In [10]:
```
!pip install yfinance pandas matplotlib
```

```
Collecting yfinance
  Using cached yfinance-0.2.66-py2.py3-none-any.whl.metadata (6.0 kB)
Requirement already satisfied: pandas in c:\users\hp\anaconda3\lib\site-package
s (2.2.2)
Requirement already satisfied: matplotlib in c:\users\hp\anaconda3\lib\site-pac
kages (3.8.4)
Requirement already satisfied: numpy>=1.16.5 in c:\users\hp\anaconda3\lib\site-
packages (from yfinance) (1.26.4)
Requirement already satisfied: requests>=2.31 in c:\users\hp\anaconda3\lib\sit
e-packages (from yfinance) (2.32.2)
Collecting multitasking>=0.0.7 (from yfinance)
  Downloading multitasking-0.0.12.tar.gz (19 kB)
  Preparing metadata (setup.py): started
  Preparing metadata (setup.py): finished with status 'done'
Requirement already satisfied: platformdirs>=2.0.0 in c:\users\hp\anaconda3\li
b\site-packages (from yfinance) (3.10.0)
Requirement already satisfied: pytz>=2022.5 in c:\users\hp\anaconda3\lib\site-p
ackages (from yfinance) (2024.1)
Requirement already satisfied: frozendict>=2.3.4 in c:\users\hp\anaconda3\lib\s
ite-packages (from yfinance) (2.4.2)
Collecting peewee>=3.16.2 (from yfinance)
  Downloading peewee-3.18.2.tar.gz (949 kB)
     ---------------------------------------- 0.0/949.2 kB ? eta -:--:--
     ---------------------------------------- 10.2/949.2 kB ? eta -:--:--
     - -------------------------------------- 30.7/949.2 kB 435.7 kB/s eta 0:00:03
     - -------------------------------------- 41.0/949.2 kB 393.8 kB/s eta 0:00:03
     -- ------------------------------------- 61.4/949.2 kB 328.2 kB/s eta 0:00:03
     --- ------------------------------------ 92.2/949.2 kB 374.1 kB/s eta 0:00:03
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     ---- ----------------------------------- 122.9/949.2 kB 277.4 kB/s eta 0:00:03
     ----- ---------------------------------- 153.6/949.2 kB 316.5 kB/s eta 0:00:03
     ----- ---------------------------------- 153.6/949.2 kB 316.5 kB/s eta 0:00:03
     ----- ---------------------------------- 153.6/949.2 kB 316.5 kB/s eta 0:00:03
     ------ --------------------------------- 174.1/949.2 kB 275.8 kB/s eta 0:00:03
     ------- -------------------------------- 194.6/949.2 kB 287.6 kB/s eta 0:00:03
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     ------- -------------------------------- 204.8/949.2 kB 289.5 kB/s eta 0:00:03
     -------- ------------------------------- 225.3/949.2 kB 254.8 kB/s eta 0:00:03
     --------- ------------------------------ 256.0/949.2 kB 271.3 kB/s eta 0:00:03
     ---------- ----------------------------- 276.5/949.2 kB 279.4 kB/s eta 0:00:03
     ---------- ----------------------------- 276.5/949.2 kB 279.4 kB/s eta 0:00:03
     ---------- ----------------------------- 276.5/949.2 kB 279.4 kB/s eta 0:00:03
     ----------- ---------------------------- 317.4/949.2 kB 285.0 kB/s eta 0:00:03
     ------------ --------------------------- 358.4/949.2 kB 305.1 kB/s eta 0:00:02
     ------------ --------------------------- 358.4/949.2 kB 305.1 kB/s eta 0:00:02
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     ------------ --------------------------- 358.4/949.2 kB 305.1 kB/s eta 0:00:02
     ------------ --------------------------- 368.6/949.2 kB 257.7 kB/s eta 0:00:03
     ------------- -------------------------- 389.1/949.2 kB 257.9 kB/s eta 0:00:03
```

```
     --------------- -------------------- 399.4/949.2 kB 254.2 kB/s eta 0:00:03
     --------------- -------------------- 399.4/949.2 kB 254.2 kB/s eta 0:00:03
     --------------- -------------------- 419.8/949.2 kB 252.1 kB/s eta 0:00:03
     --------------- -------------------- 419.8/949.2 kB 252.1 kB/s eta 0:00:03
     ---------------- ------------------- 440.3/949.2 kB 254.8 kB/s eta 0:00:02
     ----------------- ------------------ 450.6/949.2 kB 253.9 kB/s eta 0:00:02
     ----------------- ------------------ 471.0/949.2 kB 258.7 kB/s eta 0:00:02
     ----------------- ------------------ 471.0/949.2 kB 258.7 kB/s eta 0:00:02
     ----------------- ------------------ 471.0/949.2 kB 258.7 kB/s eta 0:00:02
     ----------------- ------------------ 471.0/949.2 kB 258.7 kB/s eta 0:00:02
     ------------------ ----------------- 481.3/949.2 kB 239.2 kB/s eta 0:00:02
     ------------------ ----------------- 481.3/949.2 kB 239.2 kB/s eta 0:00:02
     ------------------ ----------------- 481.3/949.2 kB 239.2 kB/s eta 0:00:02
     ------------------- ---------------- 522.2/949.2 kB 242.8 kB/s eta 0:00:02
     -------------------- --------------- 553.0/949.2 kB 249.9 kB/s eta 0:00:02
     -------------------- --------------- 553.0/949.2 kB 249.9 kB/s eta 0:00:02
     -------------------- --------------- 553.0/949.2 kB 249.9 kB/s eta 0:00:02
     ---------------------- ------------- 604.2/949.2 kB 258.6 kB/s eta 0:00:02
     ----------------------- ------------ 614.4/949.2 kB 261.2 kB/s eta 0:00:02
     ------------------------ ----------- 645.1/949.2 kB 265.5 kB/s eta 0:00:02
     ------------------------- ---------- 665.6/949.2 kB 272.4 kB/s eta 0:00:02
     --------------------------- -------- 727.0/949.2 kB 288.6 kB/s eta 0:00:01
     ------------------------------ ----- 798.7/949.2 kB 311.5 kB/s eta 0:00:01
     ------------------------------- ---- 829.4/949.2 kB 317.8 kB/s eta 0:00:01
     --------------------------------- -- 890.9/949.2 kB 335.5 kB/s eta 0:00:01
     -----------------------------------  942.1/949.2 kB 348.7 kB/s eta 0:00:01
     -----------------------------------  942.1/949.2 kB 348.7 kB/s eta 0:00:01
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     -----------------------------------  942.1/949.2 kB 348.7 kB/s eta 0:00:01
     ------------------------------------ 949.2/949.2 kB 306.6 kB/s eta 0:00:00
  Installing build dependencies: started
  Installing build dependencies: finished with status 'done'
  Getting requirements to build wheel: started
  Getting requirements to build wheel: finished with status 'done'
  Preparing metadata (pyproject.toml): started
  Preparing metadata (pyproject.toml): finished with status 'done'
Requirement already satisfied: beautifulsoup4>=4.11.1 in c:\users\hp\anaconda3\
lib\site-packages (from yfinance) (4.12.3)
Collecting curl_cffi>=0.7 (from yfinance)
  Downloading curl_cffi-0.13.0-cp39-abi3-win_amd64.whl.metadata (13 kB)
Requirement already satisfied: protobuf>=3.19.0 in c:\users\hp\anaconda3\lib\si
te-packages (from yfinance) (3.20.3)
Collecting websockets>=13.0 (from yfinance)
  Downloading websockets-15.0.1-cp312-cp312-win_amd64.whl.metadata (7.0 kB)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\hp\anaconda3\
lib\site-packages (from pandas) (2.9.0.post0)
Requirement already satisfied: tzdata>=2022.7 in c:\users\hp\anaconda3\lib\sit
e-packages (from pandas) (2023.3)
Requirement already satisfied: contourpy>=1.0.1 in c:\users\hp\anaconda3\lib\si
te-packages (from matplotlib) (1.2.0)
```

```
Requirement already satisfied: cycler>=0.10 in c:\users\hp\anaconda3\lib\site-p
ackages (from matplotlib) (0.11.0)
Requirement already satisfied: fonttools>=4.22.0 in c:\users\hp\anaconda3\lib\s
ite-packages (from matplotlib) (4.51.0)
Requirement already satisfied: kiwisolver>=1.3.1 in c:\users\hp\anaconda3\lib\s
ite-packages (from matplotlib) (1.4.4)
Requirement already satisfied: packaging>=20.0 in c:\users\hp\anaconda3\lib\sit
e-packages (from matplotlib) (23.2)
Requirement already satisfied: pillow>=8 in c:\users\hp\anaconda3\lib\site-pack
ages (from matplotlib) (10.3.0)
Requirement already satisfied: pyparsing>=2.3.1 in c:\users\hp\anaconda3\lib\si
te-packages (from matplotlib) (3.0.9)
Requirement already satisfied: soupsieve>1.2 in c:\users\hp\anaconda3\lib\site-
packages (from beautifulsoup4>=4.11.1->yfinance) (2.5)
Requirement already satisfied: cffi>=1.12.0 in c:\users\hp\anaconda3\lib\site-p
ackages (from curl_cffi>=0.7->yfinance) (1.16.0)
Requirement already satisfied: certifi>=2024.2.2 in c:\users\hp\anaconda3\lib\s
ite-packages (from curl_cffi>=0.7->yfinance) (2024.7.4)
Requirement already satisfied: six>=1.5 in c:\users\hp\anaconda3\lib\site-packa
ges (from python-dateutil>=2.8.2->pandas) (1.16.0)
Requirement already satisfied: charset-normalizer<4,>=2 in c:\users\hp\anaconda
3\lib\site-packages (from requests>=2.31->yfinance) (2.0.4)
Requirement already satisfied: idna<4,>=2.5 in c:\users\hp\anaconda3\lib\site-p
ackages (from requests>=2.31->yfinance) (3.7)
Requirement already satisfied: urllib3<3,>=1.21.1 in c:\users\hp\anaconda3\lib\
site-packages (from requests>=2.31->yfinance) (2.2.2)
Requirement already satisfied: pycparser in c:\users\hp\anaconda3\lib\site-pack
ages (from cffi>=1.12.0->curl_cffi>=0.7->yfinance) (2.21)
Downloading yfinance-0.2.66-py2.py3-none-any.whl (123 kB)
   ---------------------------------------- 0.0/123.4 kB ? eta -:--:--
   -------------------------- ------------- 81.9/123.4 kB 2.3 MB/s eta 0:00:01
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Downloading curl_cffi-0.13.0-cp39-abi3-win_amd64.whl (1.6 MB)
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   ------------------------------------- 1.6/1.6 MB 680.1 kB/s eta 0:00:00
Downloading websockets-15.0.1-cp312-cp312-win_amd64.whl (176 kB)
   ------------------------------------- 0.0/176.8 kB ? eta -:--:--
   ------ --------------------------------- 30.7/176.8 kB 1.3 MB/s eta 0:00:01
   ---------------- ---------------------- 81.9/176.8 kB 1.2 MB/s eta 0:00:01
   ------------------------------- ------- 143.4/176.8 kB 1.1 MB/s eta 0:00:01
   ------------------------------------- 174.1/176.8 kB 1.2 MB/s eta 0:00:01
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```

```
   ---------------------------------------- 176.8/176.8 kB 367.8 kB/s eta 0:00:00
Building wheels for collected packages: multitasking, peewee
  Building wheel for multitasking (setup.py): started
  Building wheel for multitasking (setup.py): finished with status 'done'
  Created wheel for multitasking: filename=multitasking-0.0.12-py3-none-any.whl
size=15617 sha256=7bc5b3e4e8dcea150d1e76d43bb048a40b52831fe88fcdb4fc18ae32fdfc1
4b3
  Stored in directory: c:\users\hp\appdata\local\pip\cache\wheels\cc\bd\6f\664d
62c99327abeef7d86489e6631cbf45b56fbf7ef1d6ef00
  Building wheel for peewee (pyproject.toml): started
  Building wheel for peewee (pyproject.toml): finished with status 'done'
  Created wheel for peewee: filename=peewee-3.18.2-py3-none-any.whl size=139153
sha256=09e3e3624c58f7caf0f87ff2174783557e4eb74c98a548c8cfc7ec828cd0870b
  Stored in directory: c:\users\hp\appdata\local\pip\cache\wheels\d1\df\a9\0202
b051c65b11c992dd6db9f2babdd2c44ec7d35d511be5d3
Successfully built multitasking peewee
Installing collected packages: peewee, multitasking, websockets, curl_cffi, yfi
nance
Successfully installed curl_cffi-0.13.0 multitasking-0.0.12 peewee-3.18.2 webso
ckets-15.0.1 yfinance-0.2.66
```

In [5]:
```python
import yfinance as yf
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestRegressor
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_absolute_error, mean_squared_error
```

In [9]:
```python
gold = yf.download("GC=F", start="2015-06-01", end="2025-06-01", interval="1mc
```

```
C:\Users\hp\AppData\Local\Temp\ipykernel_20076\2391898876.py:1: FutureWarning:
YF.download() has changed argument auto_adjust default to True
  gold = yf.download("GC=F", start="2015-06-01", end="2025-06-01", interval="1m
o")
[**********************100%**********************]  1 of 1 completed
```

In [11]:
```python
gold.to_csv("gold_prices.csv")
print("File saved successfully!")
```

```
File saved successfully!
```

In [13]:
```python
# Skip the first two rows (ticker + fake headers)
df = pd.read_csv("gold_prices.csv", skiprows=[0,1])

#Rename columns properly
df.columns = ['Date', 'Close', 'High', 'Low', 'Open', 'Volume']

# Convert 'Date' to datetime and set as index
df['Date'] = pd.to_datetime(df['Date'], errors='coerce')
df = df.set_index('Date')

#Reorder columns correctly
```

```
df = df[['Open', 'High', 'Low', 'Close', 'Volume']]

# Convert numeric columns
df = df.apply(pd.to_numeric, errors='coerce')

#  Clean and sort
df = df.dropna().sort_index()
df = df.reset_index()

print(df.head())
```

```
        Date         Open         High          Low        Close  Volume
0 2015-06-01  1190.599976  1204.000000  1164.000000  1171.500000    6252
1 2015-07-01  1173.099976  1173.099976  1078.599976  1094.900024  216892
2 2015-08-01  1095.500000  1169.000000  1080.500000  1131.599976   13251
3 2015-09-01  1133.500000  1155.900024  1098.199951  1115.500000    9119
4 2015-10-01  1115.199951  1189.000000  1105.800049  1141.500000    4321
```

In [15]:
```
# Make sure the index is a datetime type
gold.index = pd.to_datetime(gold.index)
gold = gold.sort_index()  # just in case

# Check for missing values
print("Missing values in each column:")
print(gold.isnull().sum())

# Fill missing values with the previous available value
gold = gold.fillna(method='ffill')

# Add moving averages as new features
gold["MA3"] = gold['Close'].rolling(window=3).mean()
gold["MA6"] = gold['Close'].rolling(window=6).mean()

# Add a daily (actually monthly) change feature
gold['Change'] = gold['Close'] - gold['Open']

# Drop rows with any remaining NaN values (from moving averages)
gold = gold.dropna()

# Show the updated dataframe
print(gold.head())
```

```
Missing values in each column:
Price   Ticker
Close   GC=F      0
High    GC=F      0
Low     GC=F      0
Open    GC=F      0
Volume  GC=F      0
dtype: int64
Price             Close         High          Low         Open  Volume  \
Ticker             GC=F         GC=F         GC=F         GC=F    GC=F
Date
2015-12-01  1060.300049  1098.800049  1046.199951  1064.599976   10149
2016-01-01  1116.400024  1125.699951  1063.199951  1063.400024  229558
2016-02-01  1233.900024  1260.800049  1115.300049  1116.699951   13930
2016-03-01  1234.199951  1280.699951  1210.000000  1240.500000  244751
2016-04-01  1289.199951  1295.500000  1209.199951  1232.300049    9954

Price               MA3          MA6      Change
Ticker
Date
2015-12-01  1105.766683  1119.216675   -4.299927
2016-01-01  1106.066691  1110.033346   53.000000
2016-02-01  1136.866699  1133.200012  117.200073
2016-03-01  1194.833333  1150.300008   -6.300049
2016-04-01  1252.433309  1179.250000   56.899902
```

```
C:\Users\hp\AppData\Local\Temp\ipykernel_20076\1612872133.py:10: FutureWarning:
DataFrame.fillna with 'method' is deprecated and will raise in a future versio
n. Use obj.ffill() or obj.bfill() instead.
  gold = gold.fillna(method='ffill')
```

In [17]:
```
# the features and target variable
feature_cols = ['Open', 'High', 'Low', 'Volume', 'MA3', 'MA6', 'Change']
X = gold[feature_cols]
y = gold['Close']
```

In [19]:
```
#Split into train and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, randc
```

In [21]:
```
#Train your models
# Linear Regression
lr = LinearRegression()
lr.fit(X_train, y_train)
y_pred_lr = lr.predict(X_test)
```

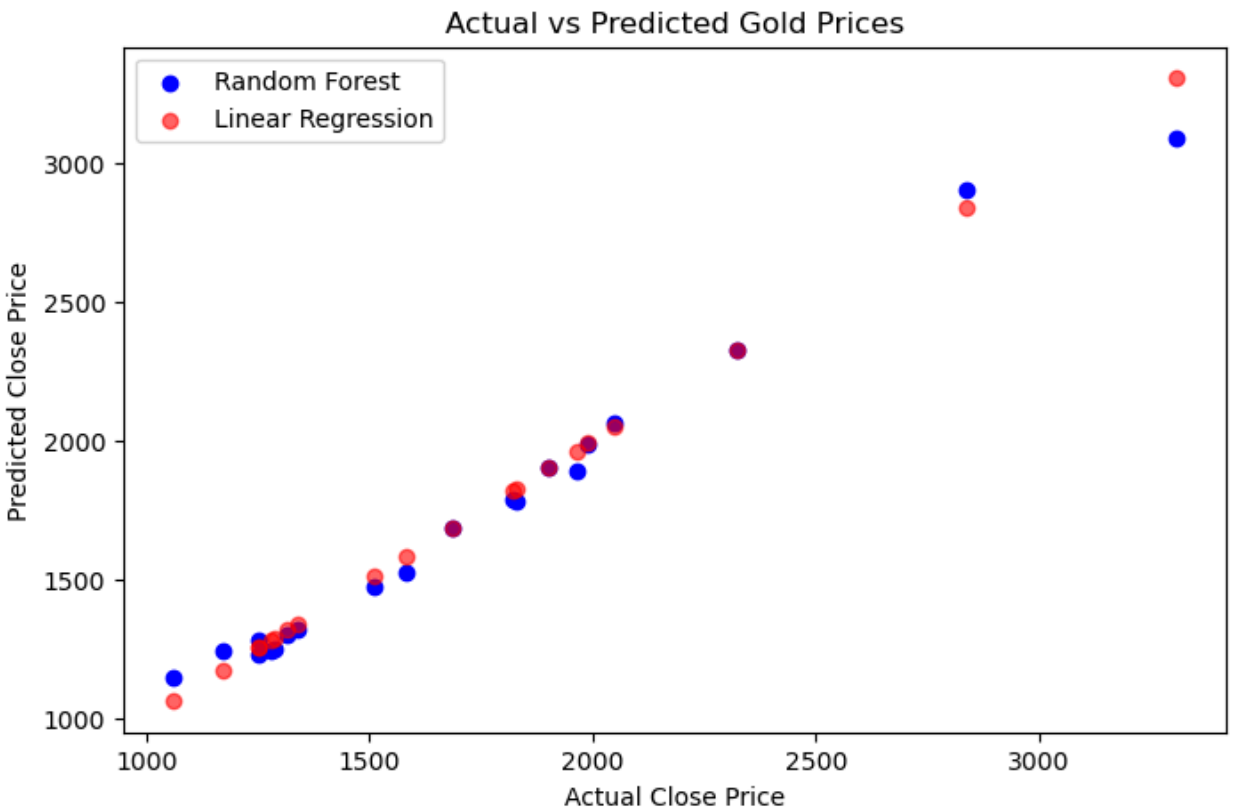
In [23]:
```
# Random Forest
rf = RandomForestRegressor()
rf.fit(X_train, y_train)
y_pred_rf = rf.predict(X_test)
```

```
C:\Users\hp\anaconda3\Lib\site-packages\sklearn\base.py:1474: DataConversionWar
ning: A column-vector y was passed when a 1d array was expected. Please change
the shape of y to (n_samples,), for example using ravel().
  return fit_method(estimator, *args, **kwargs)
```

In [33]:
```
#Evaluate the models
print("---- Linear Regression ----")
print("MAE:", mean_absolute_error(y_test, y_pred_lr))
print("MSE:", mean_squared_error(y_test, y_pred_lr))

print("\n---- Random Forest ----")
print("MAE:", mean_absolute_error(y_test, y_pred_rf))
print("MSE:", mean_squared_error(y_test, y_pred_rf))
```

```
---- Linear Regression ----
MAE: 2.0463630789890885e-12
MSE: 4.74077888569454e-24

---- Random Forest ----
MAE: 44.336398803710935
MSE: 4148.869159164642
```

In [35]:
```
#Visualize actual vs predicted values
plt.figure(figsize=(8,5))
plt.scatter(y_test, y_pred_rf, color='blue', label='Random Forest')
plt.scatter(y_test, y_pred_lr, color='red', alpha=0.6, label='Linear Regressic
plt.xlabel('Actual Close Price')
plt.ylabel('Predicted Close Price')
plt.title('Actual vs Predicted Gold Prices')
plt.legend()
plt.show()
```



In [40]:
```
pip install prophet
```

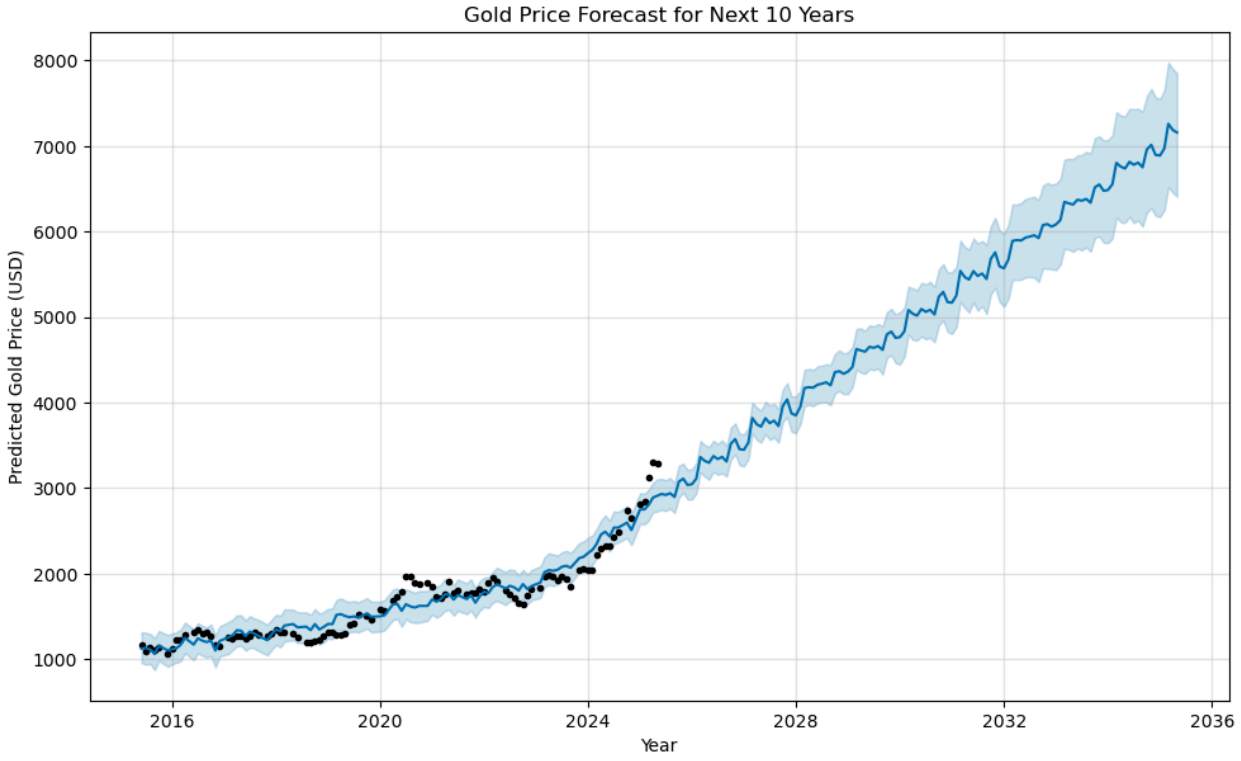
```
Requirement already satisfied: prophet in c:\users\hp\anaconda3\lib\site-packag
es (1.2.1)
Requirement already satisfied: cmdstanpy>=1.0.4 in c:\users\hp\anaconda3\lib\si
te-packages (from prophet) (1.3.0)
Requirement already satisfied: numpy>=1.15.4 in c:\users\hp\anaconda3\lib\site-
packages (from prophet) (1.26.4)
Requirement already satisfied: matplotlib>=2.0.0 in c:\users\hp\anaconda3\lib\s
ite-packages (from prophet) (3.8.4)
Requirement already satisfied: pandas>=1.0.4 in c:\users\hp\anaconda3\lib\site-
packages (from prophet) (2.2.2)
Requirement already satisfied: holidays<1,>=0.25 in c:\users\hp\anaconda3\lib\s
ite-packages (from prophet) (0.83)
Requirement already satisfied: tqdm>=4.36.1 in c:\users\hp\anaconda3\lib\site-p
ackages (from prophet) (4.66.4)
Requirement already satisfied: importlib_resources in c:\users\hp\anaconda3\li
b\site-packages (from prophet) (6.5.2)
Requirement already satisfied: stanio<2.0.0,>=0.4.0 in c:\users\hp\anaconda3\li
b\site-packages (from cmdstanpy>=1.0.4->prophet) (0.5.1)
Requirement already satisfied: python-dateutil in c:\users\hp\anaconda3\lib\sit
e-packages (from holidays<1,>=0.25->prophet) (2.9.0.post0)
Requirement already satisfied: contourpy>=1.0.1 in c:\users\hp\anaconda3\lib\si
te-packages (from matplotlib>=2.0.0->prophet) (1.2.0)
Requirement already satisfied: cycler>=0.10 in c:\users\hp\anaconda3\lib\site-p
ackages (from matplotlib>=2.0.0->prophet) (0.11.0)
Requirement already satisfied: fonttools>=4.22.0 in c:\users\hp\anaconda3\lib\s
ite-packages (from matplotlib>=2.0.0->prophet) (4.51.0)
Requirement already satisfied: kiwisolver>=1.3.1 in c:\users\hp\anaconda3\lib\s
ite-packages (from matplotlib>=2.0.0->prophet) (1.4.4)
Requirement already satisfied: packaging>=20.0 in c:\users\hp\anaconda3\lib\sit
e-packages (from matplotlib>=2.0.0->prophet) (23.2)
Requirement already satisfied: pillow>=8 in c:\users\hp\anaconda3\lib\site-pack
ages (from matplotlib>=2.0.0->prophet) (10.3.0)
Requirement already satisfied: pyparsing>=2.3.1 in c:\users\hp\anaconda3\lib\si
te-packages (from matplotlib>=2.0.0->prophet) (3.0.9)
Requirement already satisfied: pytz>=2020.1 in c:\users\hp\anaconda3\lib\site-p
ackages (from pandas>=1.0.4->prophet) (2024.1)
Requirement already satisfied: tzdata>=2022.7 in c:\users\hp\anaconda3\lib\sit
e-packages (from pandas>=1.0.4->prophet) (2023.3)
Requirement already satisfied: colorama in c:\users\hp\anaconda3\lib\site-packa
ges (from tqdm>=4.36.1->prophet) (0.4.6)
Requirement already satisfied: six>=1.5 in c:\users\hp\anaconda3\lib\site-packa
ges (from python-dateutil->holidays<1,>=0.25->prophet) (1.16.0)
Note: you may need to restart the kernel to use updated packages.
```

In [41]:

```python
from prophet import Prophet
import pandas as pd
import matplotlib.pyplot as plt

# Load your cleaned dataset
gold = pd.read_csv("gold_prices.csv", skiprows=[0,1])
gold.columns = ['Date', 'Close', 'High', 'Low', 'Open', 'Volume']
gold['Date'] = pd.to_datetime(gold['Date'])
gold = gold[['Date', 'Close']].dropna()
```

```
# Prophet needs columns named 'ds' (date) and 'y' (value)
data = gold.rename(columns={'Date': 'ds', 'Close': 'y'})

# Initialize and fit the model
model = Prophet()
model.fit(data)

# Create future dataframe for 10 years (120 months)
future = model.make_future_dataframe(periods=120, freq='M')

# Predict future values
forecast = model.predict(future)

# Plot forecast
model.plot(forecast)
plt.title("Gold Price Forecast for Next 10 Years")
plt.xlabel("Year")
plt.ylabel("Predicted Gold Price (USD)")
plt.show()
```

```
12:04:39 - cmdstanpy - INFO - Chain [1] start processing
12:04:39 - cmdstanpy - INFO - Chain [1] done processing
C:\Users\hp\anaconda3\Lib\site-packages\prophet\forecaster.py:1872: FutureWarni
ng: 'M' is deprecated and will be removed in a future version, please use 'ME'
instead.
  dates = pd.date_range(
```



In [50]:
```
!jupyter nbconvert --to html Gold_Price_Prediction_Forecasting.ipynb
```

```
[NbConvertApp] Converting notebook Gold_Price_Prediction_Forecasting.ipynb to h
tml
[NbConvertApp] WARNING | Alternative text is missing on 2 image(s).
[NbConvertApp] Writing 465350 bytes to Gold_Price_Prediction_Forecasting.html
```