot	10 min.		
Guided Lab	Tuning with Amazon SageMaker		30 min.	
Knowledge Check	Machine Learning pipeline implementation	10 min.		
Challenge Lab 1 Class Project – Select and Train an algorithm			**300 min.**	**300 min.**
Module 4 – Introducing Forecasting		**38/60 min.**	**60 min.**	**120 min.**
Lecture or Video	Forecasting overview			
Lecture or Video	Processing time series data			
Lecture or Video	Using Amazon Forecast			
Demo	Demonstration: Creating a Forecast with Amazon Forecast	10 min.		
Guided Lab	Creating a Forecast with Amazon Forecast		60 min.	
Knowledge Check	Managed Services for Forecasting	10 min.		
Module 5 – Introducing Computer Vision (CV)		**56/60 min.**	**60 min.**	**120 min.**
Lecture or Video	Introducing Computer Vision			

Course Outline

AWS Academy Machine Learning Foundations

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		# Slides/ Lecture & Demo Duration	Lab Duration	Total Duration
Lecture or Video	Analyzing image and video			
Demo	Demonstration: Introducting Amazon Rekognition	10 min.		
Lecture or Video	Preparing custom datasets for computer vision			
Demo	Demonstration: Labeling images with Amazon Ground Truth	10 min.		
Guided Lab	Facial Recognition		60 min.	
Knowledge Check	Computer Vision	10 min.		
Module 6 – Introducing Natural Language Processing		**37/ 60 min.**	**60 min.**	**120 min.**
Lecture or Video	Overview of Natural Language Processing			
Lecture or Video	Natural Language Processing managed services			
Demo	Demonstration: Introducing Amazon Polly	10 min.		
Demo	Demonstration: Introducing Amazon Comprend	10 min.		
Demo	Demonstration: Introducing Amazon Translate	10 min.		
Guided Lab	Create a bot to schedule appointments		60 min.	
Knowledge Check	Natural Language Processing	10 min.		
Module 7 – Course Wrap-Up		**11/ 30 min.**		**30 min.**

Course Outline

AWS Academy Machine Learning Foundations

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		# Slides/ Lecture & Demo Duration	Lab Duration	Total Duration
Lecture or Video	Course summary			
Lecture or Video	AWS documentation			
Lecture or Video	AWS Certified Machine Learning - Specialty			

Module Objectives

Module Title	Learning Objectives
Module 1: **Welcome to AWS Academy Machine Learning Foundations**	• Identify course prerequisites and objectives • Describe the various roles that require machine learning knowledge • Identify resources for further learning
Module 2: **Introducing Machine Learning**	• Recognize how machine learning and deep learning are part of artificial intelligence • Describe artificial intelligence and machine learning terminology • Identify how machine learning can be used to solve a business problem • Describe the machine learning process • List the tools available to data scientists • Identify when to use machine learning instead of traditional software development methods
Module 3: **Implementing a Machine Learning pipeline with Amazon SageMaker**	• Formulate a problem from a business request • Obtain and secure data for machine learning (ML) • Build a Jupyter Notebook using Amazon SageMaker • Outline the process for evaluating data • Explain why dataneeds to be preprocessed • Use open source tools to examine and preprocess data • Use Amazon SageMaker to train and host an ML model • Use cross-validation to test the performance of an ML model • Use a hosted model for inference • Create an Amazon SageMaker hyperparameter tuning job to optimize a model's effectiveness
Module 4:	• Describe the business problems solved by using Amazon Forecast

Course Outline

AWS Academy Machine Learning Foundations

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Introducing Forecasting	• Describe the challenges of working with time series data • List the steps that are required to create a forecast by using Amazon Forecast • Use Amazon Forecast to make a prediction
Module 5: **Introducing Computer Vision**	• Describe the computer vision use cases • Describe the AWS managed machine learning (ML) services for image and video analysis • List the steps required to prepare a custom dataset for object detection • Describe how Amazon SageMaker Ground Truth can be used to prepare a custom dataset • Use Amazon Rekognition to perform facial detection
Module 6: **Introducing Natural Language Processing**	• Describe the natural language processing (NLP) use cases that are solved by using managed Amazon ML services • Describe the managed Amazon ML services available for NLP • Use managed Amazon ML Services
Module 7: **Course Wrap-Up**	• N/A

Course Outline

AWS Academy Cloud Operations

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Course Version

This course outline applies to version 1.0 of *AWS Academy Cloud Operations* in English.

Description

AWS Academy Cloud Operations is designed to prepare participants to pursue entry-level DevOps, support, and cloud operations roles. It will also help prepare them to take the AWS SysOps Administrator – Associate exam. Emphasizing best practices in the AWS Cloud and recommended design patterns, this course will teach students how to solve problems and troubleshoot various scenarios. The course will show students how to create automatable and repeatable deployments of networks and systems on AWS and covers specific AWS features and tools related to configuration and deployment. With case studies and demonstrations, students will learn how some AWS customers design their infrastructures and implement various strategies and services. Students will also have the opportunity to build a variety of infrastructures via guided, hands-on activities.

Curriculum Objectives

This course teaches students how to:

- Understand AWS infrastructure as it relates to system operations, such as global infrastructure, core services, and account security
- Use the AWS Command Line Interface (AWS CLI), and understand additional administration and development tools
- Manage, secure, and scale compute instances on AWS
- Manage, secure, and scale configurations
- Identify container services and AWS services that are available for serverless computing.
- Manage, secure, and scale databases on AWS
- Build virtual private networks with Amazon Virtual Private Cloud (Amazon VPC)
- Configure and manage storage options using the storage services offered with AWS
- Monitor the health of your infrastructure with services such as Amazon CloudWatch, AWS CloudTrail, and AWS Config
- Manage resource consumption in an AWS account by using tags, Amazon CloudWatch, and AWS Trusted Advisor
- Create and configure automated and repeatable deployments with tools such as Amazon Machine Images (AMIs) and AWS CloudFormation

Course Outline

AWS Academy Cloud Operations

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Duration

Approximately 40 hours. *AWS Academy Cloud Operations* is designed to be delivered over a semester. Actual delivery times vary depending on the format. This course must be delivered over a period of at least four weeks.

Intended Audience

This intermediate (200-level) course is intended for students attending AWS Academy member institutions.

Employment Outcomes

This course is intended for prospective operations/support/DevOps roles including:

- Operations Engineer
- Support Engineer
- Application Support Engineer
- Product Support Engineer
- Customer Support Engineer
- Support Specialist
- Junior DevOps Engineer
- DevOps Engineer
- Operations Engineer
- Platform Engineer
- Cloud Engineer
- Site Reliability Engineer

Course Outline

AWS Academy Cloud Security Foundations

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Student Prerequisites

AWS Academy Cloud Operations requires a strong foundation in IT concepts and skills. To ensure success, students should have:

- Completed *AWS Academy Cloud Foundations* or have equivalent experience
- A working knowledge of at least one scripting language
- Familiarity with Linux, the command line and Application Programming Interfaces (APIs)
- Familiarity with virtualization and distributed computing
- An understanding of version control (e.g., Git)
- An understanding of data storage mechanisms such as SQL

Delivery Methods

Learning materials are provided to support in-person or online synchronous delivery. Educators may record their lectures for asynchronous delivery.

Educator Prerequisites

This course does not have any prerequisites for educators. However, prior to facilitating this course, educators are recommended to complete this course, and pass the AWS Certified SysOps Administrator - Associate exam.

Learning Resources

- Video introductions
- Lecture materials
- Educator demo instructions
- Practical activities
- Lab exercises

Course Outline

AWS Academy Cloud Security Foundations

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Course Contents

		Lecture	Digital Training	Exercise & Lab	Knowledge Check
Course Welcome and Overview		1:15		0:35	
Lecture	AWS Academy Cloud Operations on AWS Course Objectives and Overview				
Lecture	Create your AWS Training Portal Account				
Lecture	Access your Course Materials				
Activity	Documentation Scavenger Hunt				
Module 1 – Understanding Systems Operations on AWS		4:00		1:20	0:15
Lecture	Systems Operations in the Cloud				
Lecture	Introduction to Core Services				
Lecture	AWS Identity and Access Management (IAM)				
Video	IAM Policy Simulator				
Lecture	AWS Command Line Interface (CLI)				
Educator Demo	AWS CLI				
Activity	Install and Practice Using the AWS CLI				
Knowledge Check					
Module 2 - Tooling and Automation		4:00		1:50	0:15
Lecture	AWS Systems Manager				

Lecture	Additional Administration and Development Tools				
Lecture	Hosting a Static Website on Amazon S3				
Lab	Using AWS Systems Manager				
Activity	Create a Static Website on Amazon S3				
Knowledge Check					
Module 3 – Computing (Servers)		0:45		1:45	0:15
Lecture	Computing on AWS				
Lecture	Managing your AWS Instances				
Lecture	Securing your AWS Instances				
Lecture	Amazon EC2 Purchasing Options				
Lab	Creating Amazon EC2 Instances				
Activity	Troubleshoot Creating a LAMP Instance in the AWS CLI				
Knowledge Check					
Module 4 – Computing (Scaling and Name Resolution)		5:00		1:30	0:15
Lecture	Elastic Load Balancing				
Lecture	Amazon EC2 Auto Scaling				
Lecture	Amazon Route 53				
Video	Amazon Route 53 Routing Options Demo				
Lab	Configure EC2 Auto Scaling				

Video	Amazon Route 53 Geo Routing Demo				
Activity	Configure Failover Routing with Amazon Route 53				
Knowledge Check					
Module 5 – Computing (Containers and Serverless)		4:00		1:15	0:15
Lecture	AWS Lambda				
Lecture	APIs and REST				
Lecture	Amazon API Gateway				
Lecture	Containers on AWS				
Educator Demo	Deploy Docker Container on Amazon Elastic Container Service (ECS)				
Video	Introduction to AWS Step Functions				
Lecture	AWS Step Functions				
Activity	Create an AWS Lambda Function to Email Daily Reports				
Knowledge Check					
Module 6 – Computing (Database Services)		3:50		2:15	0:15
Lecture	AWS Database Services				
Lecture	Amazon Relational Database Service (RDS)				
Educator Demo	Create an RDS Instance				
Lecture	Amazon Aurora				

Video	How to Create Your First Database Cluster on Amazon Aurora				
Lecture	Amazon DynamoDB				
Lecture	AWS Database Migration Service (AWS DMS)				
Activity	Migrate to Amazon RDS				
Knowledge Check					
Module 7 – Networking		4:00		1:45	0:15
Lecture	AWS Cloud Networking and Amazon Virtual Private Cloud (VPC)				
Lecture	Amazon VPC Connectivity Options				
Lecture	Securing Your Network				
Lecture	Troubleshooting Networks on AWS				
Lab	Configuring Virtual Private Cloud (VPC)				
Activity	Troubleshoot a VPC				
Knowledge Check					
Module 8 – Storage and Archiving		4:15		2:00	0:15
Lecture	Cloud Storage Overview				
Lecture	Amazon Elastic Block Store (EBS)				
Lecture	Instance Store				
Lecture	Amazon Elastic File System				
Lecture	Amazon S3				

Lecture	Amazon S3 Glacier				
Lecture	AWS Data Transfer and Migration Services				
Lab	Automation and Optimization				
Activity	Work with Amazon S3				
Knowledge Check					
Module 9 – Monitoring and Security		3:45		1:30	0:15
Lecture	Amazon CloudWatch				
Lecture	Amazon CloudWatch Monitoring				
Lecture	Amazon CloudWatch Events				
Lecture	Amazon CloudWatch Logs				
Lecture	AWS CloudTrail				
Lecture	AWS Service Integration with Amazon Athena				
Lecture	AWS Config				
Lab	Monitoring Your Applications and Infrastructure				
Activity	Working with AWS CloudTrail				
Knowledge Check					
Module 10 – Managing Resource Consumption		2:00		1:50	0:15
Lecture	Tagging				
Video	What are tags and what can I do with them?				

Lecture	Cost Management Tools and Best Practices				
Lecture	AWS Trusted Advisor				
Lab	Managing Resources				
Activity	Optimize AWS Resource Utilization				
Knowledge Check					
Module 11 – Cloud Architecting		2:00		1:45	0:15
Lecture	Configuration Management in the Cloud				
Lecture	Using Configuration Software				
Lecture	Creating an AMI Building Strategy				
Lecture	Amazon EC2 Launch Templates				
Educator Demo	Create an EC2 Launch Template				
Lecture	Infrastructure as Code				
Lecture	Introduction to JSON and YAML				
Lecture	AWS CloudFormation				
Lecture	Troubleshooting AWS CloudFormation				
	Continuous Integration and Continuous Deployment on AWS				
Lab	Automating Deployments with AWS CloudFormation				
Activity	Infrastructure as Code				
Knowledge Check					

Course Outline

AWS Academy Cloud Security Foundations

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Recommended & Optional					
Lab	Sandbox				

Course Outline

AWS Academy Cloud Security Foundations

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Learning Objectives

Module	Learning Objectives
Module 0: **Welcome and Overview**	• Explain the course scope and expectations. • Create an AWS Training Portal account. • Create your free AWS Educate account. • Access course materials and resources. • Navigate the AWS documentation website.
Module 1: **Understanding Systems Operations on AWS**	• Describe system operations in the cloud related to automated and repeatable deployments. • Explain Amazon Web Services (AWS) regions and edge locations, and criteria for selecting them. • Describe core services related to system operations, including services for network, compute, and access. • Explain how AWS Identity and Access Management (IAM) provides security over AWS account resources. • Describe AWS Command Line Interface (AWS CLI) features.
Module 2: **Tooling and Automation**	• Describe the purpose and function of AWS Systems Manager and its related features. • Describe the purpose and function of AWS Tools for PowerShell. • Identify additional development tools used for tooling and automation, such as software development kits (SDKs), AWS CloudFormation, and AWS OpsWorks. • Explain how Amazon Simple Storage Service (Amazon S3) can be used to host a static website.
Module 3: **Computing Servers**	• Describe Amazon Elastic Compute Cloud (Amazon EC2) virtualization. • Differentiate between the instance types and storage options available for EC2 instances. • Understand the networking components that must be specified when you launch an EC2 instance.

	• Explain Amazon EC2 user data and metadata. • Differentiate the lifecycle states for an EC2 instance. • Explain the shared responsibility model. • Create Amazon EC2 instances.
Module 4: **Computing (Scaling and Name Resolution)**	• Describe Elastic Load Balancing features. • Differentiate the types of ELB load balancers. • Describe Amazon EC2 Auto Scaling and launch configurations. • Use EC2 Auto Scaling. • Describe Amazon Route 53 features and routing options. • Configure failover routing.
Module 5: **Computing (Containers and Serverless)**	• Explain the purpose and function of AWS Lambda. • Describe the purpose and function of application programing interfaces (APIs), including RESTful APIs. • Explain the benefits and function of Amazon API Gateway. • Explain the purpose and function of containers and the AWS services that support container usage. • Explain the purpose and function of AWS Step Functions.
Module 6: **Computing (Database Services)**	• Differentiate the types of managed database services offered by Amazon Web Services (AWS) and identify their recommended use. • Identify some of the factors for consideration when selecting a database (engine and workloads). • Explain the purpose and function of Amazon Relational Database Service (Amazon RDS), Amazon Aurora, and Amazon DynamoDB and related benefits of each. • Describe the main features and benefits of Amazon Relational Database Service (Amazon RDS), Amazon Aurora, and Amazon DynamoDB.

	• Explain the benefits of the AWS Database Migration Service (AWS DMS) and the capabilities of the AWS Schema Conversion Tool (AWS SCT).
Module 7: **Networking**	• Explain the foundational role of an Amazon virtual private cloud (VPC) in AWS Cloud networking. • Identify the networking components inside of a VPC and their purpose. • Differentiate the options for VPC connectivity. • Describe the layered network defense model inside a VPC, such as network Access Control Lists (network ACLs), security groups, and bastion hosts. • List the steps to troubleshoot common VPC network issues. • Configure a VPC.
Module 8: **Storage and Archiving**	• Differentiate the AWS data storage options and explain their purpose and benefits. • Create and manage Amazon EBS snapshots. • Store, retrieve, and archive Amazon S3 objects. • Identify AWS data migration services.
Module 9: **Monitoring and Security**	• Explain the benefits of Amazon CloudWatch. • Describe Amazon CloudWatch monitoring features, including metrics and alarm details. • Describe Amazon CloudWatch log features and benefits. • Explain the purpose and function of AWS CloudTrail. • Describe AWS Config features and benefits. • Use Amazon CloudWatch to monitor applications and infrastructure.
Module 10: **Managing Resource Consumption**	• Explain the purpose and function of tagging in AWS. • Describe the cost management strategies associated with tagging. • Describe how to enforce tagging using Identity and Access Management (IAM) policies.

	• Identify some of the cost benefits of the cloud. • Explain the purpose and function of the AWS Trusted Advisor service. • Manage Resources with tagging.
Module 11: **Creating Automated and Repeatable Deployments**	• Identify some of the AWS services for configuration management. • Describe the challenges associated with cloud deployments and potential solutions for remedy. • Describe infrastructure as code and the value it creates. • Describe the purpose of AWS CloudFormation. • Describe some of the types of errors with AWS CloudFormation and their remedy. • Describe best practices using AWS CloudFormation.
Lab 1 – **Using AWS Systems Manager**	• Use AWS Systems Manager Inventory to verify configurations and permissions. • Use AWS Systems Manager Run Command to execute tasks on multiple servers. • Use AWS Systems Manager Parameter Store to update application settings or configurations. • Use AWS Systems Manager Session Manager to access the command line on an instance.
Lab 2 – **Creating Amazon EC2 Instances (Linux)**	• Launch an Amazon EC2 instance using the management console. • Launch an Amazon EC2 instance using the AWS Command Line Interface (CLI).
Lab 3 – **Using Auto Scaling (Linux)**	• Create a new Amazon Machine Image (AMI) by using the Amazon Command Line Interface (CLI). • Use Auto Scaling to scale up the number of servers available for a specific task when other servers are experiencing a heavy load.
Lab 4 – **Configuring VPC (Linux)**	• Create a virtual private cloud (VPC) that contains a private and public subnet, an internet gateway, and a Network Translation (NAT) gateway.

	• Configure route tables that are associated with a public subnet for internet-bound traffic to be directed to the internet gateway for direct internet access. • Configure route tables that are associated with a private subnet for isolated resources to securely connect to the internet through a NAT gateway. • Launch a bastion host in a public subnet for resource-based secured access to the private subnet. • Evaluate the operation of the private subnet's ability to communicate with the internet.
Lab 5 – **Managing Storage (Linux)**	• Create and maintain snapshots for Amazon EC2 instances. • Upload files to and download files from Amazon S3.
Lab 6 – **Monitoring Your Applications and Infrastructure**	• Use AWS Systems Manager Run Command to install the CloudWatch Agent on Amazon EC2 instances. • Monitor Application Logs using CloudWatch Agent and CloudWatch Logs. • Monitor system metrics using CloudWatch Agent and CloudWatch Metrics. • Create real-time notifications using CloudWatch Events. • Track infrastructure compliance using AWS Config.
Lab 7 – **Managing Resources (Linux/Windows)**	• Apply tags to existing AWS resources. • Find resources based on tags. • Use the AWS CLI or AWS SDK for PHP to stop and terminate Amazon EC2 instances based on certain attributes of the resource.
Lab 8 – **Automating Deployments with AWS CloudFormation**	• Deploy an AWS CloudFormation stack with a defined Virtual Private Cloud (VPC), Identity and Access Management (IAM) role, and Security Group. • Configure an AWS CloudFormation stack with resources, such as an Amazon Simple Storage Solution (S3) bucket and Amazon Elastic Compute Cloud (EC2). • Terminate an AWS CloudFormation and its respective resources.

Course Outline

AWS Academy Cloud Security Foundations

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Activity 1: **Install AWS CLI with IAM challenge**	• Install and configure the AWS CLI. • Connect the AWS CLI to an AWS account. • Access IAM by using the AWS CLI.
Activity 2: **Create Static Website for Mom & Pop Cafe on S3**	• Run AWS CLI commands that use IAM and Amazon S3 services. • Deploy a static website to an S3 bucket. • Create a script that uses the AWS CLI to copy files in a local directory to Amazon S3.
Activity 3: **Deploy a LAMP Instance**	• Launch an Amazon EC2 instance using the AWS CLI. • Troubleshoot AWS CLI commands and Amazon EC2 service settings.
Activity 4: **Route53 with GeoRouting**	• Configure a Route 53 health check that sends emails when the health of an HTTP endpoint turns healthy. • Configure failover routing in Amazon Route 53.
Activity 5: **Lambda function for Mom & Pop Cafe emails latest data**	• Recognize necessary IAM policy permissions to enable a Lambda function to other AWS resources. • Create a Lambda layer to satisfy an external library dependency. • Create a Lambda function. • Deploy and test a Lambda function that is triggered based on a schedule and that invokes another function. • Use CloudWatch logs to troubleshoot the execution of a Lambda function.
Activity 6: **Migrate Mom & Pop Cafe from MySQL on instance to RDS**	• Create an Amazon Relational Database Service (RDS) MariaDB instance using the AWS Command Line Interface (CLI). • Migrate data from a local MariaDB database to an Amazon RDS MariaDB database. • Monitor an Amazon RDS instance using Amazon CloudWatch metrics.
Activity 7:	• Identify VPC configuration issues.

Troubleshooting a VPC	• Troubleshoot VPC configuration issues. • Enable VPC Flow Logs. • Analyze VPC Flow Logs using grep.
Activity 8: **Create a Backup Schedule with Snapshots and Migrate S3 Data to Glacier**	• Use s3api and s3 CLI commands to create and configure an Amazon S3 bucket. • Configure an Amazon S3 bucket for file sharing with an external user. • Secure an Amazon S3 bucket for different access requirements using S3 permissions. • Configure event notification on an Amazon S3 bucket.
Activity 9: **Trigger a CloudWatch Alarm, Enable CloudTrail, and Track Activity**	• Configure an AWS CloudTrail. • Analyze CloudTrail logs using a variety of methods to discover relevant information. • Import AWS CloudTrail log data into Amazon Athena. • Run queries in Amazon Athena to filter AWS CloudTrail log entries. • Resolve security concerns within the AWS account and on an EC2 Linux instance.
Activity 10: **Creating AMIs and Launching EC2 Templates**	• Optimize an Amazon EC2 instance to reduce costs. • Use the AWS Simple Monthly Calculator to estimate AWS service costs.
Activity 11: **Troubleshooting CloudFormation Deployments**	

Course Outline

AWS Academy Machine Learning for Natural Language Processing (NLP)

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Course version

This course outline applies to version 1.0 of AWS Academy Machine Learning for Natural Language Processing (NLP) in English.

Description

AWS Academy Machine Learning for Natural Language Processing (NLP) is a follow-up course to AWS Academy Machine Learning Foundations. The course is at an intermediate technical level (similar to the AWS Academy Architecting, Operations, and Developing courses) and is appropriate for students who are pursuing careers that require machine learning (ML) knowledge.

Curriculum objectives

Upon completion of this course, students will be able to do the following:

- Describe the terms in the NLP ecosystem
- Identify how NLP can be used in business
- Indicate the range of problems, tasks, and solutions with NLP
- Explain the purpose and application of each AWS NLP ML service
- Implement solutions to different NLP problems using AWS ML services
- Run the ML pipeline on AWS for an NLP-specific business problem
- Evaluate various algorithms and approaches for a given NLP problem
- Build a solution using a combination of algorithms and AWS ML services

Duration

Approximately 20 hours. The course is designed to be delivered over one semester. Actual delivery times vary depending on the format. This course must be delivered over a period of at least 4 weeks.

Intended audience

This intermediate (200-level) course is intended for students attending AWS Academy member institutions. The target audience includes learners enrolled in software engineering, data analytics, ML, or IT tracks in a STEM course at a higher education academic institution. Potential learners include undergraduate, graduate, or re-skilling professional learners.

Employment Outcomes

This course is intended for prospective machine learning roles including the following:

- Data engineer
- Data scientist
- Software developer

Course Outline

AWS Academy Machine Learning for Natural Language Processing (NLP)

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Student prerequisites

- Completed the *AWS Academy Machine Learning Foundations* course
- Familiarity with cloud computing concepts
- Familiarity with Python or similar, higher level programming languages
- Familiarity with general networking concepts
- Familiarity with deep neural networks and graph theory
- Familiarity with bots and how they use utterances and slot prompts

Delivery methods

Learning materials are provided to support any combination of synchronous or asynchronous instructor-led delivery, either in person or online (all modalities).

Educator prerequisites

This course does not have any prerequisites for educators. However, prior to facilitating this course, educators are recommended to complete the AWS Academy Machine Learning Foundations course and this course.

Learning resources

- Video lectures
- Lecture materials
- Instructor Guides
- Student Guides
- Lab exercises
- Sandbox environment for educators

Course Outline

AWS Academy Machine Learning for Natural Language Processing (NLP)

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Course timing

This table lists the module timing in this course. Note that the total classroom time for all the modules in this course is 1,200 minutes (20 hours).

Items that are not applicable are marked NA.

Module Title	Lecture (Minutes)	Activity/Lab/ (Minutes)	Knowledge Check (Minutes)	Total Classroom Time (Minutes)
Module 1: Welcome to AWS Academy NLP	50	NA	10	60
Module 2: Introduction to NLP	60	30	10	100
Module 3: Processing Text for NLP	60	90	10	160
Module 4: Implementing Sentiment Analysis	50	30	10	90
Module 5: Introducing Information Extraction	30	120	10	160
Module 6: Introducing Topic Modeling	50	170	10	230
Module 7: Working with Languages	30	30	10	70
Module 8: Course Wrap-Up	10	200	NA	210
Total Course Time	**340**	**670**	**70**	**1080**

Module sections

This section lists the module sections in this course.

Welcome to AWS Academy NLP

- Course overview
- What is NLP?
- Business problems solved by using NLP
- NLP roles
- Activity: NLP Jobs Scavenger Hunt
- Knowledge check

Module 2: Introduction to NLP

- NLP and ML
- Common NLP tasks
- Walkthrough of an NLP problem

- Lab: Applying ML to an NLP Problem
- Evolution of NLP architectures
- Knowledge check

Module 3: Processing Text for NLP

- Text processing overview
- Getting text
- Lab: Extracting Text from Webpages and Images
- Text preprocessing
- Lab: Processing Text
- Vectorizing text
- Lab: Encoding and Vectorizing Text
- Advanced processing
- Storing and visualizing unstructured data
- Knowledge check

Module 4: Implementing Sentiment Analysis

- Introducing the scenario
- Identifying the steps for text processing
- Examining the algorithms for sentiment analysis
- Lab: Implementing Sentiment Analysis
- Discussing and walking through the lab solution
- Knowledge check

Module 5: Introducing Information Extraction

- Information extraction overview
- Types of information extraction
- Implementing information extraction
- Lab: Implementing Information Extraction
- Lab: Working with Entities
- Knowledge check

Module 6: Introducing Topic Modeling

- Introduction to topic modeling
- Identifying the approach
- Implementing topic modeling
- Lab: Implementing Topic Modeling with Amazon Comprehend
- Lab: Implementing Topic Modeling with Neural Topic Model (NTM)
- Lab: Implementing Topic Modeling
- Knowledge check

Course Outline

AWS Academy Machine Learning for Natural Language Processing (NLP)

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Module 7: Working with Languages

- Working with language issues
- Detecting and translating languages
- Transcribing and vocalizing text with AWS services
- Lab: Implementing a Multilingual Solution
- Knowledge check

Module 8: Course Wrap-Up

- Lab: Capstone Project
- Course summary
- Bridging to certification

Course Outline

AWS Academy Engineering Operations Technician

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Course version

This course outline applies to version 1.0 of AWS Academy Engineering Operations Technician in English.

