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:** January 25, 2025
Section: BSCPE – 1A	**Date Submitted:** January 29, 2025
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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()

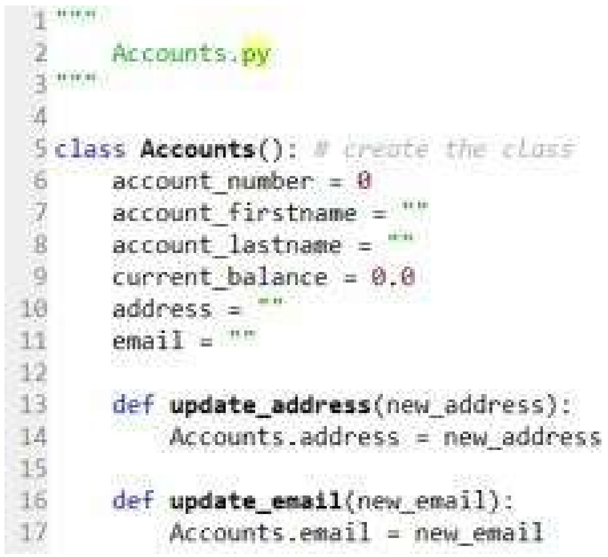
4. Materials and Equipment:

Desktop Computer with Anaconda Python/Python Colab
Windows Operating System

5. Procedure:

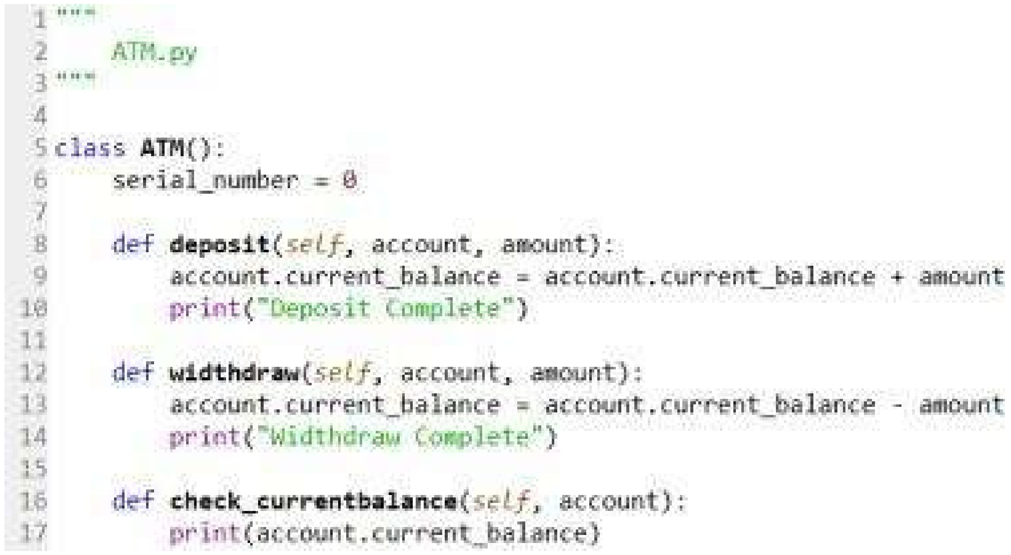
Creating Classes

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:



```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
```

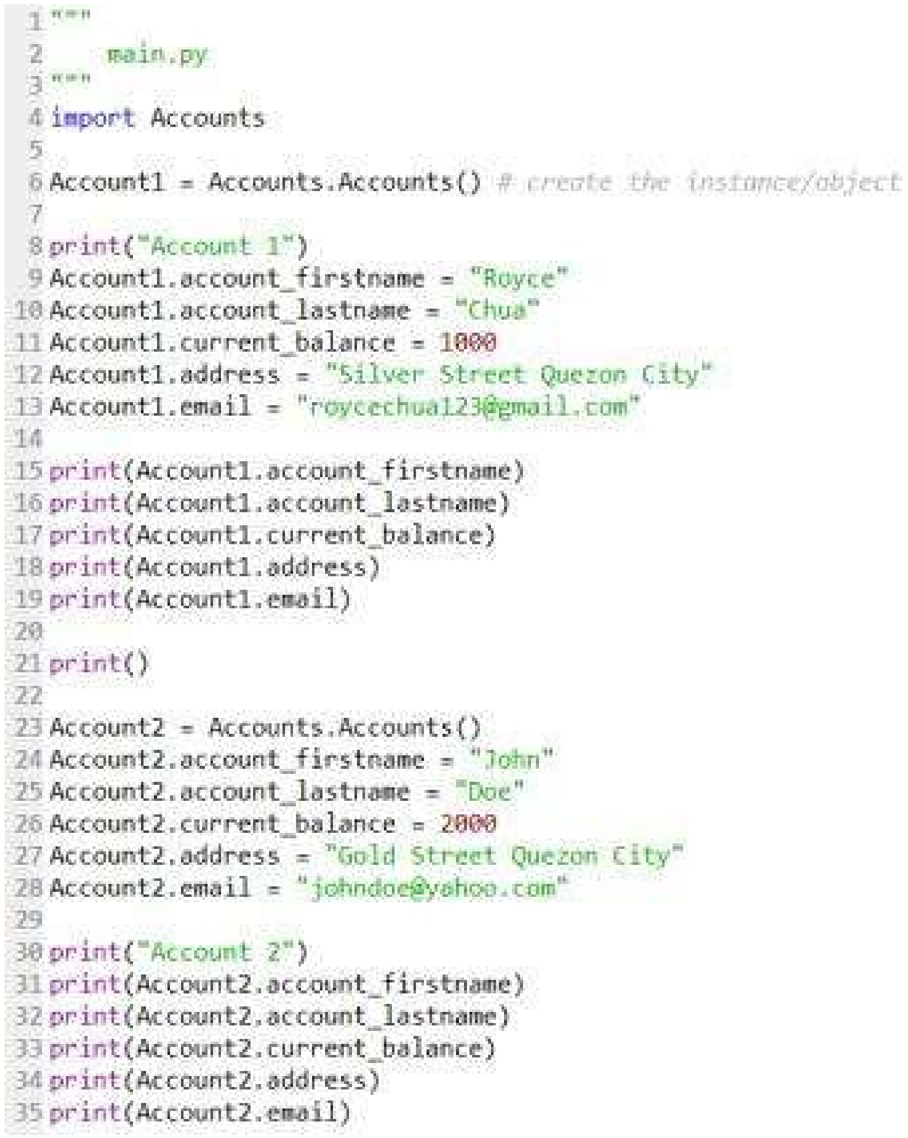
3. Modify the Accounts.py and add `self,` before the new_address and new_email.
4. Create a new file named ATM.py and copy the code shown below:



```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

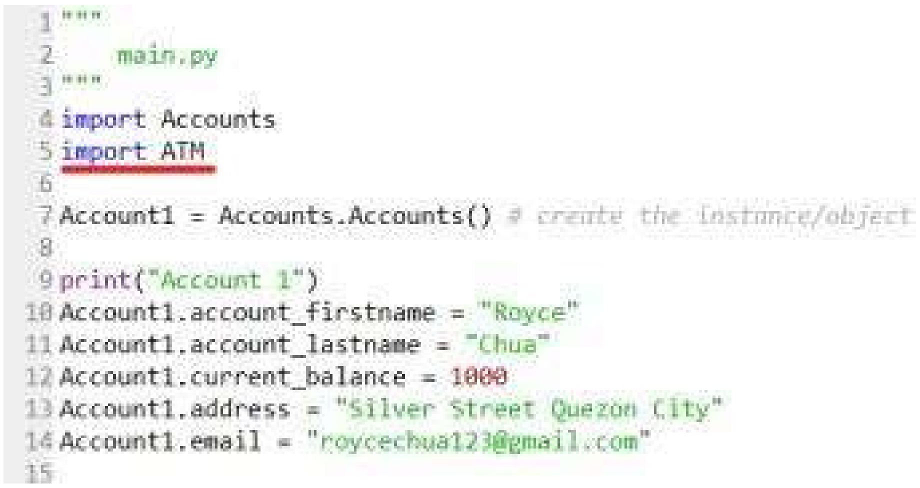
5. Create a new file named main.py and copy the code shown below:



```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.

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.

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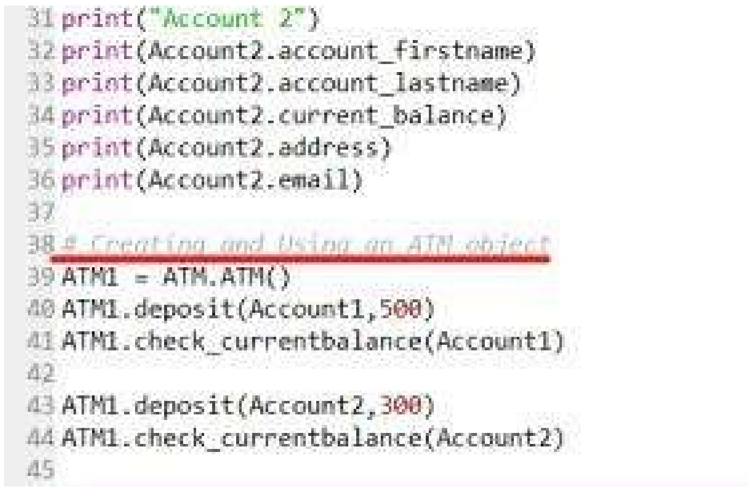
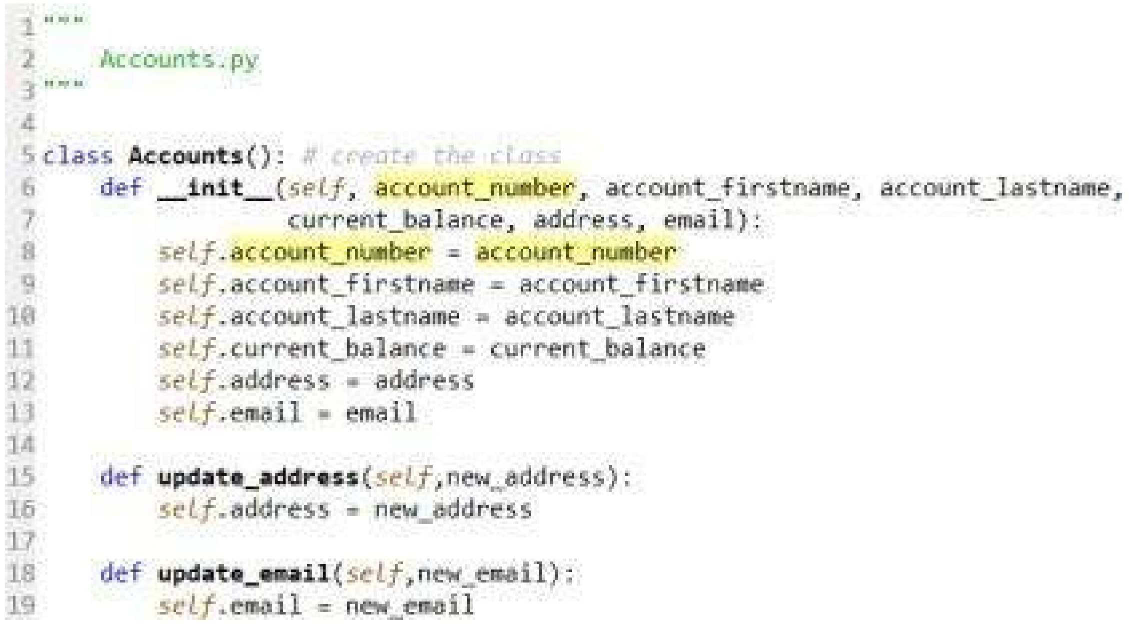


```python
print("Account 2")
print(Account2.account_firstname)
print(Account2.account_lastname)
print(Account2.current_balance)
print(Account2.address)
print(Account2.email)

# 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.

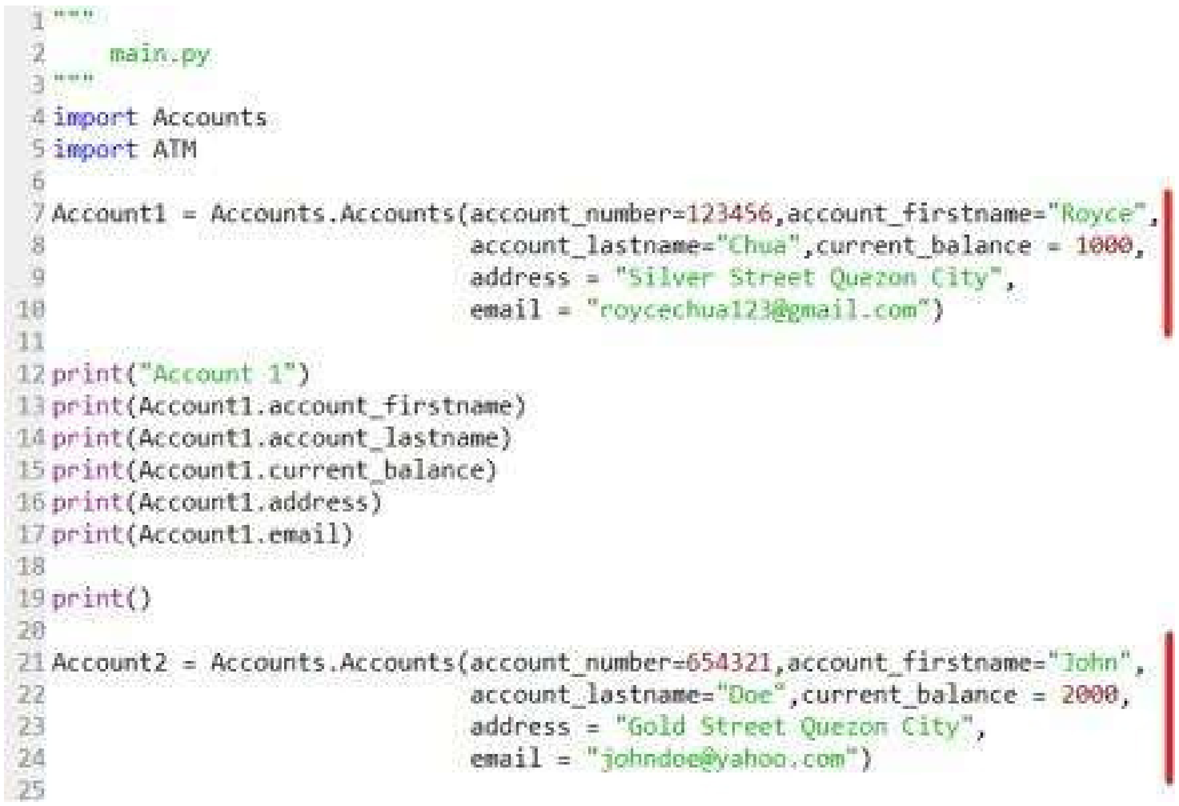
Create the Constructor in each Class

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.



```
"""
    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.

6. Supplementary Activity:

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Tasks

1. Modify the ATM.py program and add the constructor function.
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.
3. Modify the ATM.py program and add the **view_transactionsummary()** method. The method should display all the transaction made in the ATM object.

Questions

1. What is a class in Object-Oriented Programming?
   - class is a template definition of the methods and variables in a particular kind of object

2. Why do you think classes are being implemented in certain programs while some are sequential(line-by-line)?
   - classes are used in programs when organizing code into reusable and manageable parts is needed, especially for larger or more complex tasks. Sequential programming is used when a program can run step by step without needing extra structure.

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 with the same name, like account_firstname and account_lastname, can exist with different values because they are stored separately in different objects, functions, or scopes. In object-oriented programming, each object has its own copy of the variables, so different instances can hold different values for the same variable name.

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?
   - the constructor function sets up an object by giving its variables starting values when the object is created. It runs automatically when a new object is made from the class.

5. Explain the benefits of using Constructors over initializing the variables one by one in the main program?
   - Using a constructor saves time by automatically setting up an object's variables when it is created, instead of writing separate lines for each variable. It also keeps the code organized and reduces mistakes by ensuring all objects start with the right values. This makes programs easier to manage, especially when working with many objects

7. Conclusion:
This laboratory exercise taught me how to create and manage multiple Python files (i.e., account.py, atm.py, and main.py) and import them into the main file (main.py) to utilize their functionality. Additionally, it helped improve my coding skills, particularly in applying different formulas to calculate ATM balances. Overall, this laboratory was a valuable learning experience, providing me with useful knowledge and hands-on practice.
8. Assessment Rubric: