In [1]:

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.svm import SVC
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import confusion_matrix
from sklearn.metrics import accuracy_score
from sklearn.metrics import precision_score , recall_score , f1_score
from sklearn.metrics import roc_curve , auc
import matplotlib.pyplot as plt
```

In [2]:

```
# Load the dataset
df = pd.read_csv('inf.csv')
df = df.drop(['Unnamed: 0'],axis = 1)
```

In [3]:

```
df['Pathogen Test Result'].value_counts()
```

Out[3]:

```
1    10028
0     8489
Name: Pathogen Test Result, dtype: int64
```

In [4]:

```
df.describe()
```

Out[4]:

	Collection Year	Pathogen Test Result	Host Sex	Host Age	Chronic Conditions	Fever
count	18517.000000	18517.000000	18517.000000	18517.000000	18517.000000	18517.000000
mean	2015.881838	0.541556	0.471405	34.079657	7.982341	0.442944
std	2.855294	0.498284	0.499195	22.497576	11.803348	0.496747
min	2006.000000	0.000000	0.000000	1.000000	0.000000	0.000000
25%	2015.000000	0.000000	0.000000	16.000000	0.000000	0.000000
50%	2016.000000	1.000000	0.000000	32.000000	0.000000	0.000000
75%	2018.000000	1.000000	1.000000	51.000000	18.000000	1.000000
max	2020.000000	1.000000	1.000000	97.000000	30.000000	1.000000

8 rows × 22 columns

In [5]:

```
# Split the data into features and target variable
X = df.drop(['Pathogen Test Result'],axis = 1)
Y = df['Pathogen Test Result']
```

In [6]:

```
X
```

Out[6]:

	Collection Year	Host Sex	Host Age	Chronic Conditions	Fever	chills	conjunctivitis	cough	diarrhea	fev
0	2013	0.0	42	0	0	0	0	0	0	
1	2019	0.0	26	26	1	1	0	1	0	
2	2014	1.0	1	0	1	0	0	1	0	
3	2012	1.0	4	0	0	0	0	0	0	
4	2015	1.0	64	4	0	0	1	0	0	
...	...	...	...	...	...	...	...	...	...	
18512	2013	0.0	20	0	0	1	0	1	0	
18513	2016	0.0	58	8	0	1	1	0	0	
18514	2018	0.0	74	26	0	1	0	1	0	
18515	2020	1.0	4	0	1	0	0	1	0	
18516	2014	1.0	42	0	0	1	0	1	0	

18517 rows × 21 columns

In [7]:

```
Y
```

Out[7]:

```
0        1
1        0
2        1
3        1
4        1
        ..
18512    1
18513    0
18514    1
18515    0
18516    1
Name: Pathogen Test Result, Length: 18517, dtype: int64
```

In [8]:

```
# Split the data into training and testing sets
X_train , X_test , Y_train , Y_test = train_test_split(X,Y,test_size= 0.3, random_state=
```

In [9]:

```
st_x= StandardScaler()
X_train= st_x.fit_transform(X_train)
X_test= st_x.transform(X_test)
```

In [10]:

```
# Train the model on the training set
classifier = SVC(kernel='linear', random_state=2)
classifier.fit(X_train, Y_train)
```

Out[10]:

```
▾                   SVC

SVC(kernel='linear', random_state=2)
```

In [11]:

```
# Use the trained model to make predictions on the testing set
y_pred = classifier.predict(X_test)
```

In [12]:

```
cm= confusion_matrix(Y_test, y_pred)
```

In [13]:

```
cm
```

Out[13]:

```
array([[2022,  539],
       [1091, 1904]], dtype=int64)
```

In [14]:

```
score =accuracy_score(Y_test,y_pred)
print('accuracy on testing Data :',round(score*100 ,2),'%')
```

```
accuracy on testing Data : 70.66 %
```

In [ ]:

```

```

In [15]:

```
y_pred2 =classifier.predict(X_train)
```

In [16]:

```
score2 =accuracy_score(y_pred2, Y_train)
print('accuracy on Training Data :',round(score2*100 ,2),'%')
```

```
accuracy on Training Data : 71.1 %
```

In [17]:

```
# precision for trainig and testing
print('for testing  : ' , round(precision_score(Y_test , y_pred)*100,2),'%')
print('for training : ' , round(precision_score(Y_train , y_pred2)*100,2),'%')
```

```
for testing  :  77.94 %
for training :  78.67 %
```

In [18]:

```
# Recall for trainig and testing
print('for testing  : ' , round(recall_score(Y_test , y_pred)*100,2),'%')
print('for training : ' , round(recall_score(Y_train , y_pred2)*100,2),'%')
```

```
for testing  :  63.57 %
for training :  64.13 %
```

In [19]:

```
# f1_score for trainig and testing
print('for testing  : ' , round(f1_score(Y_test , y_pred)*100,2),'%')
print('for training : ' , round(f1_score(Y_train , y_pred2)*100,2),'%')
```

```
for testing  :  70.03 %
for training :  70.66 %
```

In [20]:

```
# for sensitivity and specificity
tn, fp, fn, tp = cm.ravel()
```

In [21]:

```
specificity = tn / (tn+fp)
print('specificity for data is : ',round(specificity*100,2),'%')
```

```
specificity for data is :  78.95 %
```

In [22]:

```
sensitivity = tp / (tp+fn)
print('sensitivity for data is : ',round(sensitivity*100,2),'%')
```

```
sensitivity for data is :  63.57 %
```

In [23]:

```
#ROC and AUC
fpr, tpr, threshold = roc_curve(Y_test,y_pred)
roc_auc = auc(fpr, tpr)
```

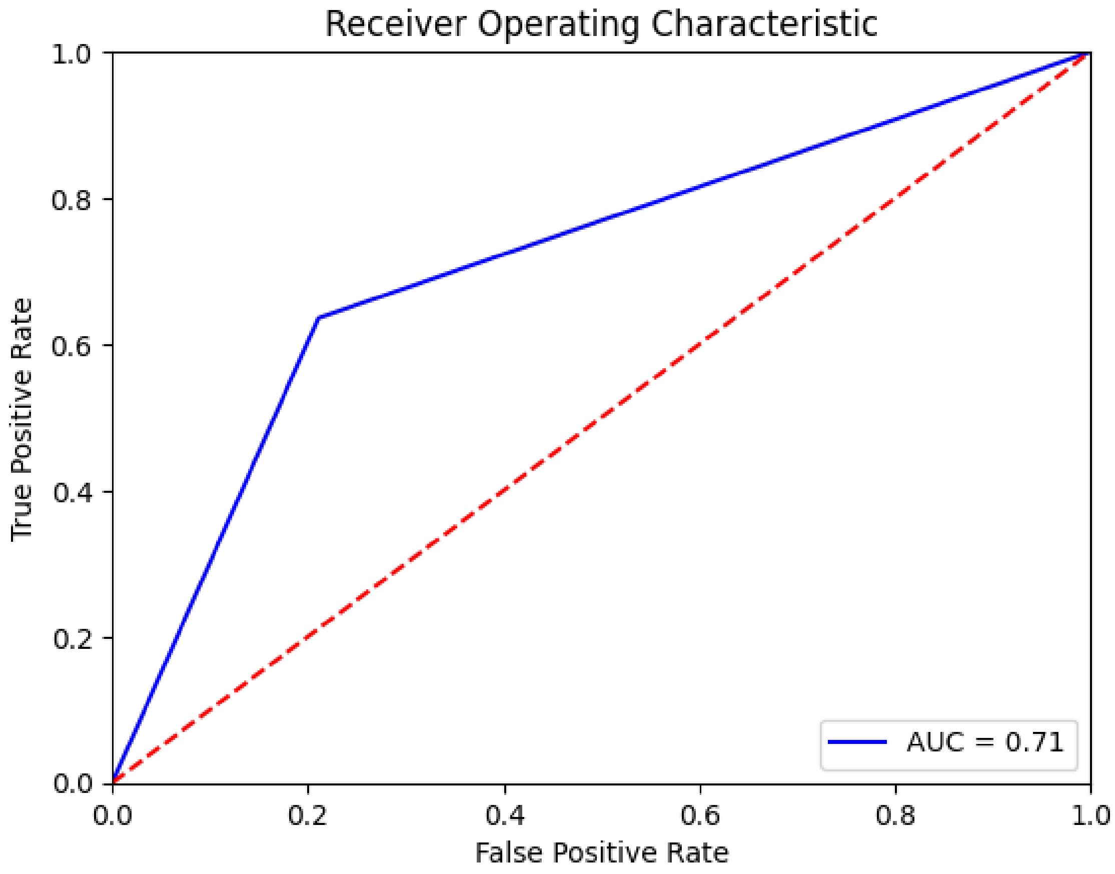
In [24]:

```
print('Area under curve : ',round(roc_auc*100,2),'%')
```

```
Area under curve :  71.26 %
```

In [25]:

```
plt.title('Receiver Operating Characteristic')
plt.plot(fpr, tpr, 'b', label = 'AUC = %0.2f' % roc_auc)
plt.legend(loc = 'lower right')
plt.plot([0, 1], [0, 1],'r--')
plt.xlim([0, 1])
plt.ylim([0, 1])
plt.ylabel('True Positive Rate')
plt.xlabel('False Positive Rate')
plt.show()
```



In [ ]:

```
```