Description

AWS Academy Engineering Operations Technician is designed to help students develop technical expertise in engineering operations. This course is for learners enrolled in a data center operations, engineering, or information technology track in a STEM course at a higher education academic institution. This course also helps to re-skill professional learners.

Curriculum objectives

Upon completion of this course, students will be able to do the following:

- Identify the basic design requirements for a data center
- Identify key elements of a Network-Critical Physical Infrastructure (NCPI) for a data center
- Recognize strategies to protect the physical security of a data center
- Explain concepts related to a data center's electrical system
- Describe the power systems that are used in a data center, including transformers, generators, and power distribution units (PDUs)
- Identify the battery systems that are used in a data center
- Describe how generators are used in a data center
- Describe how cooling systems are used in a data center
- Recognize the fire detection, communication, and suppression systems in a data center
- Identify how racks are used in a data center
- Describe how maintenance is performed in a data center
- Describe reliability and how to ensure reliability in a data center
- Describe availability and how to ensure availability in a data center
- Describe efficiency, how to measure it, and strategies for improving it in a data center
- Identify the roles, tools, and processes that are used to manage a data center
- Identify data center monitoring and management tasks
- Identify safety considerations for a data center
- Identify regulations that apply to a data center

Duration

The course duration is approximately 21 hours when delivered synchronously by an educator. Detailed timings are provided in this document. Actual delivery times will vary from class to class and depending on the delivery format.

Intended audience

This introductory (level 100) course is intended for students of AWS Academy member institutions who are interested in engineering operations technician (EOT) roles within a data center.

Course Outline

AWS Academy Engineering Operations Technician

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Student prerequisites

This is an entry-level course, but students should possess general knowledge of mechanical or electrical engineering.

Delivery methods

Learning materials are provided to support synchronous or asynchronous learning. PowerPoint slides and educator guides are provided for delivery by an educator through an in-person, online, or hybrid approach. Digital modules are provided for independent learning. The educator can determine the preferred delivery method for each module.

Educator prerequisites

Prior to teaching the course, it is highly recommended that educators complete the course and assessment, and receive the certificate of completion.

Learning resources

- Lecture slides
- Instructor guides
- Digital training modules
- Job aids
- End-of-module online knowledge checks
- End-of-course online assessment

Course Outline

AWS Academy Engineering Operations Technician

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Course timing

This table provides the suggested durations for all course activities.

Module Number and Title	Lecture Duration (Minutes)	Knowledge Check Duration (Minutes)	Total Module Duration (Minutes)
Module 1: Data Center Basics	60	10	70
Module 2: Data Center Physical Infrastructure: Overview	60	10	70
Module 3: Data Center Physical Infrastructure: Space	30	10	40
Module 4: Electrical Fundamentals	105	10	115
Module 5: Data Center Physical Infrastructure: Power	105	10	115
Module 6: Data Center Battery Overview	30	10	40
Module 7: Data Center Generators	45	10	55
Module 8: Data Center Physical Infrastructure: Cooling	150	10	160
Module 9: Fire Protection in the Data Center	60	10	70
Module 10: Data Center Racks	45	10	55
Module 11: Data Center Maintenance	45	10	55
Module 12: Data Center Reliability	45	10	55
Module 13: Data Center Availability	45	10	55
Module 14: Data Center Efficiency	60	10	70
Module 15: Managing Data Centers	45	10	55
Module 16: Data Center Operations	45	10	55
Module 17: Safety Considerations in the Data Center	60	10	70
Module 18: Data Center Regulations	30	10	40
TOTAL DURATION	**1,065**	**180**	**1,245**

Course Outline

AWS Academy Engineering Operations Technician

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Course contents

This list provides the sections within each module.

Module 1: Data Center Basics

- Recognize what a data center is
- Identify the types of data centers
- Identify the basic design requirements
- Recognize availability and resilience measures and practices
- Knowledge check

Module 2: Data Center Physical Infrastructure: Overview

- Describe the seven elements of NCPI
- Describe the four key environments: power, cooling, IT connectivity, and space
- Discuss the best practices associated with the seven NCPI elements
- Identify the challenges associated with the seven NCPI elements
- Knowledge check

Module 3: Data Center Physical Infrastructure: Space

- Describe physical security and access control
- Recognize the relationship between white and gray space environments
- Knowledge check

Module 4: Electrical Fundamentals

- Describe the basic concepts of electricity
- Describe alternating current (AC) circuit fundamentals
- Describe direct current (DC) circuit fundamentals
- Identify types of conductors and conduit
- Describe data center electrical distribution
- Differentiate between voltage types
- Describe voltage, protection relay, alarms, and metering
- Knowledge check

Module 5: Data Center Physical Infrastructure: Power

- Describe data center electrical distribution system components
- Recognize the relationship between power infrastructure components
- Describe what a transformer is
- Describe backup power infrastructure
- Describe the PDU to rack PDU (rPDU)
- Describe measuring, monitoring, and routine checks for power
- Describe electrical safety in the data center
- Knowledge check

Module 6: Data Center Battery Overview

- Describe how batteries support data centers
- Identify uninterruptible power supply (UPS) battery systems standards and codes
- Knowledge check

Course Outline

AWS Academy Engineering Operations Technician

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Module 7: Data Center Generators

- Identify the main components of a standby generator
- Recognize fuel types and resources utilized by standby generators
- Recognize fuel systems for generators
- Knowledge check

Module 8: Data Center Physical Infrastructure: Cooling

- Recognize the need for cooling
- Identify data center cooling architectures and systems
- Describe the different cooling system technologies
- Differentiate between types of cooling
- Describe a data center water treatment system
- Describe cooling infrastructure and airflow management
- Determine improvements for rack cooling
- Describe measuring, monitoring, and routine checks for cooling
- Identify the primary factors that affect transient temperature rise in data centers
- Identify practical strategies to manage cooling during power outages
- Knowledge check

Module 9: Fire Protection in the Data Center

- Identify the main goals of a data center fire protection system
- Describe the basic theory of fire suppression
- Describe sprinkler systems for data centers
- Differentiate between fire detection, fire communication, and fire suppression
- Knowledge check

Module 10: Data Center Racks

- Identify the IT cabinets and frames
- Describe physical considerations for rack layout
- Identify system challenges for racks
- Knowledge check

Module 11: Data Center Maintenance

- Identify data center maintenance needs
- Identify maintenance strategies
- Identify preventative and predictive maintenance
- Knowledge check

Module 12: Data Center Reliability

- Describe data center reliability
- Analyze reliability risks
- Identify common causes of failures in the data center
- Knowledge check

Course Outline

AWS Academy Engineering Operations Technician

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Module 13: Data Center Availability

- Identify key terms associated with data center availability
- Differentiate between availability and reliability
- Recognize threats to availability
- Knowledge check

Module 14: Data Center Efficiency

- Explain how data center efficiency is measured
- Describe power usage effectiveness in the data center
- Describe heating, ventilation, and air conditioning (HVAC) efficiency and power usage effectiveness
- Identify portable and permanently installed efficiency measurement equipment
- Knowledge check

Module 15: Managing Data Centers

- Identify data center management tools
- Describe change management in a data center
- Describe decommissioning in a data center
- Knowledge check

Module 16: Data Center Operations

- Describe data center operation structure
- Identify operational processes and procedures
- Identify operational measuring and monitoring
- Knowledge check

Module 17: Safety Considerations in the Data Center

- Identify safety considerations for environmental health and safety
- Identify safety considerations for life safety systems
- Identify safety considerations for personal protective equipment (PPE)
- Identify safety considerations for risk assessment and method statements
- Knowledge check

Module 18: Data Center Regulations

- Identify data center codes and regulations
- Identify industry guidelines and best practices
- Knowledge check

Course Outline

AWS Academy Data Center Technician

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Course version

This course outline applies to version 1.0 of AWS Academy Data Center Technician in English.

Description

The AWS Academy Data Center Technician course is designed to help students develop technical expertise in data center operations. This course is for learners enrolled in a data center operations, engineering, or information technology track in a STEM course at a higher education academic institution. This course also helps to re-skill data center professional learners.

Curriculum objectives

Upon completion of this course, students will be able to do the following:

Section 1: Hardware

- Describe a computer, operating system (OS), and program
- Recognize a computer installation, repair tools, and safety rules
- Identify the components of a motherboard, and steps to install or remove one
- Define the functions of a processor in a PC, and the steps to install or remove one
- Define memory in a PC
- Identify the types of storage drives and how to install them
- Define a power supply unit (PSU), and the steps to install and remove one from a PC
- Recognize the functions of a graphics card, and how to install, remove, and troubleshoot one
- Identify basic hardware peripherals

Section 2: Software

- Define OS fundamentals
- Explain the installation of an OS and how to create disk partitions
- Describe OS configuration (including application, drivers, and firewall)
- Describe the installation and configuration of various web browsers, and how to manage them
- Define file systems
- Describe the basics of using the command line interface (CLI)
- Define an OS process and process control block (PCB)
- Define memory, paging, segmentation, and memory swapping
- Define the basic ways to use Microsoft Office

Section 3: Networking

- Identify the fundamentals of networking
- Define the Open Systems Interconnection (OSI) model, Transmission Control Protocol/Internet Protocol (TCP/IP) model, function of the Dynamic Host Configuration Protocol (DHCP), and function of a Domain Name System (DNS)
- Identify copper networking cables, fiber data cables, and optical fiber transceivers
- Compare the different cabinets and racks used in a data center
- Recognize the process of data transmission through networks
- Understand IP and subnetting

Course Outline

AWS Academy Data Center Technician

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Section 4: Programming

- Describe the basic concepts of structured programming
- Define a string and its use case
- Identify the use of loops in computer programming
- Define an array and the two different methods to assign values to an array

Section 5: Applications and Mathematics

- Identify operations for fractions, powers, percentages and how to convert between decimal, hexadecimal, binary, and octal number systems
- Recognize the basics of databases
- Define logic, probability, and graphs

Section 6: Web Development

- Describe the basics of web development

Duration

The course duration is approximately 36 hours when delivered synchronously by an educator. Detailed timings are provided in this document. Actual delivery times will vary from class to class and depending on the delivery format.

Intended audience

This introductory (level 100) course is intended for students of AWS Academy member institutions who are interested in data center technician (DCT) roles within a data center.

Student prerequisites

This is an entry-level course, but students should possess general knowledge of mechanical or electrical engineering.

Delivery methods

Learning materials are provided to support synchronous or asynchronous learning. PowerPoint slides and educator guides are provided for delivery by an educator through an in-person, online, or hybrid approach. Digital modules are provided for independent learning. The educator can determine the preferred delivery method for each module.

Educator prerequisites

Prior to teaching the course, it is highly recommended that educators complete the course and assessment, and receive the certificate of completion.

Course Outline

AWS Academy Data Center Technician

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Learning resources

- Lecture slides
- Instructor guides
- Digital training modules
- End-of-module online knowledge checks
- End-of-course online assessment

Course timing

This table provides the suggested durations for all course activities. Items that are not applicable are marked NA.

Module Number and Title	Lecture Duration (Minutes)	Knowledge Check Duration (Minutes)	Total Module Duration (Minutes)
Section 1: Hardware	**NA**	**NA**	**NA**
Module 1: Hardware Fundamentals	45	10	45
Module 2: Hardware Used to Work on Computers	30	10	40
Module 3: Motherboards	30	10	40
Module 4: Processors	30	10	40
Module 5: Memory	60	10	70
Module 6: Storage Drives	60	10	70
Module 7: Power Supplies	45	10	55
Module 8: Graphics Cards	45	10	55
Module 9: Hardware Peripherals	90	10	100
Section 2: Software	**NA**	**NA**	**NA**
Module 10: Operating System Fundamentals	90	10	100
Module 11: Operating System Installation	45	10	55
Module 12: Operating System Configuration	105	10	115
Module 13: Web Browsers	75	10	85
Module 14: File System	75	10	85
Module 15: Command Line	60	10	70
Module 16: Processing	60	10	70

Course Outline

AWS Academy Data Center Technician

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Module Number and Title	Lecture Duration (Minutes)	Knowledge Check Duration (Minutes)	Total Module Duration (Minutes)
Module 17: Memory Management	30	10	40
Module 18: Microsoft Office	45	10	55
Section 3: Networking	**NA**	**NA**	**NA**
Module 19: Networking Fundamentals	45	10	55
Module 20: Models and Protocols	60	10	70
Module 21: Network Links	75	10	85
Module 22: Physical Network	60	10	70
Module 23: Data Transmission	30	10	40
Module 24: IP and Subnetting	45	10	55
Section 4: Programming	**NA**	**NA**	**NA**
Module 25: Programming Fundamentals	90	10	100
Module 26: Strings	45	10	55
Module 27: Loops	30	10	40
Module 28: Arrays	60	10	70
Section 5: Applications and Mathematics	**NA**	**NA**	**NA**
Module 29: Mathematics Fundamentals	30	10	40
Module 30: Databases	105	10	115
Module 31: Logic, Probability, and Graphs	60	10	70
Section 6: Web Development	**NA**	**NA**	**NA**
Module 32: Web Development Fundamentals	60	10	70
Total Course Time	**1,815**	**320**	**2,135**

Course Outline

AWS Academy Data Center Technician

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Course contents

This list provides the sections within each module.

Section 1: Hardware

Module 1: Hardware Fundamentals

- Define a computer
- Differentiate between types of computers
- Define a program
- Knowledge check

Module 2: Hardware Used to Work on Computers

- Apply safety best practices when working with a computer
- Identify tools required for working with a computer
- Knowledge check

Module 3: Motherboards

- Identify components of a motherboard
- Remove and insert a motherboard
- Knowledge check

Module 4: Processors

- Define the functions of a processor
- Install and remove a processor
- Knowledge check

Module 5: Memory

- What is computer storage and why is it needed?
- Explain how memory functions within a computer
- Explain cache, access, and packaging
- Troubleshoot faulty random access memory (RAM) modules
- Knowledge check

Module 6: Storage Drives

- Differentiate the types of drives available: hard disk drive (HDD), solid state drive (SSD), Universal Serial Bus (USB), tape cartridge
- Explain the use case for each type of drive
- Insert and remove each type of drive
- Troubleshoot each type of drive
- Knowledge check

Module 7: Power Supplies

- Identify the use case of a PSU
- Install and remove a PSU
- Troubleshoot a PSU
- Knowledge check

Course Outline

AWS Academy Data Center Technician

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Module 8: Graphics Cards

- Define the functions of a graphics card
- Remove and install a graphics card
- Troubleshoot a graphics card
- Knowledge check

Module 9: Hardware Peripherals

- Differentiate the various types of keyboards
- Differentiate the various types of mice
- Differentiate the various types of monitors
- Explain the use case of serial ports
- Connect and configure a printer
- Connect and configure a scanner
- Knowledge check

Section 2: Software

Module 10: Operating System Fundamentals

- Explain the operating system architecture
- Differentiate between application software and system software
- Differentiate between Windows and Linux environments
- Explain the boot process of a computer
- Identify and explain the use cases of a graphical user interface (GUI)
- Identify and explain the use cases of a CLI
- Knowledge check

Module 11: Operating System Installation

- Explain how to install an OS
- Explain how to create disk partitions
- Differentiate between dual and single boot modes
- Knowledge check

Module 12: Operating System Configuration

- Add, configure, and edit a user account
- Install and update application software
- Troubleshoot application software
- Explain the use of device drivers
- Install and update device drivers
- Define what plug and play (PnP) means
- Identify the use case of a firewall
- Knowledge check

Course Outline

AWS Academy Data Center Technician

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Module 13: Web Browsers

- Install and configure various web browsers
- Use various search engines
- Create new bookmarks and categorize them into folders
- Back up and restore bookmarks
- Locate search history and bookmarks
- Knowledge check

Module 14: File System

- Identify common file types
- Manage files and directories
- Navigate the file system
- Describe how to mount and unmount file systems
- Identify common file system formats
- Knowledge check

Module 15: Command Line

- Navigate a Windows system with the command prompt
- Conduct common Windows tasks with the command prompt
- Navigate a Linux system with a command line
- Conduct common Linux tasks with a command line
- Knowledge check

Module 16: Processing

- Explain a PCB
- Identify various process states
- Explain the process lifecycle
- Configure process scheduling policies
- Knowledge check

Module 17: Memory Management

- Define process paging, segmentation, and virtual memory
- Differentiate between memory paging and swapping
- Knowledge check

Module 18: Microsoft Office

- Using Microsoft Outlook
- Using Microsoft Word
- Using Microsoft PowerPoint
- Knowledge check

Course Outline

AWS Academy Data Center Technician

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Section 3: Networking

Module 19: Networking Fundamentals

- Differentiate between switching and routing
- Identify components required to create a network
- Differentiate between a local area network (LAN), personal area network (PAN), metropolitan area network (MAN), and wide area network (WAN)
- Knowledge check

Module 20: Models and Protocols

- Explain each layer of the OSI model
- Explain the TCP/IP model
- Explain the function and stages of DHCP
- Explain the function of a DNS
- Knowledge check

Module 21: Network Links

- Identify copper networking cables
- Identify the various types of fibers and their use cases
- Identify the various types of optics and their use cases
- Describe how to correctly handle fiber and copper cables
- Troubleshoot fiber and copper network cables
- Knowledge check

Module 22: Physical Network

- Identify IT cabinets and frames
- Identify types of cable containment
- Identify types of structured wiring
- Compare types of fiber optical cabling
- Knowledge check

Module 23: Data Transmission

- Explain data encapsulation
- Explain data encryption and decryption use cases
- Knowledge check

Module 24: IP and Subnetting

- Differentiate the classes of IP addresses
- Define the function of network address translation (NAT)
- Calculate subnet masks
- Knowledge check

Course Outline

AWS Academy Data Center Technician

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Section 4: Programming

Module 25: Programming Fundamentals

- Differentiate between various programming languages
- Define the use case of pseudocode and comments
- Define a variable and its use case
- Assign a value to a variable
- Identify the control construct of a program
- Define the use case of a function
- Knowledge check

Module 26: Strings

- Define a string and its use case
- Assign a value to a string
- Modify the value assigned to a string
- Knowledge check

Module 27: Loops

- Identify and construct loops
- Describe continuous loops and breaks
- Knowledge check

Module 28: Arrays

- Recognize an array and its use case
- Assign values to an array
- Sort, search, and modify values within an array
- Define a multidimensional array
- Knowledge check

Section 5: Applications and Mathematics

Module 29: Mathematics Fundamentals

- Calculate fractions, powers, and percentages
- Convert and calculate binary, octal, and hexadecimal numbers
- Knowledge check

Module 30: Databases

- Explain the use case of a database
- Differentiate between a database and an Excel document
- Define the functions of a database schema
- Create a table within a database
- Differentiate between the various field properties
- Explain the relationship between primary and foreign keys
- Insert, update, and retrieve information using basic structured query language (SQL) queries
- Knowledge check

Course Outline

AWS Academy Data Center Technician

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Module 31: Logic, Probability, and Graphs

- Calculate “AND” and “IF…THEN” operators
- Count and calculate probabilities
- Differentiate between linear and quadratic graphs
- Assess and calculate graph data
- Knowledge check

Section 6: Web Development

Module 32: Web Development Fundamentals

- Explain the process for hosting a webpage
- Create and apply a style sheet to a webpage
- Construct a basic webpage using Hypertext Markup Language (HTML)
- Add images, videos, and hyperlinks to a webpage
- Knowledge check

Course Outline

AWS Academy Cloud Security Foundations

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Course version

This course outline applies to version 1.0 of AWS Academy Cloud Security Foundations in English.

Description

This course is designed to help students gain a foundational knowledge of cybersecurity principles and services for cloud computing through a guided hands-on approach. This course includes demonstrations, instructional guides, and real-life scenarios.

Curriculum objectives

Upon completion of this course, students will be able to do the following:

- Identify security benefits and responsibilities of using the Amazon Web Services (AWS) Cloud.
- Use the identity and access management features of AWS.
- Describe how to secure network access to AWS resources.
- Explain the available methods for encrypting data at rest and data in transit.
- Determine which AWS services can be used for monitoring and incident response.

Duration

The course duration is approximately 20 hours when delivered synchronously by an educator. This course is designed to be delivered over one semester. Actual delivery times will vary from class to class and depending on delivery format. This course must be delivered over a period of at least 4 weeks.

Intended audience

This fundamental (level 100) course is intended for students attending AWS Academy member institutions who seek a foundational understanding of cloud security concepts.

Student prerequisites

This course requires a strong foundation in IT concepts and skills. To ensure success in this course, students should have the following:

- Completed the AWS Academy Cloud Foundations course or have equivalent experience
- Worked with distributed systems
- Worked with multi-tier architectures
- Introduced to general networking concepts
- Introduced to cloud computing concepts

Course Outline

AWS Academy Cloud Security Foundations

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Delivery methods

Learning materials are provided to support synchronous or asynchronous learning. Lecture slides and an instructor guide are provided for instructor-led training. Recorded lectures and demos are provided for independent learning. The educator can determine the preferred delivery method for each module.

Educator prerequisites

This course does not have any prerequisites for educators. However, prior to facilitating this course, educators are recommended to complete this course, complete the AWS Academy Cloud Foundations course, and pass the AWS Certified Cloud Practitioner exam.

Learning resources

- Lecture slides
- Student guide
- Instructor guide
- Practical activities
- Lab exercises
- Instructor lab sandbox environment
- Recorded lectures
- Recorded demos
- Module knowledge checks
- Course assessment

Course timing

This table provides the suggested durations for all course activities. Note that the total classroom time for all the modules in this course is 1,200 minutes (20 hours). Items that are not applicable are marked NA.

Module Title	Lecture (Minutes)	Activity/Lab /Demo (Minutes)	Knowledge Check (Minutes)	Total Classroom Time (Minutes)	Recorded Lecture (Minutes)
Module 1: Welcome	40	20	NA	60	7
Module 2: Introduction to Security on AWS	60	20	20	100	25
Module 3: Securing Access to Cloud Resources	95	75	20	190	36
Module 4: Securing Your Infrastructure	95	90	20	205	30

Course Outline

AWS Academy Cloud Security Foundations

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Module Title	Lecture (Minutes)	Activity/Lab /Demo (Minutes)	Knowledge Check (Minutes)	Total Classroom Time (Minutes)	Recorded Lecture (Minutes)
Module 5: Protecting Data in Your Application	95	75	20	190	39
Module 6: Logging and Monitoring	95	110	20	225	21
Module 7: Responding to and Managing an Incident	95	75	20	190	24
Module 8: Bridging to Certification	40	NA	NA	40	8
Total Course Time	**615**	**465**	**120**	**1,200**	**190**

Module sections

This section lists the module sections in this course.

Module 1: Welcome

- Course prerequisites and objectives
- Course overview
- AWS Certified Security – Specialty certification
- Activity: AWS Documentation Scavenger Hunt

Module 2: Introduction to Security on AWS

- Security in the AWS Cloud
- Security design principles
- Shared responsibility model
- Activity: Shared Responsibility Model
- Knowledge check

Module 3: Securing Access to Cloud Resources

- AWS Identity and Access Management (IAM) fundamentals
- Authenticating with IAM
- Authorizing with IAM
- Examples of authorizing with IAM
- Demonstration: Amazon Simple Storage Service (Amazon S3) Cross-Account Resource-Based Policy
- Additional authentication and access management services

- Using AWS Organizations
- Lab: Using Resource-Based Policies to Secure an S3 Bucket
- Knowledge check

Module 4: Securing Your Infrastructure

- Structure of a three-tier web application
- Using a virtual private cloud (VPC)
- Setting up public and private subnets and internet protocols
- Using AWS security groups
- Using AWS network access control lists (ACLs)
- Using AWS load balancers
- Pulling it all together
- Protecting your compute resources
- Lab: Securing VPC Resources by Using Security Groups
- Knowledge check

Module 5: Protecting Data in Your Application

- Protect data at rest
- Amazon S3 protection features
- Protection through encryption
- Protect data in transit
- Best practices to protect data in Amazon S3
- Additional data protection services
- Lab: Encrypting Data at Rest by Using AWS Key Management Service (AWS KMS)
- Knowledge check

Module 6: Logging and Monitoring

- Importance of logging and monitoring
- Capture and collect
- Activity: Reading a Log File
- AWS services with built-in logs
- Monitor and report
- Best practices for logging and monitoring
- Additional AWS services for logging and monitoring
- Demonstration: AWS Security Hub
- Lab: Monitoring and Alerting with AWS CloudTrail and Amazon CloudWatch
- Knowledge check

Module 7: Responding to and Managing an Incident

- Identifying an incident
- AWS services that support the discovery and recognition phase
- AWS services that support the resolution and recovery phase
- Best practices for handling an incident
- Lab: Remediating an Incident by Using AWS Config and AWS Lambda
- Knowledge check

Course Outline

AWS Academy Cloud Security Foundations

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Module 8: Bridging to Certification

- Continuing on the AWS Academy Security learning path
- AWS documentation and frameworks

Building a Data Pipeline to Support Analyzing Clickstream Data with AWS

AWS Academy Lab Project Outline

Project version

This outline applies to version 1.0 of the Building a Data Pipeline to Support Analyzing Clickstream Data with AWS lab project in English.

Description

Throughout various AWS Academy courses, students have completed hands-on labs. These labs included step-by-step guidance to build lab-specific applications by using AWS services and features.

In this project, students are challenged to use AWS services to build a data analytics pipeline to analyze website clickstream data without step-by-step guidance. The pipeline must reflect the principles of the AWS Well-Architected Framework and be able to ingest, transform, analyze, and visualize data to produce meaningful insights for businesses to make informed decisions. Specific sections of the assignment are meant to challenge students on skills that they have acquired throughout the learning process.

Learning objectives

Upon completion of this project, students will be able to do the following:

- Deploy a data analytics pipeline on AWS that supports the analysis of website clickstream data.
- Transform clickstream data before it arrives in the visualization layer.
- Use AWS services to analyze clickstream data.
- Design a dashboard reporting mechanism for clickstream data analysis.
- Adjust the data analytics pipeline.

Duration

The duration will vary depending on how educators integrate this project into course activities and can be from one week to one semester. The project includes the following:

- Planning activities, such as creating an architectural diagram and a cost estimate of what students will build.
- Implementation time to build the solution. Building the solution in the lab environment is anticipated to take a student 8–12 hours.
- Post-build activities, such as creating a presentation or recording a demo to share the solution with the educator and other students.

To spread out the work throughout a semester, educators can divide the project work time between planning activities and implementation and then have students present their project. Educators can also choose to have students plan, implement, and present their solutions within a single week or two.

Intended audience

This project is intended for students who attend AWS Academy member institutions, seek to gain work-based experience, and are interested in developing a career as a data engineer, data integration specialist, or data scientist.

Student prerequisites

To ensure success with this project, students are strongly recommended to have the following:

- Completed the AWS Academy Cloud Foundations course or have equivalent experience
- Completed the AWS Academy Data Engineering course or have equivalent experience
- Worked with Structured Query Language (SQL), Apache httpd web server, Linux (Bash), SSH, and HTML (Note: This experience would be helpful but is not mandatory.)

Educator prerequisites

This project does not have any prerequisites for educators. However, prior to facilitating the project, educators are recommended to complete this project, complete the AWS Academy Cloud Foundations course, and complete the AWS Academy Data Engineering course.

Delivery methods

Learning materials are provided to support in-person or online synchronous delivery. Educators can determine the level of scaffolding to provide, such as using a guided approach or having students complete the project with limited instructor support.

