DESARROLLO LABORATORIO 19

In [2]:
```
#Just in Case
import warnings
warnings.filterwarnings('ignore')


#Importando las librerías necesarias
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import os
import model_evaluation_utils as meu

from sklearn.model_selection import train_test_split
from sklearn.preprocessing import KBinsDiscretizer
from sklearn.preprocessing import LabelEncoder
from collections import defaultdict
from sklearn.model_selection import GridSearchCV
from imblearn.combine import SMOTETomek
from sklearn.metrics import confusion_matrix, auc, roc_curve
from sklearn.preprocessing import label_binarize
from mlxtend.plotting import plot_decision_regions
from sklearn.naive_bayes import GaussianNB       #Para hacer un modelo Naive-Bayes
from sklearn.svm import SVC                      #Para hacer un modelo de Máquina de Soporte Vecto
```

In [3]:
```
# Estableciendo mi directorio de trabajo
os.chdir('D:\Social Data Consulting\Python for Data Science\data')
```

In [4]:
```
miArchivo="diabetes.csv"
df_diabetes=pd.read_csv(miArchivo)
df_diabetes.head()
```

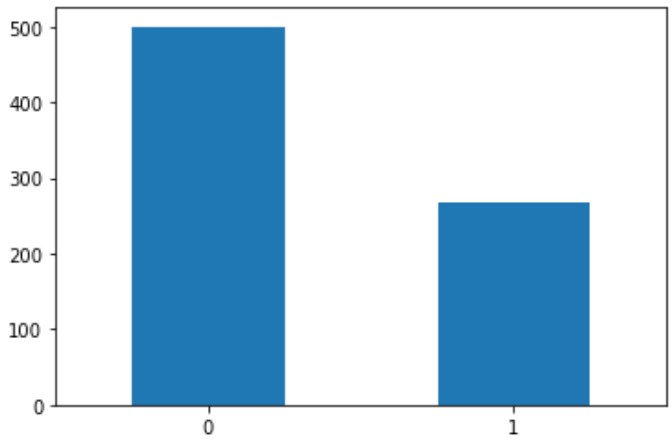
Out[4]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	6	148	72	35	0	33.6	0.627	50	1
1	1	85	66	29	0	26.6	0.351	31	0
2	8	183	64	0	0	23.3	0.672	32	1
3	1	89	66	23	94	28.1	0.167	21	0
4	0	137	40	35	168	43.1	2.288	33	1

1.Representar la variable predictora mediante el grafico de barras

In [5]:
```
pd.value_counts(df_diabetes.Outcome).plot(kind='bar',rot=0)
```

Out[5]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x221082afc10>
```



2.Dividir la data en 60% de entrenamiento y lo restante para la data de testeo

In [53]:
```
columnas=['Pregnancies', 'Glucose', 'BloodPressure', 'SkinThickness', 'Insulin', 'BMI', 'DiabetesP
target=['Outcome']
```

In [54]:
```
X=df_diabetes.iloc[:,0:df_diabetes.shape[1]-1].values
y=df_diabetes.iloc[:,df_diabetes.shape[1]-1].values
```

In [55]:
```
xtrain,xtest,ytrain,ytest=train_test_split(X,
                                           y,
                                           test_size=0.4,
                                           random_state=2020,
                                           stratify=y)
```

In [56]:
```
xtrain_df=pd.DataFrame(xtrain,columns=columnas)
ytrain_df=pd.DataFrame(ytrain,columns=target)

xtest_df=pd.DataFrame(xtest,columns=columnas)
ytest_df=pd.DataFrame(ytest,columns=target)

df_diabetes_train=pd.concat([xtrain_df,ytrain_df],axis=1)
df_diabetes_test=pd.concat([xtest_df,ytest_df],axis=1)
```

3. Entrenar el modelo y sacar el score de la data de entrenamiento y testeo

Discretizacion

In [57]:
```
#Instanciamos un objeto de clase KBinsDiscretizer
kbd=KBinsDiscretizer(n_bins=3,encode='ordinal',strategy='kmeans')
```

In [58]:
```
train_discreta=kbd.fit_transform(df_diabetes_train.loc[:,columnas])
test_discreta=kbd.transform(df_diabetes_test.loc[:,columnas])
```

In [59]:
```
train_discreta_df=pd.DataFrame(train_discreta,columns=columnas)
test_discreta_df=pd.DataFrame(test_discreta,columns=columnas)
```

In [60]:
```
df_diabetes_train.Pregnancies=train_discreta_df.Pregnancies
df_diabetes_train.Glucose=train_discreta_df.Glucose
df_diabetes_train.BloodPressure=train_discreta_df.BloodPressure
df_diabetes_train.SkinThickness=train_discreta_df.SkinThickness
df_diabetes_train.Insulin=train_discreta_df.Insulin
df_diabetes_train.BMI=train_discreta_df.BMI
df_diabetes_train.DiabetesPedigreeFunction=train_discreta_df.DiabetesPedigreeFunction
df_diabetes_train.Age=train_discreta_df.Age
```

In [61]:
```
df_diabetes_test.Pregnancies=test_discreta_df.Pregnancies
df_diabetes_test.Glucose=test_discreta_df.Glucose
df_diabetes_test.BloodPressure=test_discreta_df.BloodPressure
df_diabetes_test.SkinThickness=test_discreta_df.SkinThickness
df_diabetes_test.Insulin=test_discreta_df.Insulin
df_diabetes_test.BMI=test_discreta_df.BMI
df_diabetes_test.DiabetesPedigreeFunction=test_discreta_df.DiabetesPedigreeFunction
df_diabetes_test.Age=test_discreta_df.Age
```

In [84]:
```
df_diabetes_train.head()
```

Out[84]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	1.0	2.0	2.0	1.0	0.0	1.0	0.0	1.0	0
1	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	0
2	0.0	2.0	2.0	0.0	0.0	2.0	2.0	1.0	0
3	0.0	0.0	1.0	1.0	0.0	1.0	2.0	0.0	0
4	2.0	1.0	2.0	1.0	1.0	1.0	0.0	1.0	0

In [85]:
```
df_diabetes_test.head()
```

Out[85]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	0.0	2.0	2.0	1.0	1.0	1.0	1.0	0.0	1
1	0.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	1
2	0.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0	1
3	0.0	0.0	1.0	0.0	0.0	1.0	1.0	1.0	0
4	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0	0

Instanciamos y entrenamos el modelo

In [62]:
```
clf=GaussianNB()
```

In [63]:
```
clf.fit(xtrain,ytrain)
```

Out[63]:
```
GaussianNB()
```

Obtenemos el score del modelo Naive Bayes

Score para datos de entrenamiento

Score para datos de entrenamiento

In [64]:
```
clf.score(xtrain,ytrain)
```

Out[64]:
```
0.7608695652173914
```

Score para datos de testeo

In [69]:
```
clf.score(xtest,ytest)
```

Out[69]:
```
0.7532467532467533
```

4. Generar la matriz de confusion

Matriz de confusión para data de entrenamiento

In [79]:
```
#Estableciendo etiquetas
label_names=[0,1]
```

In [75]:
```
#Calculandremos los Ypredichos
ypredichos_train=clf.predict(xtrain)
```

In [76]:
```
confusion_matrix(ytrain,ypredichos_train)
```

Out[76]:
```
array([[251,  48],
       [ 62,  99]], dtype=int64)
```

In [80]:
```
#Evaluando la performance del modelo para datos de entrenamiento
meu.display_model_performance_metrics(true_labels=ytrain,predicted_labels=ypredichos_train, classe
```

```
Model Performance metrics:
------------------------------
Accuracy: 0.7609
Precision: 0.757
Recall: 0.7609
F1 Score: 0.7582

Model Classification report:
------------------------------
              precision    recall  f1-score   support

           0       0.80      0.84      0.82       299
           1       0.67      0.61      0.64       161

    accuracy                           0.76       460
   macro avg       0.74      0.73      0.73       460
weighted avg       0.76      0.76      0.76       460


Prediction Confusion Matrix:
------------------------------
     0   1
0  251  48
1   62  99
```

Matriz de confusión para data de testeo

In [77]:
```
ypredichos_test=clf.predict(xtest)
```

In [78]:
```
confusion_matrix(ytest,ypredichos_test)
```

Out[78]:
```
array([[163,  38],
       [ 38,  69]], dtype=int64)
```

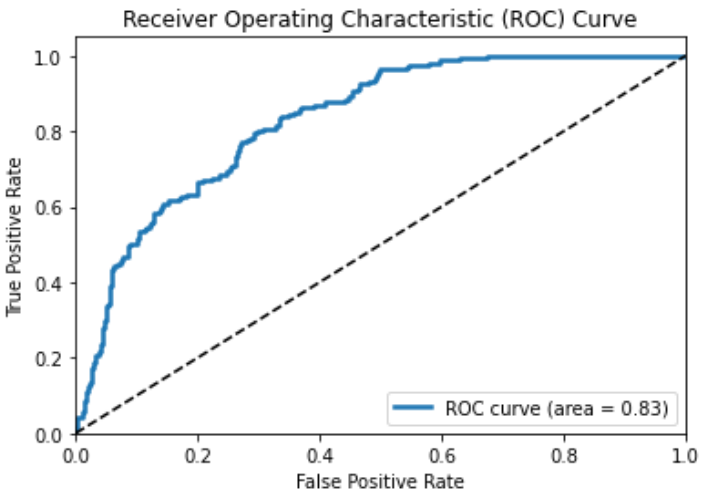
In [81]:
```
#Evaluando la performance del modelo para datos de entrenamiento
meu.display_model_performance_metrics(true_labels=ytest,predicted_labels=ypredichos_test, classes=
```

```
Model Performance metrics:
------------------------------
Accuracy: 0.7532
Precision: 0.7532
Recall: 0.7532
F1 Score: 0.7532

Model Classification report:
------------------------------
              precision    recall  f1-score   support

           0       0.81      0.81      0.81       201
           1       0.64      0.64      0.64       107

    accuracy                           0.75       308
   macro avg       0.73      0.73      0.73       308
weighted avg       0.75      0.75      0.75       308


Prediction Confusion Matrix:
------------------------------
     0   1
0  163  38
1   38  69
```

5. Generar la curva ROC

Curva ROC para data de entrenamiento

In [82]:
```
meu.plot_model_roc_curve(clf,xtrain,ytrain)
```



Curva ROC para data de testeo

In [83]:
```
meu.plot_model_roc_curve(clf,xtest,ytest)
```