

# Courses in this Machine Learning series

Introduction to Trading with Machine Learning on Google Cloud

Using Machine Learning in Trading and Finance

Reinforcement Learning for Trading Strategies

# Recommended target audience

- Data analysts, data scientists, and machine learning engineers that want to learn how to apply their knowledge to financial use cases, specifically trading, using Google Cloud
- Financial advisors and traders who are interested in applying Machine Learning for trading strategies and decision making. These individuals will need to have previous knowledge of the foundational concepts of ML.

# Module Overview: Using Machine Learning in Trading and Finance

Quant Trading Strategies

Introduction to TensorFlow

Training Neural Networks with  
Tensorflow and Keras

Building a Momentum-based Trading  
Strategy

Build a Pair-trading Strategy  
Prediction Model

# TensorFlow & Keras labs you will complete in this course

- Writing low-level TensorFlow programs
- Manipulating data with Tensorflow Dataset API
- Intro to Keras Sequential API
- Intro to Keras Functional API

# Trading strategy labs you will complete in this course

- Momentum Trading
- Pairs Trading
- Kalman Filters
- Hurst Coefficients (optional)
- Momentum labs using ML in the QuantQuest platform (optional)

# Lab environment will be actual Google Cloud accounts

Each lab provides you a real Google Cloud project for a limited time

You will have two browser windows:

- One with a lab walkthrough,
- Another is Google Cloud at [console.cloud.google.com](https://console.cloud.google.com)

The screenshot shows a lab interface with a blue header bar containing a back arrow, the title 'Building an ARIMA Model for a Financial Dataset', a help icon, and a user profile icon. Below the header, there's a red 'End Lab' button and a timer showing '01:29:51'. A section titled 'Open Google Console' contains a caution message: 'Caution: When you are in the console, do not deviate from the lab instructions. Doing so may cause your account to be blocked. [Learn more.](#)'. Below this are three input fields: 'Username' with the value 'student-04-4fb5705bbfb5@qwiklabs.net', 'Password' with the value '9t4N3NbC', and 'GCP Project ID' with the value 'qwiklabs-gcp-04-21cf2a46433d'. Each field has a copy icon to its right. At the bottom of the lab card, it shows '1 hour 30 minutes', '1 Credit', and a star rating with a 'Rate Lab' link.

## Building an ARIMA Model for a Financial Dataset

1 hour 30 minutes 1 Credit ★★★★★ [Rate Lab](#)

### Overview

In this lab, you will build an ARIMA model for AAPL stock closing prices using the statsmodels library in

Overview

Set up your environment

Launch AI Platform Not

Clone Course Repo within your AI

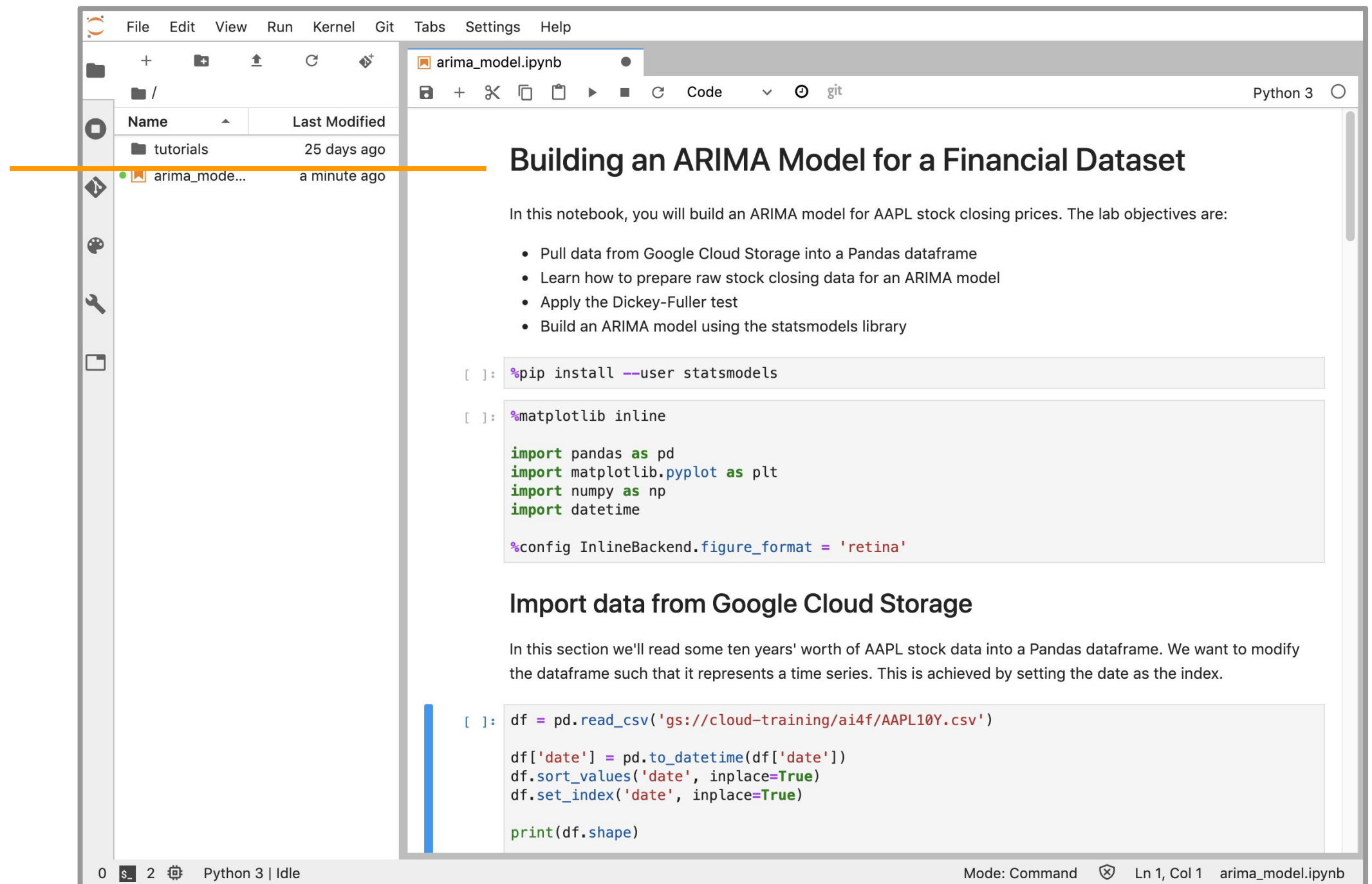
[Chat](#)

# We will use Python3 in Jupyter Notebooks on AI Platform

Each lab corresponds to a public .ipynb file that you will work through

All lab instructions and code are publicly available:

<https://github.com/GoogleCloudPlatform/training-data-analyst/tree/master/courses/ai-for-finance>



The screenshot shows a Jupyter Notebook interface. On the left is a file explorer with a table of files:

| Name           | Last Modified |
|----------------|---------------|
| tutorials      | 25 days ago   |
| arima_model... | a minute ago  |

The main notebook area is titled "Building an ARIMA Model for a Financial Dataset". It contains the following text and code:

In this notebook, you will build an ARIMA model for AAPL stock closing prices. The lab objectives are:

- Pull data from Google Cloud Storage into a Pandas dataframe
- Learn how to prepare raw stock closing data for an ARIMA model
- Apply the Dickey-Fuller test
- Build an ARIMA model using the statsmodels library

```
[ ]: %pip install --user statsmodels
```

```
[ ]: %matplotlib inline
```

```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
import datetime
```

```
%config InlineBackend.figure_format = 'retina'
```

**Import data from Google Cloud Storage**

In this section we'll read some ten years' worth of AAPL stock data into a Pandas dataframe. We want to modify the dataframe such that it represents a time series. This is achieved by setting the date as the index.

```
[ ]: df = pd.read_csv('gs://cloud-training/ai4f/AAPL10Y.csv')
```

```
df['date'] = pd.to_datetime(df['date'])
df.sort_values('date', inplace=True)
df.set_index('date', inplace=True)
```

```
print(df.shape)
```

The bottom status bar shows "0 2 Python 3 | Idle" and "Mode: Command Ln 1, Col 1 arima\_model.ipynb".

# What is *not* covered in this course

- **Building and implementing the next highly-profitable high-frequency pairs-trading algorithm**
- **Advanced ML and data science topics → course #3**
  - LSTM time-series models
  - Reinforcement learning models
- **Prerequisites**
  - Python basics → See References links
  - Machine learning 101 (what are features etc.) → See References links



# Preview of Future Topics

- LSTM models for time-series prediction
- How to develop a Reinforcement Learning trading system