Learning resources

- Instructor guide
- Grading rubric
- Lab instructions
- Lab environment
- Knowledge check
- Showcase presentation template

AWS Academy Learner Lab

Educator Guide

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Table of contents

Purpose

This document provides educators with instructions for using AWS Academy Learner Labs.

AWS Academy Learner Labs offer a **long-running lab environment** that is suitable for student projects over a period designated by the educator. AWS Academy educators can create Learner Lab classes and add learners. Academy Learner Labs are independent from other AWS Academy courses, and educators can use this environment with their learners.

Each learner in a Learner Lab class has a **$100 USD AWS platform credit** to use for the duration of the class. Within this class, learners have access to a restricted set of AWS services (see the **Resources** area of the AWS Academy Portal for the list) for educator-designed project work, lab exercises, or practice. Not all AWS documentation walkthroughs or sample labs that operate in an AWS production account will work in the Learner Lab environment. Services that students deploy are available until the end date designated by the educator or when the credit has exceeded $100 USD.

Each session lasts for 4 hours by default, although students can extend a session to run longer by choosing **Start Lab** to reset the session timer. At the end of each session, any resources that a learner created will persist. However, Amazon Elastic Compute Cloud (Amazon EC2) instances are automatically shut down. Other resources, such as Amazon Relational Database Service (Amazon RDS) instances, continue running. Keep in mind that some AWS features can incur charges between sessions (for example, a load balancer or NAT gateway). Learners might want to delete those types of resources at the end of a session and then re-create them as needed.

Learners have access to this environment for the duration of the class that they are enrolled in. When the class ends, learner access to the Learner Lab environment also ends.

AWS Academy Learner Lab

Educator Guide

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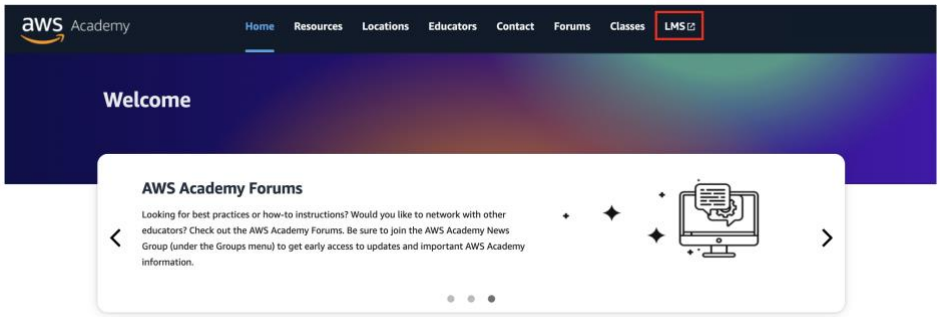
How to create and access a Learner Lab

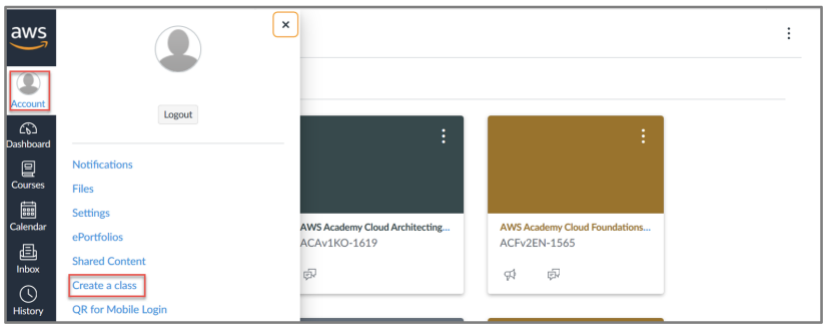
Note:

- These instructions are also available in Canvas in the Educator Getting Started with AWS Academy course. In the **Guides: Working with Students (optional)** section, see **How to Create and Delete a Class**.
- You must complete the Educator Getting Started with AWS Academy course in the AWS Academy LMS before you are able to create a class or Learner Lab.

1. Log in to the AWS Academy Portal and navigate to the LMS.



2. In the navigation pane, choose **Account** > **Create a class**.



3. For **Course**, choose **AWS Academy Learner Lab** and fill in the remaining fields. You are notified by email when the course is available to teach.

AWS Academy Learner Lab

Educator Guide

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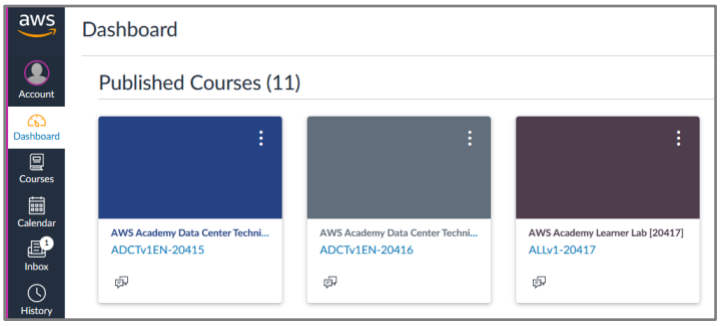
How to add students to a Learner Lab

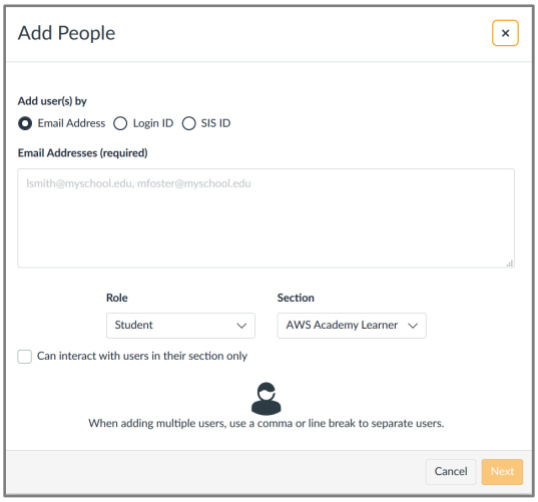
Note: These instructions are also available in Canvas in the Educator Getting Started with AWS Academy course. In the **Guides: Working with Students (optional)** section, see **How to Add Students to the AWS Academy LMS (Canvas)**.

1. From the **Dashboard**, locate the Learner Lab course that you created.

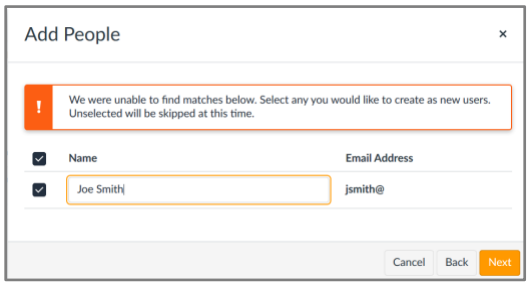


2. In the navigation menu, choose **People**.

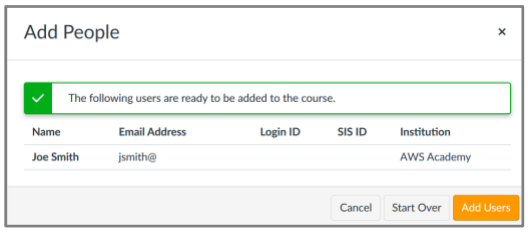
3. Choose **+ People** in the upper-right corner of the page.
4. Provide a comma-separated list of student email addresses, and choose **Next**.



5. Fill in the names of students as needed, and then choose **Next**.



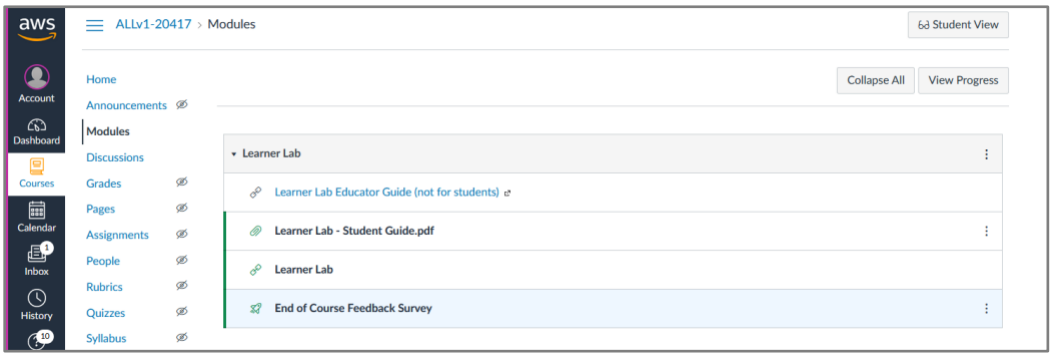
6. Confirm the information, and then choose **Add Users**.



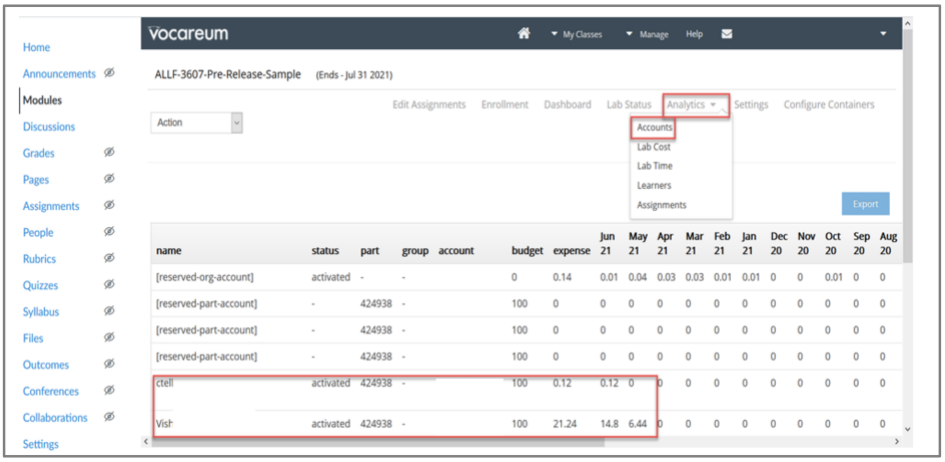
How to track spending and activity in a Learner Lab

Note: These instructions are also available in Canvas in the Educator Getting Started with AWS Academy course. In the **Guides: Managing Lab Exercises (optional)** section, see **How to View a Student's Lab Cost** and **How to View a Student's Lab Time**.

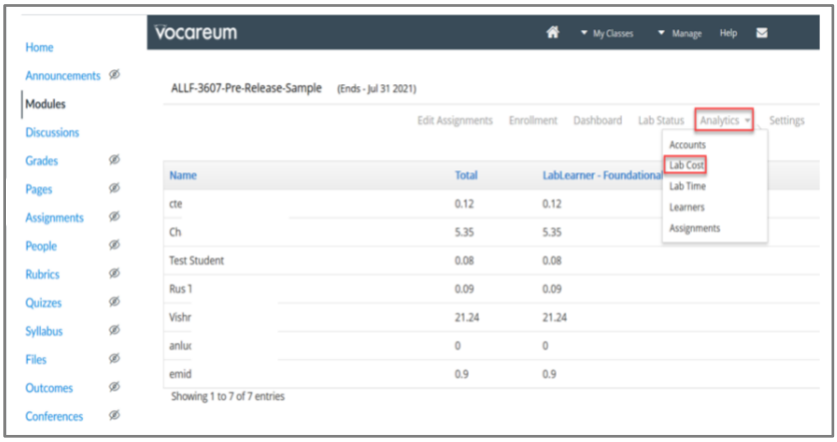
1. In the navigation pane, choose **Courses**, and then choose **Modules**.
2. Choose the link for the Learner Lab that you want to track spending or activity for.



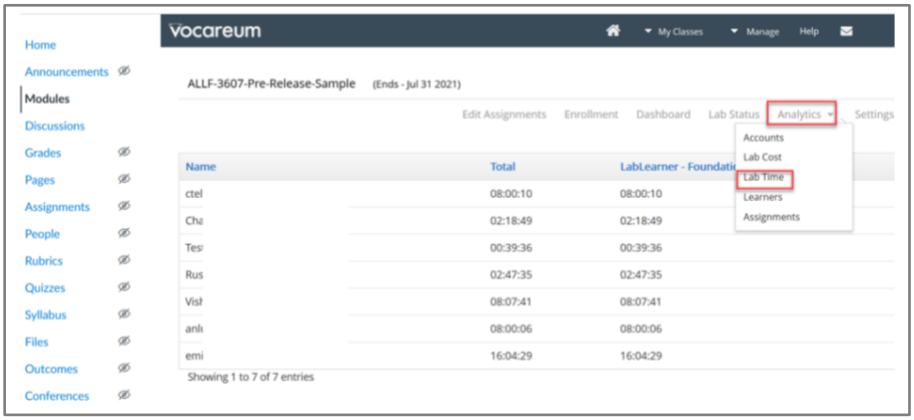
3. Choose **Analytics**, and then choose the option for the report you want to see.
   - For an overview of spending by student per month, choose **Accounts**.



   - For a report of spending by student, choose **Lab Cost**.



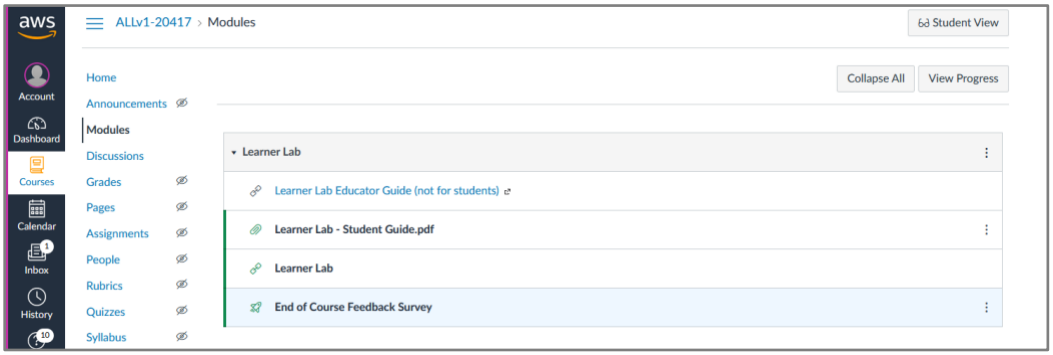
- For a report of the time that a student used the lab environment, choose **Lab Time**. **Note:** If a student exits the lab environment without choosing **End Lab**, it might appear that the student spent more time using the environment than they actively did.



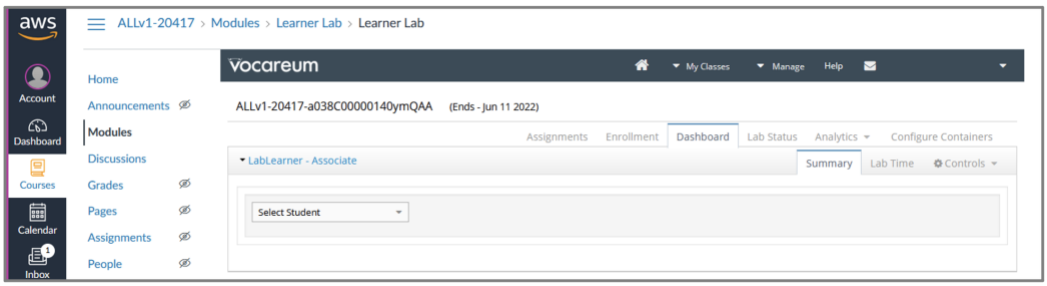
How to view the spend summary for an individual student

Note: These instructions are also available in Canvas in the Educator Getting Started with AWS Academy course. In the **Guides: Managing Lab Exercises (optional)** section, see **How to View a Student's Lab Cost**.

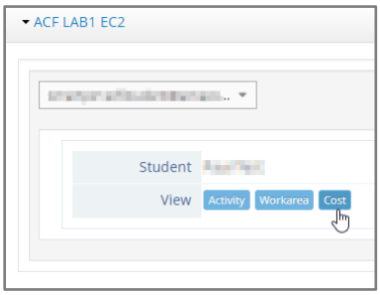
1. In the navigation pane, choose **Courses**, and then choose **Modules**.
2. Choose the link for the Learner Lab that you want to track spending for.



3. From the dropdown menu, select the student who you want to track spending for.



4. Choose **Cost**.



A detailed description is displayed of the services used and their costs.

/ [redacted] / 290130 / vc_2_0_04022019org237_17 / 4319 / 721207104099

1	2019-4	Item Description	Cost
2		APS2-BoxUsage:t2.small	$0.001517
3		APS2-BoxUsage:t2.micro	$0.003885
4		APS2-EBS:VolumeUsage.gp2	$0.000512
5	2019-4 subtotal		$0.005914

AWS Academy Learner Lab

Educator Guide

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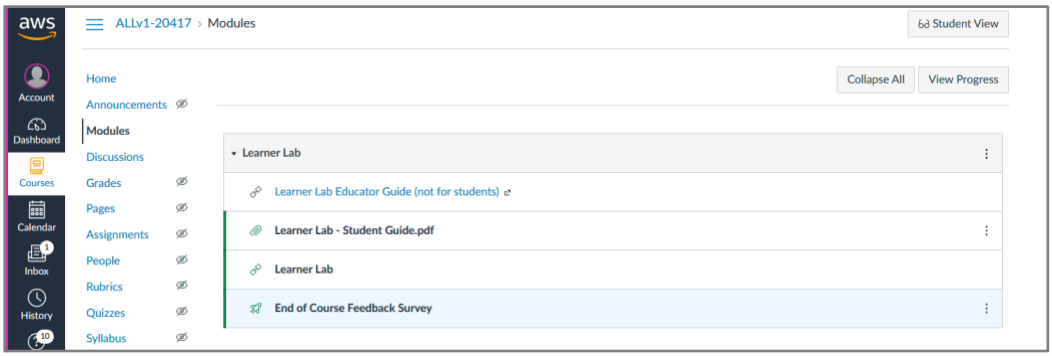
How to view and troubleshoot a student's lab workarea

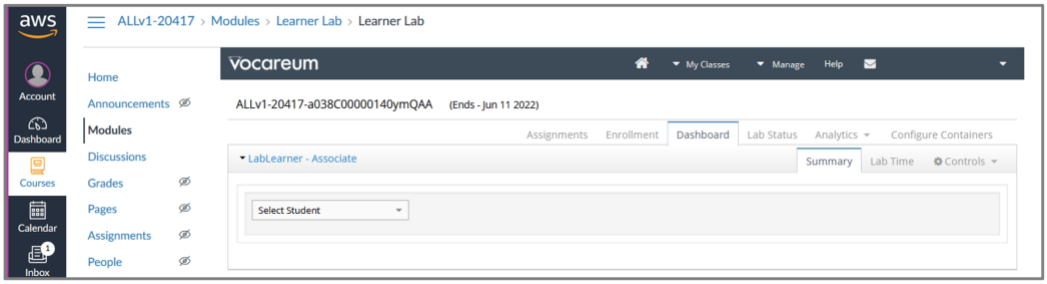
You can log in to the AWS Management Console with a student's lab environment account while they are completing a lab exercise. This allows you to see everything that the student has configured so you can help them to troubleshoot.

Note: These instructions are also available in Canvas in the Educator Getting Started with AWS Academy course. In the **Guides: Managing Lab Exercises (optional)** section, see **How to Troubleshoot a Student's Lab Workarea**.

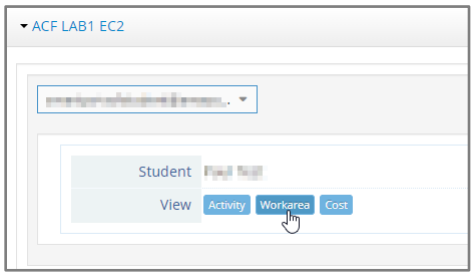
1. In the navigation pane, choose **Courses**, and then choose **Modules**.
2. Choose the link for the Learner Lab that you want to troubleshoot.



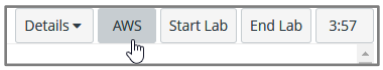
3. From the dropdown menu, select the student whose lab workarea you want to access.



4. Choose **Workarea**.



5. To open the AWS Management Console, choose **AWS**.



   You are logged in to the console and can see everything that the student has configured.

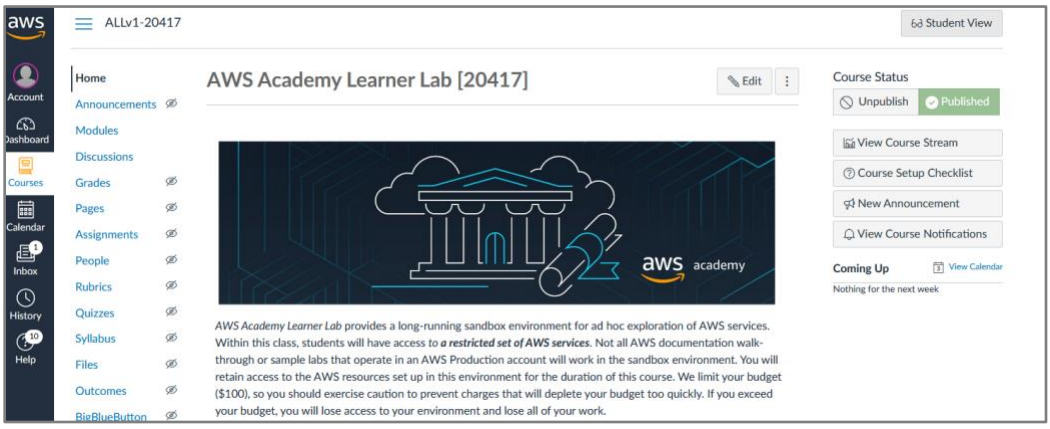
6. When you are finished viewing the student's lab workarea, choose **Modules** in the navigation menu to return to the course as a teacher.

How to view a Learner Lab in Student View

In a Canvas course, you can switch to Student View to navigate the course as a student.

Note: These instructions are also available in Canvas in the Educator Getting Started with AWS Academy course. In the **Guides: Working with Students (optional)** section, see **How to View a Course as a Student**.

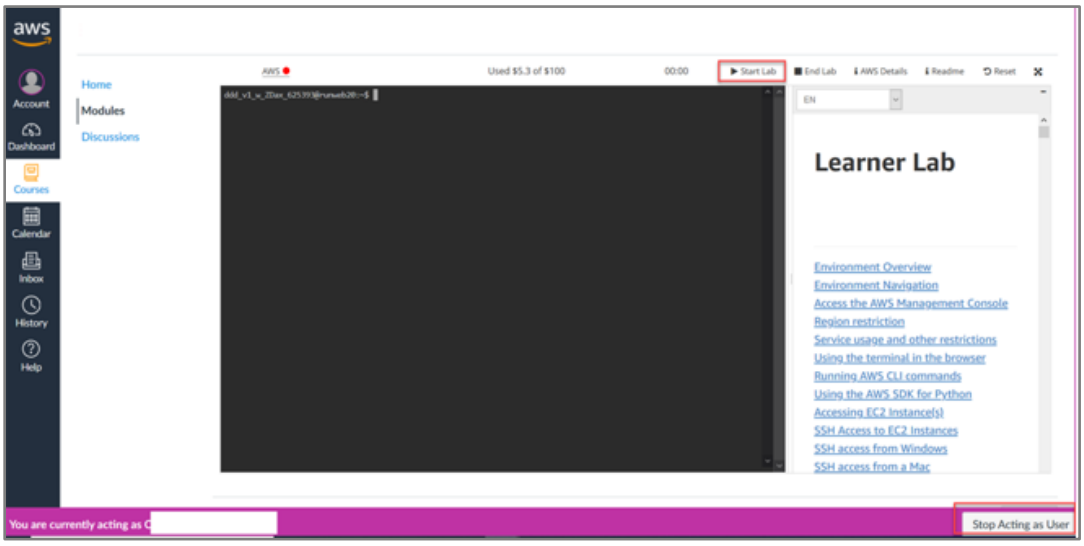
1. To switch to Student View, from a course's home page, choose **Student View** in the upper-right corner. A purple border appears around the page to indicate that you are in Student View.



2. In the navigation menu, choose **Modules**, and then choose the link for the Learner Lab that you want to view.

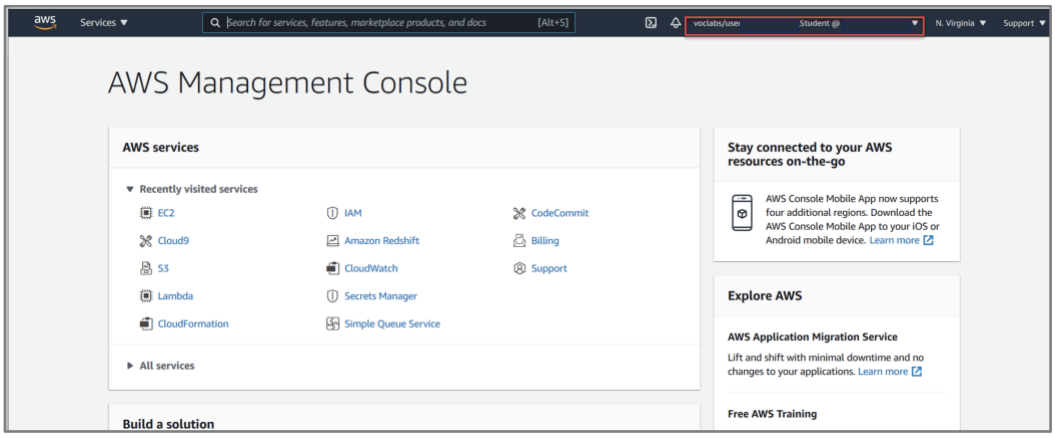
   You are now in the lab environment as the student. **Note:** If this is the first time that you have used the Student View, you might need to refresh the page to see and accept the terms and conditions.

3. To start the lab, choose **Start Lab**.

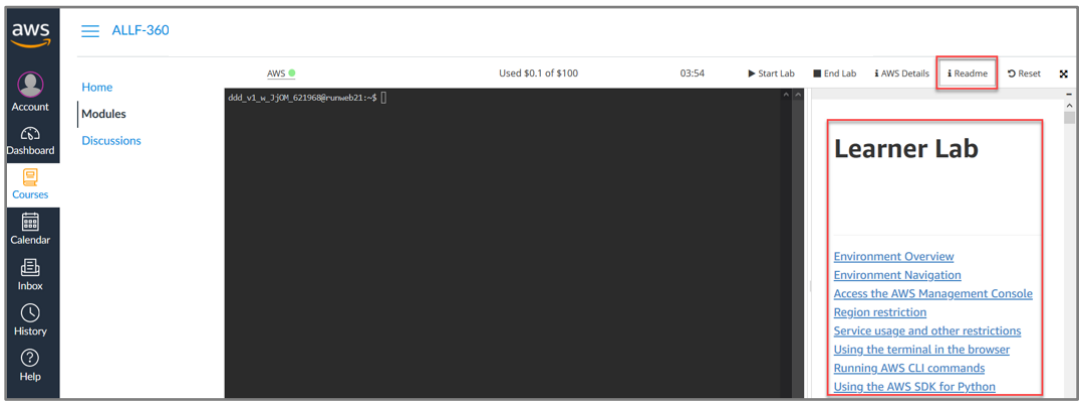


4. To access the AWS Management Console, after the lab starts, choose **AWS**.

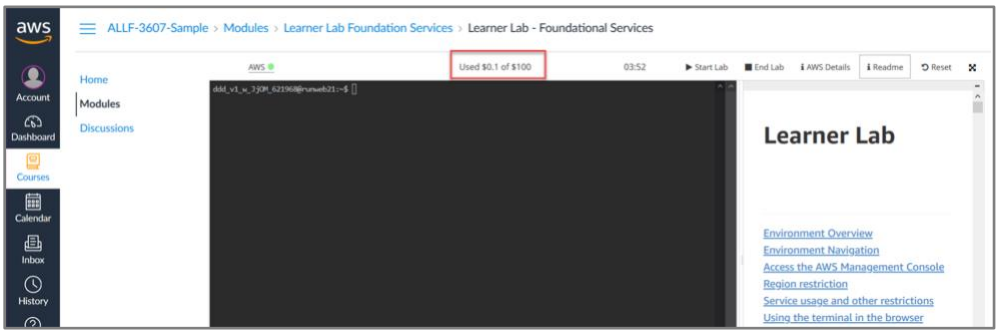
You are transparently logged in to a temporary AWS account, which you can use as long as the lab session timer is active.



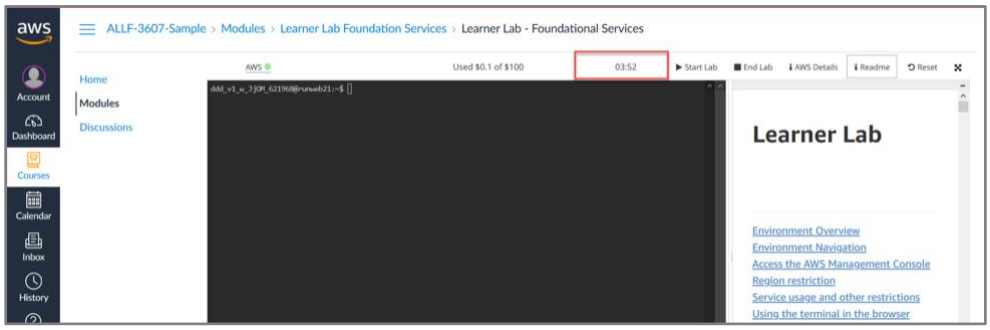
5. To see the lab instructions, return to the LMS and choose **Readme**.



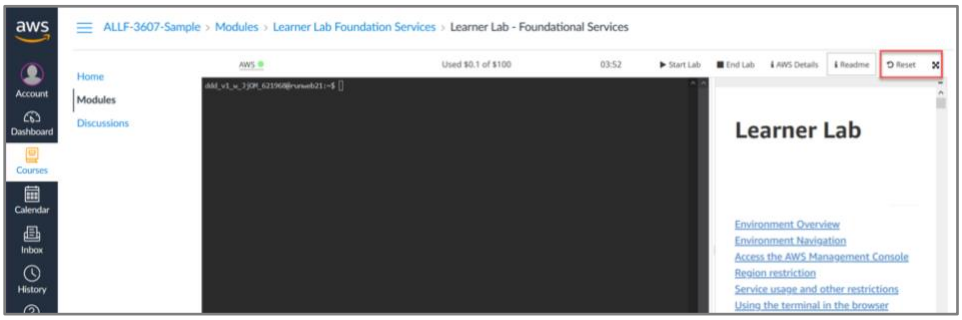
6. To monitor spending, see the area at the top of the lab instructions. **Note:** This information is provided by the AWS Budgets service and might be delayed by up to 8 hours. This is an approximate view of spending.



7. To monitor your remaining session time, see the area at the top of the lab instructions. **Note:** If you are actively working and need more time, choose **Start Lab** again to reset your session timer.



8. To delete all resources that you have configured in a lab and start with a fresh AWS account, choose **Reset**. **Important: All work will be lost and cannot be recovered.**



9. When you are finished with the session, choose **End Lab**.

   Any running Amazon Elastic Compute Cloud (Amazon EC2) instances will be stopped. If you return and restart the lab, any stopped EC2 instances will restart and any other resources that you configured will still be available.

AWS Academy Learner Lab

Educator Guide

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How to effectively use the Academy Learner Labs

The Academy Learner Lab course provide acces to the AWS Academy Learner Labs – Compliance and Security Module. This module is designed to help educators and learners gain knowledge of compliance and security responsibilities that should be followed when using AWS services through the AWS Academy Learner Labs. Educators and learners have access to lecture materials, and to one optional online knowledge check.

Module objectives

Upon completion of this module, learner will be able to do the following:

- Identify features and compliance guidelines of the AWS Academy Learner Labs.
- Identify the AWS shared responsibility model.
- Identify a set of the AWS security best practices.
- Recognize AWS Academy Learner Labs compliance and security best practices.
- Identify where to find AWS security resources.

Duration

Approximately 20 minutes. The module is designed to be reviewed before using the AWS Academy Learner Labs. It is highly recommended educators require learners to review the module content and complete the module assessment before starting the AWS Academy Learner Labs.

Intended audience

This compliance module is intended for learners attending AWS Academy member institutions who want to use AWS Academy Learner Labs for projects over a period designated by the educator. AWS Academy encourage educators and learners to review this module to learn how to effectively use the AWS Academy Learner Labs.

Learner prerequisites

This module does not have any prerequisites. However, prior to working in the AWS Academy Learner Labs, learners are recommended to complete this module, and complete the AWS Academy Cloud Foundations course.

Delivery methods

Learning materials are provided to support synchronous, asynchronous and independent learning. The educator can determine the preferred delivery method for this module.

Educator prerequisites

This module does not have any prerequisites for educators. However, prior to facilitating an AWS Academy Learner Labs, educators are recommended to complete this module, complete the AWS Academy Cloud Foundations course, and pass the AWS Certified Cloud Practitioner exam.

Learner resources

- Lecture slides and one optional module knowledge check.

AWS Academy Learner Lab

Educator Guide

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Module sections

This section lists the topics covered in this module.

Section 1: AWS Academy Learner Labs overview

- AWS Academy Learner Labs environment features
- AWS Academy Learner Labs compliance information

Section 2: AWS Shared Responsibility Model

- Shared responsibility model
- Responsibility for security in the cloud
- Responsibility for security of the cloud

Section 3: AWS Security Best Practices

- Using VPCs to secure resources
- Protecting Compute resources
- Protecting Storage resources

Section 4: AWS Academy Learner Labs best practices

- Best practices to avoid permissions errors
- Best practices to preserve Lab budget

Section 5: Additional resources

- AWS documentation
- AWS security training.

AWS Academy Learner Lab

Service Information

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Last updated:18/May/2023
Version: 2.0

Purpose

The restrictions described in this document apply for your use of the AWS Academy Learner Lab.

Region restrictions

All service access is limited to the us-east-1 and us-west-2 Regions unless mentioned otherwise in the service details below. If you load a service console page in another AWS Region you will see access error messages.

Service usage and other restrictions

The following services are available in Learner Labs. Specific limitations apply as documented, and AWS services and service restrictions are subject to change.

Amazon API Gateway

- This service can assume the LabRole IAM role.

AWS App Mesh

AWS Application Auto Scaling

- This service can assume the LabRole IAM role.

AWS AppSync

Amazon Athena

- This service can assume the LabRole IAM role.

Amazon Aurora

AWS Backup

AWS Batch

- This service can assume the LabRole IAM role.

AWS Certificate Manager (ACM)

AWS Cloud9

- This service can assume the LabRole IAM role.
- Supported instance types: nano, micro, small, medium, large, and c4.xlarge.
- **Tip**: When creating a new Cloud9 instance with the *New EC2 instance* environment type, in *Network settings* choose **Secure Shell (SSH)**

AWS CloudFormation

- This service can assume the LabRole IAM role.

Amazon CloudFront

- This service can assume the LabRole IAM role.

Amazon CloudSearch

AWS CloudShell

AWS CloudTrail

- This service can assume the LabRole IAM role.
- You can create a CloudTrail, but you cannot enable CloudWatch logging for the trail.

Amazon CloudWatch

AWS CodeCommit

- This service can assume the LabRole IAM role.

AWS CodeDeploy

- This service can assume the LabRole IAM role.

AWS Config

AWS Cost and Usage Reports

AWS Cost Explorer

AWS Data Pipeline

- This service can assume the LabRole IAM role.
- Tip: If you see a warning that data pipeline:GetAccountLimits cannot be performed, you can ignore it. Also, when creating a pipeline, choose LabRole as the pipeline role and if applicable, choose LabInstanceProfile as the EC2 instance role.

AWS DeepComposer

AWS DeepLens

AWS DeepRacer

- This service can assume the LabRole IAM role.

AWS Directory Service

Amazon DynamoDB

- This service can assume the LabRole IAM role.

Amazon EC2 Auto Scaling

- This service can assume the LabRole IAM role.
- Supported instance types: nano, micro, small, medium, and large.
- Read the *Concurrently running instances limits* details documented in the EC2 service details below to be aware of further restrictions.
- Recommendation: size to your actual need to avoid using up your lab budget.

AWS Elastic Beanstalk

- This service can assume the LabRole IAM role.
- To create an application: choose **Create Application**, give it an application name, choose a platform, then choose **Configure more options**. Scroll down to the Security panel and choose **Edit**. For Service role, choose **LabRole**. If the environment is in the us-east-1 AWS Region, for EC2 key pair, choose **vockey** and for IAM *instance profile*, choose **LabInstanceProfile**. Choose **Save**, then choose **Create app**.
- Supported instance types: nano, micro, small, medium, and large. If you attempt to launch a larger instance type, it will be terminated.

Amazon Elastic Block Store (Amazon EBS)

- Maximum volume size is 100 GB.
- PIOPs not supported.

Amazon Elastic Compute Cloud (Amazon EC2)

- This service can assume the LabRole IAM role.
- Supported AMIs:
  - AMIs available in us-east-1 or us-west-2. For example, Quickstart AMIs, My AMIs, and Community AMIs.
  - AWS Marketplace AMIs are not supported.
  - AMIs such as MacOS that must launch as a dedicated instance or on a dedicated host are also not supported.
  - Recommendation**:** To launch an instance with a guest OS of ***Microsoft Windows***, ***Amazon Linux***, or one of many other popular Linux distribution, choose "**Launch instances"**, then choose from the ones available in the "Quick Start" tab.
- Supported instance types: nano, micro, small, medium, and large.
- Only On-Demand Instances are supported.
- *Concurrently running instances limits* per supported region:
  - Maximum of 9 concurrently running EC2 instances, regardless of instance size. If you attempt to launch more, the excess instances will be terminated (and nine will be left running).
  - Note**:** Services such as Amazon EMR, AWS Cloud9, and Elastic Beanstalk can launch EC2 instances. The 9 concurrent running EC2 instances limit applies across all services that create instances visible in the EC2 console.
  - Maximum of 32 vCPUs used by concurrently running instances, regardless of instance size or instance count. For example, t2.micro instances use 1 vCPU each, so you could run up to 32 of them in us-west-2 (but still only 9 of them in us-east-1 because of the other limitation listed above).

  - Note**:** The maximum 32 vCPUs limit also applies across all services that create instances visible in the Amazon EC2 console.
  - **Caution:** Any attempt to have 20 or more concurrently running instances (regardless of size) will result in *immediate* deactivation of the AWS account and all resources in the account will be immediately deleted.
  - *Recommendation***:** size to your actual need to avoid using up your cost budget.
- EBS volumes - sizes up to 100 GB and type must be General Purpose SSD (`gp2`, `gp3`) cold HDD (`sc1`), or standard.
- Key pairs - If you are creating an EC2 instance in any AWS Region other than us-east-1, the vockey key pair will not be available. In such cases, you should create a new key pair and download it when creating the EC2 instance. Then use the new key pair to connect to that instance.
- A role named **LabRole** and an instance profile named **LabInstanceProfile** have been pre-created for you. You can attach the role (via the instance profile) to an EC2 instance when you want to access an EC2 instance (terminal in the browser) using AWS Systems Manager Session Manager. The role also grants permissions to any applications running on the instance to access many other AWS services from the instance.
- **Tips:**
  - When your session ends, the lab environment may place any running instances into a 'stopped' state.
  - When you start a new session, the lab environment will start all instances that were previously stopped by you or stopped by the lab environment when the lab session ended.
  - Instances that have been stopped and started again will be assigned a new IPv4 public IP address unless you have an elastic IP address associated with the instance.
- **Recommendations:**
  - To preserve your lab budget, stop any running EC2 instances before you are done using the account for the day (and terminate them if not longer needed).
  - Be aware of all instances you keep in the account between sessions because they will run (and cut into your budget) when you start the lab again unless you remember to turn stop them manually after starting the lab.

Amazon Elastic Container Registry (Amazon ECR)

- The LabRole IAM role has read-only access to this service and as a console user you have write access to this service.

Amazon Elastic Container Service (Amazon ECS)

- Supported instance types: nano, micro, small, medium, and large.
- To avoid permissions errors, be sure to set *LabRole* as the role to use wherever you are prompted to specify a role. For example, as the task role and task execution role when creating a task definition.
- Tip: If you see a message when creating a cluster that the ECS service linked role could not be assumed, choose the back button and then try again. This sometimes happens if the service linked role does not yet exist in your account.

Amazon Elastic File System (Amazon EFS)

- This service can assume the LabRole IAM role.

Amazon Elastic Inference

Amazon Elastic Kubernetes Service (Amazon EKS)

- This service can assume the LabRole IAM role.
- Supported instance types: nano, micro, small, medium, and large.

Elastic Load Balancing (ELB)

- This service can assume the LabRole IAM role.

Amazon EMR

- This service can assume the LabRole IAM role.
- Supported instance types: nano, micro, small, medium, and large. If you attempt to launch a larger instance type, it will be terminated.
- Tip: If you have any trouble successfully launching a cluster, try using the m4.large instance type.
- Maximum of 32 vCPUs used by concurrently running EC2 instances in an AWS Region. Note that you cannot launch more than 9 instances (of any size) in a Region at once.
- **Note**: An EMR cluster will not continue to work if your session ends and then you start a new lab session. In Learner Labs, session end causes the EC2 instances that the EMR cluster uses to be stopped, and stopping an EMR cluster is not supported (by AWS). *Recommendation*: write EMR job results to S3 if you need to preserve your results, before you end your current Learner Labs session, then read the results back into a new EMR cluster as needed when you start your next Learner Labs session.

Amazon ElastiCache

Amazon EventBridge

AWS Fargate

- This service can assume the LabRole IAM role.

Amazon Forecast

- This service can assume the LabRole IAM role.

AWS Glue

- This service can assume the LabRole IAM role.

AWS Glue DataBrew

- This service can assume the LabRole IAM role.

Amazon GuardDuty

AWS Health

AWS Identity and Access Management (IAM)

- Extremely limited access. You cannot create users or groups. You cannot create roles, except service-linked roles.
- Service role creation is generally permitted. If the service needs to create a role for you, you might need to retry role creation if it fails the first time.
- A role named ***LabRole*** has been pre-created for you. This role is designed to be used when you want to attach a role to a resource in an AWS service. The role grants many AWS services access to other AWS services and has permissions similar to the permissions that you have as a user in the console.
    - Example use: Attach the *LabRole* through the instance profile named *LabInstanceProfile* to an EC2 instance for terminal in the browser access to an EC2 instance guest OS by using AWS Systems Manager Session Manager.
    - Another example: Attach the *LabRole* to a Lambda function so that the Lambda function can access Amazon S3, CloudWatch, Amazon RDS, or another service.
    - Another example: Attach the *LabRole* to a SageMaker notebook instance so that the instance can access files in an S3 bucket.

AWS IAM Access Analyzer

Amazon Inspector

AWS IoT 1-Click

AWS IoT Analytics

- This service can assume the LabRole IAM role.

AWS IoT Core

- This service can assume the LabRole IAM role.

AWS IoT Greengrass

Amazon Kendra

- This service can assume the LabRole IAM role.

AWS Key Management Service (AWS KMS)

- This service can assume the LabRole IAM role.

Amazon Kinesis

- If you create an Amazon Kinesis Data Analytics Studio notebook, choose "*Create with custom settings*". Then, choose **LabRole** in the IAM settings area.
- If you create an Amazon Kinesis Delivery Stream, choose *"Advance settings"*. Then, choose to use **LabRole**.

Amazon Kinesis Video Streams

AWS Lambda

- **Tip:** Attach the existing *LabRole* to any function that you create, if that function will need permissions to interact with other AWS services.

Amazon Lex

- This service can assume the LabRole IAM role.

Amazon Machine Learning (Amazon ML)

AWS Marketplace Subscriptions

- Extremely limited read-only access.

AWS Mobile Hub

Amazon Neptune

- Supported instance types: nano, micro, small, and medium (Tip: choose *Burstable classes* to find these).
- Supported storage types: EBS volumes - size up to 100 GB and type General Purpose SSD (gp2). PIOPS storage types are not supported.
- On-Demand DB instance class types only.
- ***Enhanced monitoring is not supported*** (you must *uncheck* this default setting in the *Additional configuration / Monitoring* panel).
- **Tip**: to preserve your lab budget, stop any running Neptune instances before you are done using the account for the day (or terminate them if not longer needed).

AWS OpsWorks

Amazon Personalize

- This service can assume the LabRole IAM role.

Amazon QuickSight

- This service can assume the LabRole IAM role.
- Only Standard edition is supported.
- Only Athena and S3 are supported as data sources. Verify that you have defined an Athena workgroup before you sign up for a QuickSight account.
- **Tip:** When creating the account, choose *Standard*. Ignore the warning "This IAM user or role may not have all the correct permissions...". After connecting to the QuickSight account, go to the IAM console and add the AmazonS3FullAccess policy to the aws-quicksight-service-role-v0 role.

Amazon Redshift

- This service can assume the LabRole IAM role.
- Supported instance type: dc2.large
- Supported cluster size: maximum two instances

Amazon Rekognition

- This service can assume the LabRole IAM role.

Amazon Relational Database Service (Amazon RDS)

- This service can assume the LabRole IAM role.
- Supported database engines: Amazon Aurora, Oracle, Microsoft SQL, MySQL, PostgreSQL, and MariaDB. Note: if you are creating an RDS instance using a CloudFormation template, be sure to specify the engine type using lower-case letters.
- Supported instance types: nano, micro, small, and medium. (**Tip:** choose *Burstable* classes to find these).
- Supported storage types: EBS volumes, size up to 100 GB and type General Purpose SSD (gp2). PIOPS storage types are not supported.
- Only On-Demand DB instance class types are supported.
- Enhanced monitoring is not supported (you must uncheck this default setting in the Additional configuration / Monitoring panel).
- **Tip:** To preserve your lab budget, stop any running RDS instances before you finish using the account for the day (or terminate them if no longer needed).
- **Caution**: When a lab session ends, the lab environment may not stop an RDS instance or cluster that you leave running. Also, even if you do stop an RDS instance, if you leave it stopped for seven days, AWS will start it again automatically, which will increase the cost impact.

AWS Resource Groups & Tag Editor

- This service can assume the LabRole IAM role.

AWS RoboMaker

- This service can assume the LabRole IAM role.
- Supported instance types for development environments: nano, micro, small, medium, large, and c4.xlarge.

Amazon Route 53

- You cannot register a domain.

Amazon SageMaker

- This service can assume the LabRole IAM role.
- You can create SageMaker Notebook instances.
  - Supported instance types: medium, large, and xlarge.
  - GPU instance types are not supported.
- Only some of the features within SageMaker Studio are supported.
  - **Note**: To launch SageMaker Studio, choose *Launch SageMaker Studio*. Accept the default user profile, and specify LabRole as the execution role, then choose *Submit*. You will receive two not authorized messages because we cannot give you iam:CreateRole access in Learner Labs. However, the SageMaker Domain will still be created and you can still access SageMaker Studio after a few minutes if you navigate to the SageMaker *Control panel*, and from the Launch app menu next to the user you created, choose *Studio*. This will open SageMaker Studio. From this screen, you can open resources such as a Python 3 Notebook, Python 3 Console, or Image terminal.
  - Supported instance types: medium, large, and xlarge only.
  - Some SageMaker JumpStart projects require more access permissions than we can grant in Learner Labs.
- There is limited support for **SageMaker Canvas** features.
  - In the Setup SageMaker Domain screen, choose Quick setup, and in the User profile panel choose LabRole as the role to use. Also, be sure to turn off the Enable SageMaker Canvas permissions. You will observe numerous AccessDeniedException warning, because we cannot give you iam:CreateRole access in Learner Labs. However, the SageMaker Domain will still be created and should be able to access SageMaker Canvas after a few minutes if you choose the Canvas link under Control panel in the SageMaker left side menu.
- Tips:
  - When your session ends, the lab environment may place any running SageMaker notebook instances into a 'stopped' state. Stopped SageMaker notebook instances will not be automatically restarted when you start a new session.
  - To preserve your lab budget when using SageMaker Canvas, logout of the session when you are done working with it.

AWS Secrets Manager

- This service can assume the LabRole IAM role.

AWS Security Hub

AWS Security Token Service (AWS STS)

AWS Serverless Application Repository

AWS Service Catalog

- This service can assume the LabRole IAM role.

Amazon Simple Notification Service (Amazon SNS)

- This service can assume the LabRole IAM role.

Amazon Simple Queue Service (Amazon SQS)

- This service can assume the LabRole IAM role.

Amazon Simple Storage Service (Amazon S3)

- This service can assume the LabRole IAM role.

Amazon Simple Storage Service Glacier (S3 Glacier)

- You cannot create a vault lock

Amazon Simple Workflow Service (Amazon SWF)

AWS Step Functions

AWS Storage Gateway

AWS Systems Manager

- A role named *LabRole* and an instance profile named *LabInstanceProfile* have been pre-created for you. You can attach the role (through the instance profile) to an EC2 instance when you want to access an EC2 instance (terminal in the browser) using AWS Systems Manager Session Manager.

Amazon Textract

Amazon Timestream

AWS Trusted Advisor

Amazon Virtual Private Cloud (Amazon VPC)

AWS WAF

AWS Well-Architected Tool

AWS X-Ray

Readiness Rubic

AWS Academy

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Rubric version

This is version 1.0 of AWS Academy Readiness Rubric.

Description

This process assists you in reflecting upon your current professional practice, allowing self-identification of improvement areas and the possibility of establishing goals to reduce gaps when teaching AWS Academy content. This rubric will also empower you to engage autonomously in the improvement of your AWS Academy teaching practice.

The Readiness Rubric promotes a reflective practice and develops self-directed learning. You will build an idea of your current state about teaching AWS Academy content and we encourage you to set appropriate and reasonable teaching improvement goals. It is recommended to use your rubric results to find learning opportunities to enhance areas identified for improvement.

This rubric provides a type of scoring guide that assesses and articulates specific components and expectations regarding levels of accomplishment, and is a valuable tool when looking for improvement. Please keep in mind this is a tool to reflect on your state of readiness in order to deliver an AWS Academy Course to your students.

How to use this document

Please complete this self-assessment by yourself. Remember, this is a tool for your use only, and it is recommended to share the results with your AWS Academy TPM.

Step 1	For each row under the dimension column, rate yourself 1-4 based on which indicator statement you agree matches your level of readiness related to teaching AWS Academy curricula. Write your score at the end of the row. For example, if you frequently engage in a behavior describe by the column three (3) in the first row, you would write a “3” at the end of the first row.
Step 2	For each dimension, reflect on your current teaching practice. Use the table on page three (3) to take notes, set improvement actions and share with your thoughts with your AWS Academy TPM.
Step 3	Consider exploring resources in the area for which you had the lowest score. For example, talk to your AWS Academy TPM about AWS Academy webinars, technical documentation, or other training opportunities.
Step 4	(Optional but recommended) Share the final document via e-mail with your AWS Academy TPM

Readiness Rubic

AWS Academy

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Level		4	3	2	1	Score
DIMENSIONS	**Course objective and structure**	I'm able to identify and communicate to my students all the learning objectives of the course and how they are connected to the modules, sections and activities provided in the course structure.	I'm able to identify and communicate to my students most of the learning objective of the course and how they are connected to the modules, sections and activities provided in the course structure.	I'm able to identify and communicate to my students few learning objectives of the course and how they are connected to the modules, sections and activities provided in the course structure.	I'm not able neither identify and communicate to my students the learning objectives of the course and how they are connected to the modules, sections and activities provided in the course structure.	
	Use of modules content	I'm able to use and adapt as needed all the provided modules with challenging tasks and measurable outcomes; such that all students are able to learn and apply the knowledge and skills defined in the course outline.	I'm able to only use all the provided modules with basic tasks and measurable outcomes; such that all students are able to learn and apply the knowledge and skills defined in the course outline.	I'm able to use some of the provided modules to address some knowledge and skills defined in the course outline.	I'm still not able to use the provided modules to include student engagement strategies and the development of skills defined in the course outline.	
	Audience knowledge	I'm able to assess the knowledge levels of students in the course and use this information to adjust or expand all learning experiences that enable students to make significant progress toward meeting intended outcomes.	I'm able to assess the knowledge levels of students in the course and use this information to adjust or expand some of the learning experience that enables students to make progress toward meeting intended outcomes.	I'm not able to identify knowledge levels and ways of learning among the students in the course and/or develop learning experiences that enable students to make progress toward meeting intended outcomes.	I don't have enough knowledge about levels of students in the course, or differences in how students learn. I typically develop one learning experience for all students that does not enable most students to meet the intended outcomes.	
	Use of labs and demos	I integrate and use available Labs and Demos to engage students in learning experiences and to reinforce the understanding of the topics in the course modules.	I integrate and use available Labs and Demos to engage students in learning experiences and to reinforce the understanding of some topics in the course modules.	I poorly use available Labs and Demos to engage students in learning experiences and to reinforce the understanding of some topics in the course modules.	I don't use available labs, and Demos to engage students in learning experiences.	
	Use of support material	I use supporting materials (real-world examples, statistics, analogies, citations, among others) that promote and reinforce the effectiveness of the presentation, aligning student learning for the use of AWS Services and best practices.	I use supporting materials (real-world examples, statistics, analogies, citations, among others) that support the presentation.	I use supporting materials (real-world examples, statistics, analogies, citations, among others). However, it is not effective in the presentation.	I don't use supporting materials (real-world examples, statistics, analogies, citations, among others) that promote and reinforce the effectiveness of the presentation.	
	Subject matter knowledge	I demonstrate expertise in subject matter, and I'm able to troubleshoot technical problems during hands-on practices, allowing my students to apply complex knowledge and specific skills.	I demonstrate sound knowledge and understanding of the subject matter, and I'm able to troubleshoot technical problems during hands-on practices, allowing my students to apply complex knowledge and specific skills.	I demonstrate factual knowledge of subject matter, and sometimes I'm able to troubleshoot technical problems during hands-on practices, allowing my students to apply complex knowledge and specific skills.	I demonstrate limited knowledge of subject matter, and I still rely heavily on resources for the development of the hands-on content. Rarely, I'm able to troubleshoot technical problems during hands on practices.	
	Students' learning assessment	I routinely analyze results from a students' assessments embedded into the course, to determine progress toward modules and use these findings to adjust practice in real-time and in upcoming modules by identifying and/or implementing appropriate differentiated interventions and enhancements for all students.	Sometimes I analyze results from a students' assessments embedded into the course, to determine progress toward modules and use these findings to adjust practice in real-time and in upcoming modules by identifying and/or implementing appropriate differentiated interventions and enhancements for all students.	I occasionally analyze results from a students' assessments embedded into the course, to determine progress toward modules, but only occasionally adjust practice or modifies future sessions based on the findings.	I don't use assessments results as an input to make adjustments to my course.	

Readiness Rubic

AWS Academy

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Self-reflection

		Self-reflection	Improvement actions (Plan)
DIMENSIONS	**Course objective and structure**		
	Use of modules content		
	Audience knowledge		
	Use of labs and demos		
	Use of support material		
	Subject matter knowledge		
	Students' learning assessment		