Importing the dataset

In [1]:
```
import pandas as pd
data = pd.read_csv('updated_pollution_dataset.csv')
print(data.head())
```

```
   Temperature  Humidity  PM2.5  PM10   NO2   SO2    CO  \
0         29.8      59.1    5.2  17.9  18.9   9.2  1.72
1         28.3      75.6    2.3  12.2  30.8   9.7  1.64
2         23.1      74.7   26.7  33.8  24.4  12.6  1.63
3         27.1      39.1    6.1   6.3  13.5   5.3  1.15
4         26.5      70.7    6.9  16.0  21.9   5.6  1.01

   Proximity_to_Industrial_Areas  Population_Density Air Quality
0                            6.3                 319    Moderate
1                            6.0                 611    Moderate
2                            5.2                 619    Moderate
3                           11.1                 551        Good
4                           12.7                 303        Good
```

Determining Key Features

In [2]:
```
key = ['Temperature', 'Humidity', 'NO2', 'SO2', 'CO', 'Population_Density','Air Quality']
df = pd.DataFrame(data,columns=key)
df.head()
```

Out[2]:

	Temperature	Humidity	NO2	SO2	CO	Population_Density	Air Quality
0	29.8	59.1	18.9	9.2	1.72	319	Moderate
1	28.3	75.6	30.8	9.7	1.64	611	Moderate
2	23.1	74.7	24.4	12.6	1.63	619	Moderate
3	27.1	39.1	13.5	5.3	1.15	551	Good
4	26.5	70.7	21.9	5.6	1.01	303	Good

In [3]:
```
y = df['Air Quality']
X = df.drop(columns=['Air Quality'])
```

Converting labels, splitting and training the dataset

In [4]:
```
from sklearn.preprocessing import LabelEncoder
from sklearn.model_selection import train_test_split
from sklearn.svm import SVC
```

In [5]:
```
label_encoder = LabelEncoder()
y_encoded = label_encoder.fit_transform(y)
```

In [6]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y_encoded, test_size=0.2, random_state=42)
model = SVC(kernel='linear')
model.fit(X_train, y_train)
```

Out[6]:
```
SVC
SVC(kernel='linear')
```

In [7]:
```
y_pred = model.predict(X_test)
```

Determining the accuracy, precision, recall and f1-score

In [8]:
```
from sklearn.metrics import accuracy_score
from sklearn.metrics import precision_score, recall_score, f1_score
```

In [9]:
```
accuracy=accuracy_score(y_test,y_pred)
print("Accuracy:", accuracy)
```

```
Accuracy: 0.922
```

In [10]:
```
precision=precision_score(y_test,y_pred, average="weighted")
recall=recall_score(y_test,y_pred, average="weighted")
f1score=f1_score(y_test,y_pred, average="weighted")
```

In [11]:
```
print("Precision:", precision)
print("Recall:", recall)
print("F1-score:", f1score)
```

```
Precision: 0.9225227412863467
Recall: 0.922
F1-score: 0.9218282647629309
```

Plotting the confusion matrix

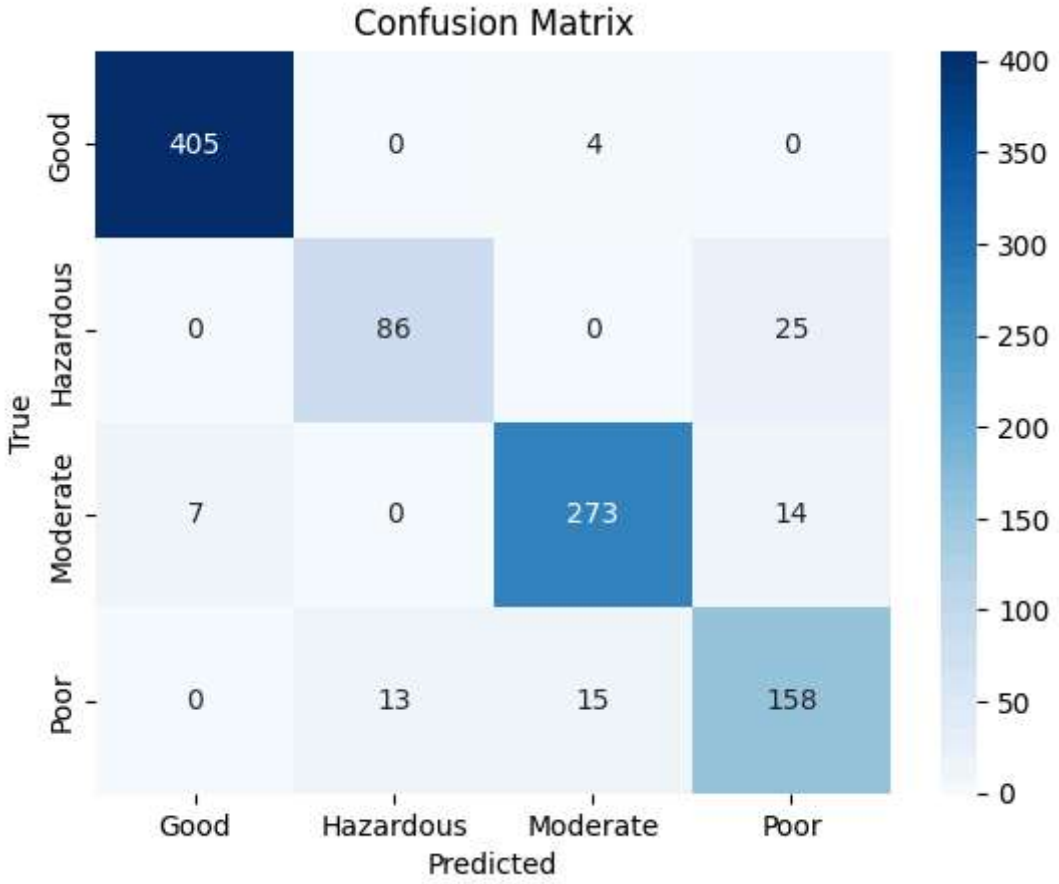
In [12]:
```
from sklearn.metrics import confusion_matrix
import seaborn as sns
import matplotlib.pyplot as plt
```

In [13]:
```
cm = confusion_matrix(y_test,y_pred)
cm
```

Out[13]:
```
array([[405,   0,   4,   0],
       [  0,  86,   0,  25],
       [  7,   0, 273,  14],
       [  0,  13,  15, 158]])
```

In [14]:
```
labels = label_encoder.classes_

sns.heatmap(cm, annot=True, fmt="d", cmap='Blues', xticklabels=labels, yticklabels=labels)
plt.xlabel('Predicted')
plt.ylabel('True')
plt.title('Confusion Matrix')
plt.show()
```


Confusion Matrix
Good
Hazardous
Moderate
Poor
True
405
0
4
0
0
86
0
25
7
0
273
14
0
13
15
158
Good
Hazardous
Moderate
Poor
Predicted
400
350
300
250
200
150
100
50
0