UNIVERSITY OF CALOOCAN CITY
Caloocan, 1400 Metro Manila, Philippines

COLLEGE OF ENGINEERING
Computer Engineering
2nd Semester, School Year 2024-2025

Laboratory Activity No. 3.1	
Introduction to Object-Oriented Programming	
Course Code: CPE103	**Program:** BSCPE
Course Title: Object-Oriented Programming	**Date Performed:** 01/25/25
Section: 1-A	**Date Submitted:** 01/31/25
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1. Objective(s):	
This activity aims to familiarize students with the concepts of Object-Oriented Programming	
2. Intended Learning Outcomes (ILOs):	
The students should be able to: 2.1 Identify the possible attributes and methods of a given object 2.2 Create a class using the Python language 2.3 Create and modify the instances and the attributes in the instance.	
3. Discussion:	

Object-Oriented Programming (OOP) is an approach to programming that views the world and systems as consisting of objects that relate and interact with each other. This involves identifying the characteristics that describe the object which are known as the Attributes of the object. Furthermore, it also deals with identifying the possible capabilities or actions that an object is able to do which are called Methods.

An object is simply composed of Attributes and Methods wherein Attributes are variables that hold the information describing the object and Methods are functions which allow the object to perform its defined capabilities/actions. A UML Class Diagram is used to formally represent the collection of Attributes and Methods.

An example is given below considering a simple banking system.

Accounts ATM
+ account_number: int + serial_number: int
+ account_firstname: string
+ account_lastname: string
+ current_balance: float
+ address: string + deposit(account: Accounts, amount: int) + email: string + widthdraw(account: Accounts, amount: int) + update_address(new_address: string) + check_currentbalance(account: Accounts) + update_email(new_email: string) + view_transactionsummary()

4. Materials and Equipment:

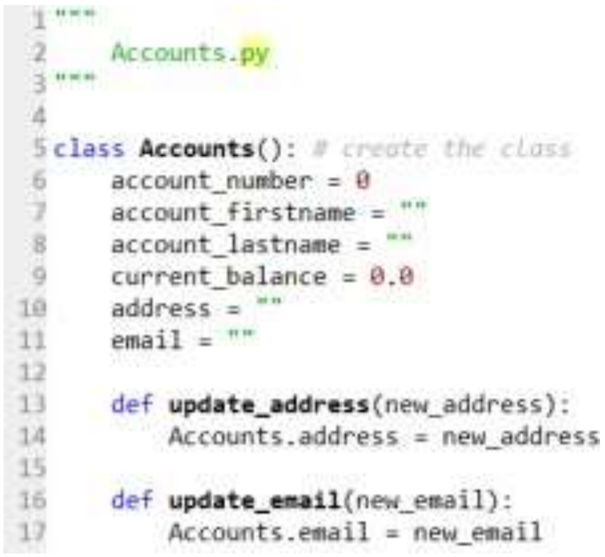
Desktop Computer with Anaconda Python/Python Colab
Windows Operating System

5. Procedure:

Creating Classes
1. Create a folder named **OOPIntro_LastName**
2. Create a Python file inside the **OOPIntro_LastName** folder named **Accounts.py** and copy the code shown below:

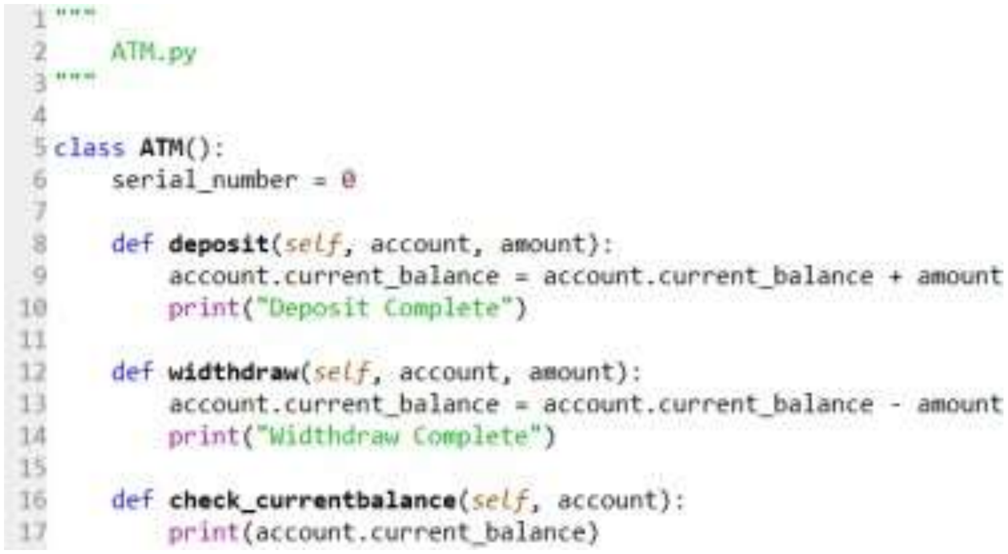
- **PLEASE REFER TO THIS LINK FOR MY ANSWERS**

https://colab.research.google.com/drive/1piiIF3Bkqrp6gqIILDuIBomZoUYlCNeW?authuser=2#scrollTo=4DzY8mbMKla5



```python
"""
    Accounts.py
"""

class Accounts(): # create the class
    account_number = 0
    account_firstname = ""
    account_lastname = ""
    current_balance = 0.0
    address = ""
    email = ""

    def update_address(new_address):
        Accounts.address = new_address

    def update_email(new_email):
        Accounts.email = new_email
```

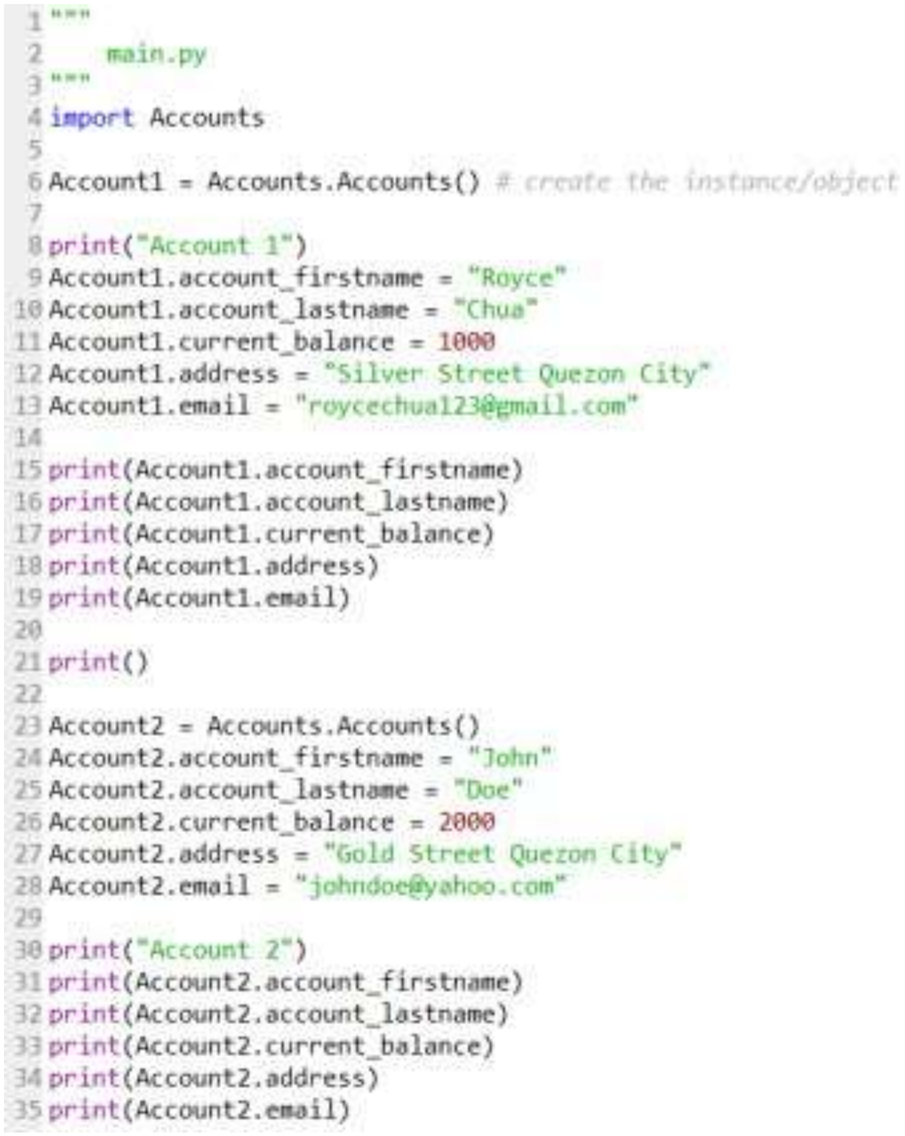
3. Modify the Accounts.py and add `self,` before the new_address and new_email.
4. Create a new file named ATM.py and copy the code shown below:



```python
"""
    ATM.py
"""

class ATM():
    serial_number = 0

    def deposit(self, account, amount):
        account.current_balance = account.current_balance + amount
        print("Deposit Complete")

    def widthdraw(self, account, amount):
        account.current_balance = account.current_balance - amount
        print("Widthdraw Complete")

    def check_currentbalance(self, account):
        print(account.current_balance)
```

