



# Perform Cloud Data Science with Azure Machine Learning

Course ID #: 1401-812-16-W

Hours: 35

## Course Content

### Course Description:

The main purpose of the course is to give students the ability to analyze and present data by using Azure Machine Learning, and to provide an introduction to the use of machine learning with big data tools such as HDInsight and R Services.

### At Course Completion:

After completing this course, student will be able to:

- Explain machine learning, and how algorithms and languages are used
- Describe the purpose of Azure Machine Learning, and list the main features of Azure Machine Learning Studio
- Upload and explore various types of data to Azure Machine Learning
- Explore and use techniques to prepare datasets ready for use with Azure Machine Learning
- Explore and use feature engineering and selection techniques on datasets that are to be used with Azure Machine Learning
- Explore and use regression algorithms and neural networks with Azure Machine Learning
- Explore and use classification and clustering algorithms with Azure Machine Learning
- Use R and Python with Azure Machine Learning, and choose when to use a particular language
- Explore and use hyperparameters and multiple algorithms and models, and be able to score and evaluate models
- Explore how to provide end-users with Azure Machine Learning services, and how to share data generated from Azure Machine Learning models
- Explore and use the Cognitive Services APIs for text and image processing, to create a recommendation application, and describe the use of neural networks with Azure Machine Learning
- Explore and use HDInsight with Azure Machine Learning
- Explore and use R and R Server with Azure Machine Learning, and explain how to deploy and configure SQL Server to support R services

### Target Student:

The primary audience for this course is people who wish to analyze and present data by using Azure Machine Learning.

The secondary audience is IT professionals, Developers and information workers who need to support solutions based on Azure machine learning.



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## Prerequisites:

In addition to their professional experience, students who attend this course should have:

- Programming experience using R, and familiarity with common R packages
- Knowledge of common statistical methods and data analysis best practices.
- Basic knowledge of the Microsoft Windows operating system and its core functionality.
- Working knowledge of relational databases.

## Topics:

### Module 1: Introduction to Machine Learning

This module introduces machine learning and discussed how algorithms and languages are used.

#### Lessons

- What is machine learning?
- Introduction to machine learning algorithms
- Introduction to machine learning languages

#### Lab: Introduction to machine Learning

- Sign up for Azure machine learning studio account
- View a simple experiment from gallery
- Evaluate an experiment

#### After completing this module, students will be able to:

- Describe machine learning
- Describe machine learning algorithms
- Describe machine learning languages

### Module 2: Introduction to Azure Machine Learning

Describe the purpose of Azure Machine Learning, and list the main features of Azure Machine Learning Studio.

#### Lessons

- Azure machine learning overview
- Introduction to Azure machine learning studio
- Developing and hosting Azure machine learning applications

#### Lab: Introduction to Azure machine learning

- Explore the Azure machine learning studio workspace
- Clone and run a simple experiment
- Clone an experiment, make some simple changes, and run the experiment

#### After completing this module, students will be able to:

- Describe Azure machine learning.
- Use the Azure machine learning studio.
- Describe the Azure machine learning platforms and environments.



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## Module 3: Managing Datasets

At the end of this module the student will be able to upload and explore various types of data in Azure machine learning.

### Lessons

- Categorizing your data
- Importing data to Azure machine learning
- Exploring and transforming data in Azure machine learning

### Lab: Managing Datasets

- Prepare Azure SQL database
- Import data
- Visualize data
- Summarize data

### After completing this module, students will be able to:

- Understand the types of data they have.
- Upload data from a number of different sources.
- Explore the data that has been uploaded.

## Module 4: Preparing Data for use with Azure Machine Learning

This module provides techniques to prepare datasets for use with Azure machine learning.

### Lessons

- Data pre-processing
- Handling incomplete datasets

### Lab: Preparing data for use with Azure machine learning

- Explore some data using Power BI
- Clean the data
- After completing this module, students will be able to:
  - Pre-process data to clean and normalize it.
  - Handle incomplete datasets.

## Module 5: Using Feature Engineering and Selection

This module describes how to explore and use feature engineering and selection techniques on datasets that are to be used with Azure machine learning.

### Lessons

- Using feature engineering
- Using feature selection

### Lab: Using feature engineering and selection

- Prepare datasets
- Use Join to Merge data

### After completing this module, students will be able to:

- Use feature engineering to manipulate data.
- Use feature selection.

## Module 6: Building Azure Machine Learning Models

This module describes how to use regression algorithms and neural networks with Azure machine learning.



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## Lessons

- Azure machine learning workflows
- Scoring and evaluating models
- Using regression algorithms
- Using neural networks

## Lab: Building Azure machine learning models

- Using Azure machine learning studio modules for regression
- Create and run a neural-network based application

## After completing this module, students will be able to:

- Describe machine learning workflows.
- Explain scoring and evaluating models.
- Describe regression algorithms.
- Use a neural-network.

## Module 7: Using Classification and Clustering with Azure machine learning models

This module describes how to use classification and clustering algorithms with Azure machine learning.

## Lessons

- Using classification algorithms
- Clustering techniques
- Selecting algorithms

## Lab: Using classification and clustering with Azure machine learning models

- Using Azure machine learning studio modules for classification.
- Add k-means section to an experiment
- Add PCA for anomaly detection.
- Evaluate the models

## After completing this module, students will be able to:

- Use classification algorithms.
- Describe clustering techniques.
- Select appropriate algorithms.

## Module 8: Using R and Python with Azure Machine Learning

This module describes how to use R and Python with azure machine learning and choose when to use a particular language.

## Lessons

- Using R
- Using Python
- Incorporating R and Python into Machine Learning experiments

## Lab: Using R and Python with Azure machine learning

- Exploring data using R
- Analyzing data using Python

## After completing this module, students will be able to:

- Explain the key features and benefits of R.
- Explain the key features and benefits of Python.
- Use Jupyter notebooks.
- Support R and Python.

## Module 9: Initializing and Optimizing Machine Learning Models

This module describes how to use hyper-parameters and multiple algorithms and



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models, and be able to score and evaluate models.

## Lessons

- Using hyper-parameters
- Using multiple algorithms and models
- Scoring and evaluating Models

## Lab: Initializing and optimizing machine learning models

- Using hyper-parameters

## After completing this module, students will be able to:

- Use hyper-parameters.
- Use multiple algorithms and models to create ensembles.
- Score and evaluate ensembles.

## Module 10: Using Azure Machine Learning Models

This module explores how to provide end users with Azure machine learning services, and how to share data generated from Azure machine learning models.

## Lessons

- Deploying and publishing models
- Consuming Experiments

## Lab: Using Azure machine learning models

- Deploy machine learning models
- Consume a published model

## After completing this module, students will be able to:

- Deploy and publish models.
- Export data to a variety of targets.

## Module 11: Using Cognitive Services

This module introduces the cognitive services APIs for text and image processing to create a recommendation application, and describes the use of neural networks with Azure machine learning.

## Lessons

- Cognitive services overview
- Processing language
- Processing images and video
- Recommending products

## Lab: Using Cognitive Services

- Build a language application
- Build a face detection application
- Build a recommendation application

## After completing this module, students will be able to:

- Describe cognitive services.
- Process text through an application.
- Process images through an application.
- Create a recommendation application.

## Module 12: Using Machine Learning with HDInsight

This module describes how use HDInsight with Azure machine learning.



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## Lessons

- Introduction to HDInsight
- HDInsight cluster types
- HDInsight and machine learning models

## Lab: Machine Learning with HDInsight

- Provision an HDInsight cluster
- Use the HDInsight cluster with MapReduce and Spark

## After completing this module, students will be able to:

- Describe the features and benefits of HDInsight.
- Describe the different HDInsight cluster types.
- Use HDInsight with machine learning models.

## Module 13: Using R Services with Machine Learning

This module describes how to use R and R server with Azure machine learning, and explain how to deploy and configure SQL Server and support R services.

## Lessons

- R and R server overview
- Using R server with machine learning
- Using R with SQL Server

## Lab: Using R services with machine learning

- Deploy DSVM
- Prepare a sample SQL Server database and configure SQL Server and R
- Use a remote R session
- Execute R scripts inside T-SQL statements

## After completing this module, students will be able to:

- Implement interactive queries.
- Perform exploratory data analysis.