AWS Academy Machine Learning Foundations
Module 01 Student Guide
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Contents

Welcome to Module 1: Welcome to AWS Academy Machine Learning.

Module objects

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At the end of this module, you should be able to:
- Identify course prerequisites and objectives
- Describe the various roles that require machine learning knowledge
- Identify resources for further learning

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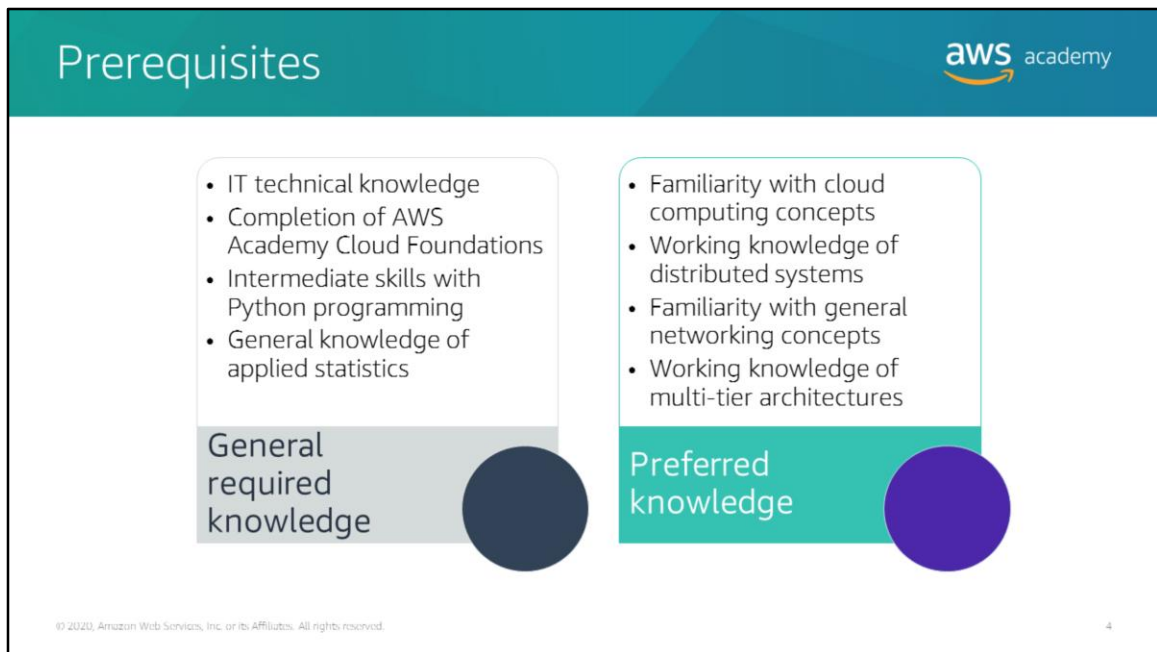- Identify resources for further learning

Module 1: Welcome to AWS Academy Machine Learning Foundations

Section 1: Course prerequisites and objectives

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Introducing Section 1: Course prerequisites and objectives.

It is helpful to understand the prerequisites of this course.

1. It's preferable for attendees to have some general **IT knowledge**. The foundational computer literacy skills that you need to be successful include basic computer concepts, email, file management, and a good understanding of the internet. You also should have completed the AWS Academy Cloud Foundations course, intermediate skills with Python programming, and general knowledge of applied statistics.
2. **General business knowledge** is important, including insight into how information technology is used in business. Communication skills, leadership abilities, and a customer service orientation are also important skill sets.

To achieve success in this course, you also should have:

- A general familiarity with **cloud computing** concepts
- A working knowledge of **distributed systems**
- Familiarity with **general networking** concepts
- A working knowledge of **multi-tier architectures**

Course objectives

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- 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

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In this course, you will learn how to describe machine learning (ML), which includes how to:

- 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

You will also learn how to implement a machine learning pipeline, which includes learning how to:

- Formulate a problem from a business request
- Obtain and secure data for machine learning
- Use Amazon SageMaker to build a Jupyter notebook
- Outline the process for evaluating data
- Explain why data must be preprocessed
- Use open-source tools to examine and preprocess data
- Use Amazon SageMaker to train and host a machine learning model

- Use cross validation to test the performance of a machine learning model
- Use a hosted model for inference
- Create an Amazon SageMaker hyperparameter tuning job to optimize a model's effectiveness

Finally, you will learn how to use managed Amazon ML services to solve specific machine learning problems in forecasting, computer vision, and natural language processing.

Course outline

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Module 1: Welcome to AWS Academy Machine Learning

Module 2: Introducing Machine Learning

Module 3: Implementing a Machine Learning Pipeline with Amazon SageMaker

Module 4: Introducing Forecasting

Module 5: Introducing Computer Vision

Module 6: Introducing Natural Language Processing

Module 7: Course Summary

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To achieve the course objectives, you will complete the following modules:

- Module 2 provides an introduction to machine learning.
- Module 3 describes how to implement a machine learning pipeline with Amazon SageMaker.
- Modules 4, 5, and 6 describe how to apply AWS Managed Services for problems in forecasting, computer vision, and natural language processing.
- Module 7 is a summary of the course, along with an overview of steps that you can take toward attaining certification in machine learning.

The next five slides provide more detail on the subtopics that are covered in each module.

The purpose of this module is to introduce you to major concepts for understanding machine learning.

- Section 1 describes the overall field of machine learning and how machine learning relates to artificial intelligence and deep learning.
- Section 2 summarizes some of the most common business problems that you can solve with machine learning.
- Section 3 describes the general workflow for solving machine learning problems and defines some of the more common terms that are used in machine learning.
- Section 4 reviews some of the tools that machine learning professionals commonly use.
- Section 5 provides an overview of some of the common challenges that you will face when you work with machine learning problems.

Module 3: Implementing a Machine Learning Pipeline with Amazon SageMaker

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Module sections:

1. Scenario introduction
2. Collecting and securing data
3. Evaluating your data
4. Feature engineering
5. Training
6. Hosting and using the model
7. Evaluating the accuracy of the model
8. Hyperparameter and model tuning

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Module 3 provides an introduction to Amazon SageMaker and how you can use it to implement a machine learning pipeline. The module focuses on the application of machine learning to computer vision as an example of the machine learning pipeline.

- Section 1 introduces you to the general field of computer vision.
- Sections 2 through 8 describe the phases of the machine learning pipeline by using computer vision as an example application.
    - In Section 2, you learn how to collect and secure data.
    - Section 3 describes different techniques for evaluating data.
    - In Section 4, you learn about the process of feature engineering.
    - Section 5 describes the steps to take in Amazon SageMaker to train a model.
    - Section 6 provides an overview of the options for hosting and using a model with Amazon SageMaker.
    - Finally, Sections 7 and 8 cover how to evaluate and tune your model with Amazon SageMaker.

Module 4: Introducing Forecasting

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Module sections:
1. Forecasting overview
2. Processing time series data
3. Using Amazon Forecast

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This module provides an introduction to the use of machine learning to create forecasts that are based on time series data.

- Section 1 describes forecasting in general and summarizes some common applications of forecasting.
- Section 2 outlines some of the pitfalls of the use of time series data to make forecasts.
- Section 3 provides an overview of how to use the Amazon Forecast service.

Module 5: Introducing Computer Vision

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Module sections:

1. Introducing computer vision
2. Analyzing image and video
3. Preparing custom datasets for computer vision

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The purpose of this module is to describe how to use machine learning for computer vision.

- Section 1 describes the general problems that must be solved for computer vision.
- Section 2 outlines the process for analyzing images and videos.
- Finally, Section 3 provides the steps to take to prepare datasets for computer vision.

Module 6: Introducing Natural Language Processing

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Module sections:

1. Overview of natural language processing (NLP)
2. Natural language processing managed services

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This module provides an introduction to natural language processing with machine learning.

- Section 1 describes the general set of problems that you can solve with natural language processing.
- Section 2 reviews some of the managed AWS services that you can use to address natural language processing problems. The services reviewed include Amazon Transcribe, Amazon Translate, Amazon Lex, Amazon Comprehend, and Amazon Polly.
- Section 3 describes the guided lab in which you will create a bot to schedule appointments.

In Module 7, you review what you have learned, and you learn about the process of obtaining a certification with Amazon Machine Learning.

- Section 1 provides an overview of what you have covered in the course.
- In Section 2, you learn more about Amazon documentation and review two common frameworks for applying AWS services.
- Section 3 describes the steps that you should take to continue to work toward an AWS Certified Machine Learning – Specialty certification.

Introducing Section 2: Machine learning job roles.

In this section, you get an overview of some of the more common job roles for machine learning professionals.

If you decide to work toward a data scientist role, you should focus on developing analytical, statistical, and programming skills. As a data scientist, you use those skills to collect, analyze, and interpret large datasets. Some universities now offer degrees in data science, but often data scientists have degrees in statistics, math, computer science, or economics. As a data scientist, you need technical competencies in statistics, machine learning, programming languages, and data analytics.

If you decide to work toward a career as a machine learning engineer, you need some skills that are similar to a data scientist's skills. However, your focus is more on programming skills and software architecture. As a machine learning engineer, you can apply those skills to design and develop machine learning systems. Machine learning engineers often have previous experience with software development. Although these roles also require technical competencies in statistics and machine learning, they rely more on programming and software engineering than other machine learning roles.

You might also decide to work toward a career in science where you can apply machine learning technology. Machine learning has an impact on everything from astronomy to zoology, so many different paths are open to you. As an applied science researcher, your primary focus is on the type of science that you decide to concentrate on. You need some of the skills of a data scientist, but you must also know how to apply those skills to your chosen domain. These roles also require technical competencies in statistics and machine learning.

Many software developers are now integrating machine learning into their applications. If you are working toward a career as a software developer, you should include machine learning technology in your course of study. As a machine learning developer, your primary focus is on software development skills, but you also need some of the skills of a data scientist. Therefore, you should include coursework in statistics and applied mathematics.

Module 1: Welcome to AWS Academy Machine Learning Foundations

Section 3: Resources, documentation, and whitepapers

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Introducing Section 3: Resources, documentation, and whitepapers. This section provides some useful links to extra resources you can use in this course.

Resources and documentation

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- Machine Learning on AWS
- AWS Machine Learning Blog
- Machine Learning Solutions in AWS Marketplace
- Amazon Machine Learning Service Documentation
- Machine Learning Solutions in AWS Marketplace
- Amazon Machine Learning Service Documentation
- Machine Learning in the AWS Partner Network

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If you want to learn more about machine learning, you might find the following additional resources helpful:

- Machine Learning on AWS
- AWS Machine Learning Blog
- Machine Learning Solutions in AWS Marketplace
- Amazon Machine Learning Service Documentation
- Machine Learning Solutions in AWS Marketplace
- Amazon Machine Learning Service Documentation
- Machine Learning in the AWS Partner Network
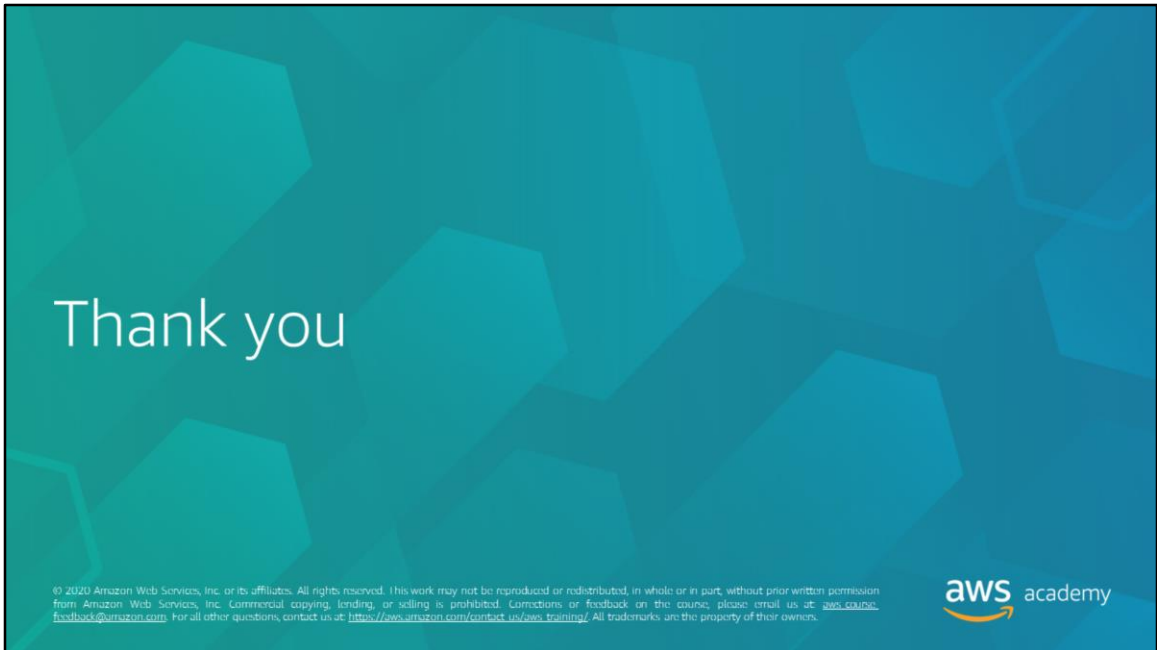
Thank you for completing this module.