Creating Instances of Classes

5. Create a new file named main.py and copy the code shown below:



```python
"""
    main.py
"""
import Accounts

Account1 = Accounts.Accounts() # create the instance/object

print("Account 1")
Account1.account_firstname = "Royce"
Account1.account_lastname = "Chua"
Account1.current_balance = 1000
Account1.address = "Silver Street Quezon City"
Account1.email = "roycechua123@gmail.com"

print(Account1.account_firstname)
print(Account1.account_lastname)
print(Account1.current_balance)
print(Account1.address)
print(Account1.email)

print()

Account2 = Accounts.Accounts()
Account2.account_firstname = "John"
Account2.account_lastname = "Doe"
Account2.current_balance = 2000
Account2.address = "Gold Street Quezon City"
Account2.email = "johndoe@yahoo.com"

print("Account 2")
print(Account2.account_firstname)
print(Account2.account_lastname)
print(Account2.current_balance)
print(Account2.address)
print(Account2.email)
```

6.

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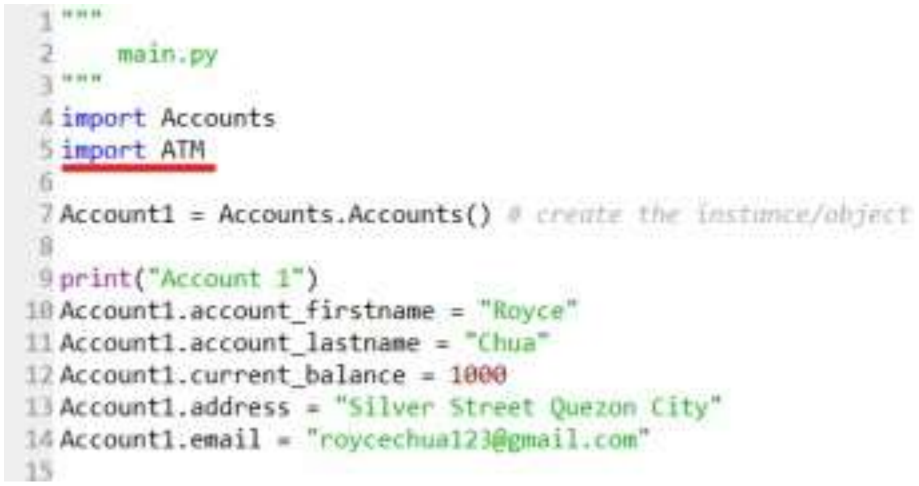
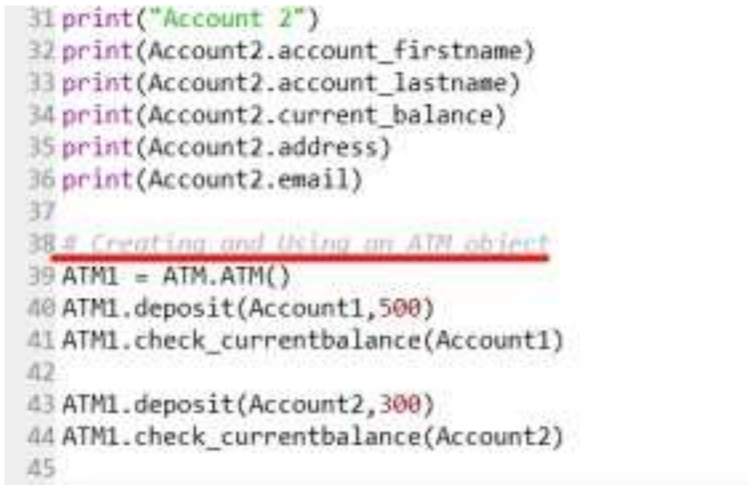
Run the main.py program and observe the output. Observe the variables names account_firstname, account_lastname as well as other variables being used in the Account1 and Account2. 7. Modify the main.py program and add the code underlined in red.



```
"""
    main.py
"""
import Accounts
import ATM

Account1 = Accounts.Accounts() # create the instance/object

print("Account 1")
Account1.account_firstname = "Royce"
Account1.account_lastname = "Chua"
Account1.current_balance = 1000
Account1.address = "Silver Street Quezon City"
Account1.email = "roycechua123@gmail.com"

```

8. Modify the main.py program and add the code below line 38.

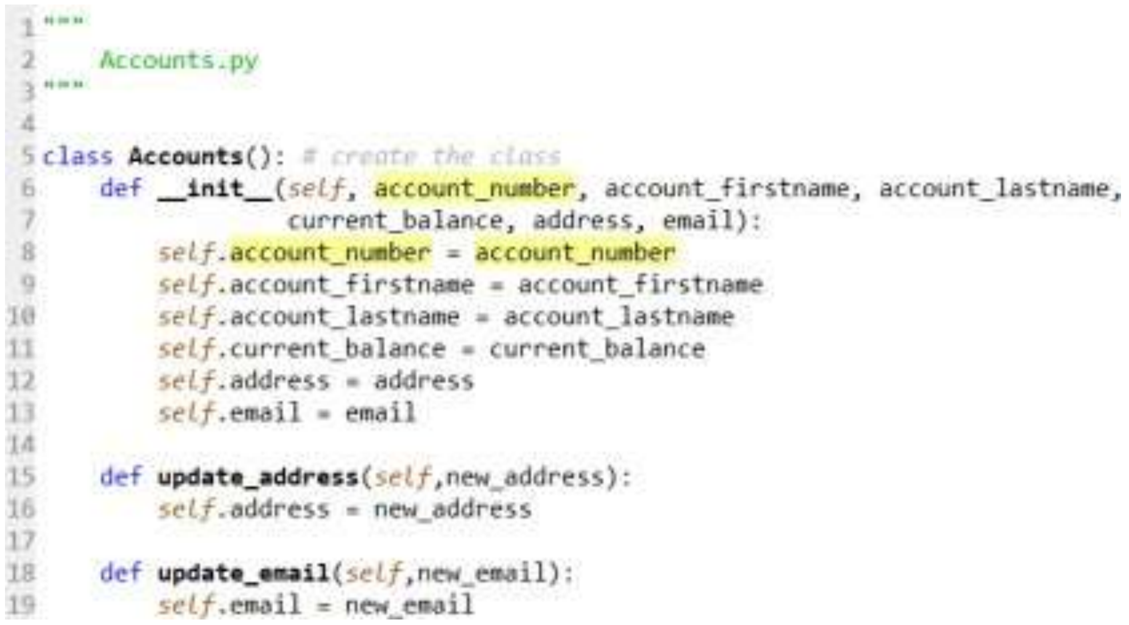


```python
print("Account 2")
print(Account2.account_firstname)
print(Account2.account_lastname)
print(Account2.current_balance)
print(Account2.address)
print(Account2.email)

# Creating and Using an ATM object
ATM1 = ATM.ATM()
ATM1.deposit(Account1,500)
ATM1.check_currentbalance(Account1)

ATM1.deposit(Account2,300)
ATM1.check_currentbalance(Account2)

```

9. Run the main.py program.

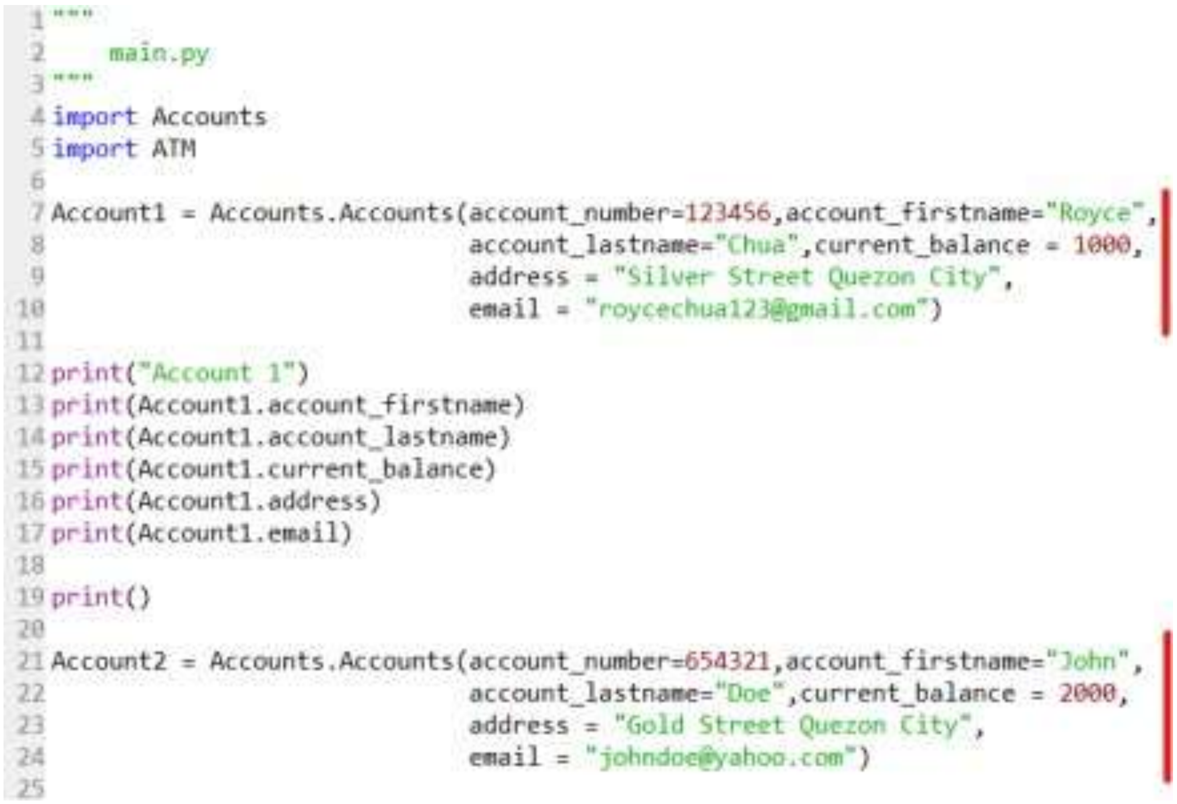
Create the Constructor in each Class

1. Modify the Accounts.py with the following code:
   Reminder: def _init_(): is also known as the constructor class



```python
"""
    Accounts.py
"""

class Accounts(): # create the class
    def __init__(self, account_number, account_firstname, account_lastname,
                 current_balance, address, email):
        self.account_number = account_number
        self.account_firstname = account_firstname
        self.account_lastname = account_lastname
        self.current_balance = current_balance
        self.address = address
        self.email = email

    def update_address(self,new_address):
        self.address = new_address

    def update_email(self,new_email):
        self.email = new_email
```

2. Modify the main.py and change the following codes with the red line. Do not remove the other codes in the program.



```python
"""
    main.py
"""
import Accounts
import ATM

Account1 = Accounts.Accounts(account_number=123456,account_firstname="Royce",
                             account_lastname="Chua",current_balance = 1000,
                             address = "Silver Street Quezon City",
                             email = "roycechua123@gmail.com")

print("Account 1")
print(Account1.account_firstname)
print(Account1.account_lastname)
print(Account1.current_balance)
print(Account1.address)
print(Account1.email)

print()

Account2 = Accounts.Accounts(account_number=654321,account_firstname="John",
                             account_lastname="Doe",current_balance = 2000,
                             address = "Gold Street Quezon City",
                             email = "johndoe@yahoo.com")

```

3. Run the main.py program again and run the output.

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6. Supplementary Activity:

Tasks

1. Modify the ATM.py program and add the constructor function.
   https://colab.research.google.com/drive/1piiIF3Bkqrp6gqIILDuIBomZoUYlCNeW?authuser=2#scr
   ollTo=lfSCNKDFEUdf&line=1&uniqifier=1
2. Modify the main.py program and initialize the ATM machine with any integer serial number combination and display the serial number at the end of the program.
   https://colab.research.google.com/drive/1piiIF3Bkqrp6gqIILDuIBomZoUYlCNeW?authuser=2
   #scrollTo=FIU7LzLqHlxW&line=1&uniqifier=1
3. Modify the ATM.py program and add the **view_transactionsummary()** method. The method should display all the transaction made in the ATM object.
   https://colab.research.google.com/drive/1piiIF3Bkqrp6gqIILDuIBomZoUYlCNeW?authuser=
   2#scrollTo=tUGOxWbYJDzh&line=1&uniqifier=1

Questions

1. What is a class in Object-Oriented Programming?

   - **A class in Object-Oriented Programming is like a blueprint for creating objects. It defines variables and methods that objects of that class will have.**

2. Why do you think classes are being implemented in certain programs while some are sequential(line-by-line)?

   - **Some programs use classes because they need reusable and organized code, especially for large projects. Other programs are sequential because they are small and don't need complex structures.**

3. How is it that there are variables of the same name such account_firstname and account_lastname that exist but have different values?

   - **Variables like account_firstname and account_lastname can have different values because they belong to different objects. Each object has its own copy of the variables.**

4. Explain the constructor functions role in initializing the attributes of the class? When does the Constructor function execute or when is the constructor function called?

- **A constructor function initializes the attributes of a class when an object is created. It is called automatically when the object is made.**

5. Explain the benefits of using Constructors over initializing the variables one by one in the main program?

- **Using constructors is better because it saves time, reduces errors, and keeps code clean. Instead of writing multiple lines to set values, the constructor does it all at once when the object is created**.

7. Conclusion:

In this laboratory, I explored the concept of classes in Object-Oriented Programming and their importance in structuring code efficiently. I learned that classes provide a blueprint for creating objects, making code more reusable and organized. The use of constructors simplifies initialization by automatically setting values when an object is created. Understanding why some programs use classes while others follow a sequential approach helped me see how different programming styles fit different needs.

8. Assessment Rubric: