



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: 25-02-26
Section: 1-A	Date Submitted: 25-02-06
Name: Ruperto, April Anne A	Instructor: Engr. Maria Rizette H. Sayo
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:	



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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 + withdraw(account:
Accounts, amount: int) + update_address(new_address: string) + check_currentbalance(account:
Accounts) + update_email(new_email: string) + view_transactionssummary()
```

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:



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```
1 """
2     Accounts.py
3 """
4
5 class Accounts(): # create the class
6     account_number = 0
7     account_firstname = ""
8     account_lastname = ""
9     current_balance = 0.0
10    address = ""
11    email = ""
12
13    def update_address(new_address):
14        Accounts.address = new_address
15
16    def update_email(new_email):
17        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:

```
1 """
2     ATM.py
3 """
4
5 class ATM():
6     serial_number = 0
7
8     def deposit(self, account, amount):
9         account.current_balance = account.current_balance + amount
10        print("Deposit Complete")
11
12    def widthdraw(self, account, amount):
13        account.current_balance = account.current_balance - amount
14        print("Widthdraw Complete")
15
16    def check_currentbalance(self, account):
17        print(account.current_balance)
```

Creating Instances of Classes

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



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```
1 """
2     main.py
3 """
4 import Accounts
5
6 Account1 = Accounts.Accounts() # create the instance/object
7
8 print("Account 1")
9 Account1.account_firstname = "Royce"
10 Account1.account_lastname = "Chua"
11 Account1.current_balance = 1000
12 Account1.address = "Silver Street Quezon City"
13 Account1.email = "roycechua123@gmail.com"
14
15 print(Account1.account_firstname)
16 print(Account1.account_lastname)
17 print(Account1.current_balance)
18 print(Account1.address)
19 print(Account1.email)
20
21 print()
22
23 Account2 = Accounts.Accounts()
24 Account2.account_firstname = "John"
25 Account2.account_lastname = "Doe"
26 Account2.current_balance = 2000
27 Account2.address = "Gold Street Quezon City"
28 Account2.email = "johndoe@yahoo.com"
29
30 print("Account 2")
31 print(Account2.account_firstname)
32 print(Account2.account_lastname)
33 print(Account2.current_balance)
34 print(Account2.address)
35 print(Account2.email)
```



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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.

```
1 """
2     main.py
3 """
4 import Accounts
5 import ATM
6
7 Account1 = Accounts.Accounts() # create the instance/object
8
9 print("Account 1")
10 Account1.account_firstname = "Royce"
11 Account1.account_lastname = "Chua"
12 Account1.current_balance = 1000
13 Account1.address = "Silver Street Quezon City"
14 Account1.email = "roycechua123@gmail.com"
15
```

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



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```
31 print("Account 2")
32 print(Account2.account_firstname)
33 print(Account2.account_lastname)
34 print(Account2.current_balance)
35 print(Account2.address)
36 print(Account2.email)
37
38 # Creating and Using an ATM object
39 ATM1 = ATM.ATM()
40 ATM1.deposit(Account1,500)
41 ATM1.check_currentbalance(Account1)
42
43 ATM1.deposit(Account2,300)
44 ATM1.check_currentbalance(Account2)
45
```

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

```
1 """
2 Accounts.py
3 """
4
5 class Accounts(): # create the class
6     def __init__(self, account_number, account_firstname, account_lastname,
7                 current_balance, address, email):
8         self.account_number = account_number
9         self.account_firstname = account_firstname
10        self.account_lastname = account_lastname
11        self.current_balance = current_balance
12        self.address = address
13        self.email = email
14
15    def update_address(self,new_address):
16        self.address = new_address
17
18    def update_email(self,new_email):
19        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.



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```
1 """
2     main.py
3 """
4 import Accounts
5 import ATM
6
7 Account1 = Accounts.Accounts(account_number=123456,account_firstname="Royce",
8                               account_lastname="Chua",current_balance = 1000,
9                               address = "Silver Street Quezon City",
10                              email = "roycechua123@gmail.com")
11
12 print("Account 1")
13 print(Account1.account_firstname)
14 print(Account1.account_lastname)
15 print(Account1.current_balance)
16 print(Account1.address)
17 print(Account1.email)
18
19 print()
20
21 Account2 = Accounts.Accounts(account_number=654321,account_firstname="John",
22                               account_lastname="Doe",current_balance = 2000,
23                               address = "Gold Street Quezon City",
24                               email = "johndoe@yahoo.com")
25
```

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_transactionssummary()** method. The method should display all the transaction made in the ATM object.

Please refer to this link: [Laboratory No.3.ipynb - Colab](#)

Questions

1. What is a class in Object-Oriented Programming?
 - The object-oriented programming class can be referred to as a building plan or a prototype to design these objects. These involve the definition of attributes, which are the variables, and methods, which are the functions that define the behavior and characteristics of the objects. For instance, a Car class may have attributes like color, brand, and top speed, and methods like the drive () and brake ().
2. Why do you think classes are being implemented in certain programs while some are sequential(line-by-line)?
 - The need for modality, reuseability, and scalability are the major criteria in selecting which programs classes should be applied in. Classes organize code by combining related data and behavior, which makes it more convenient to manage and extend. On the other hand, sequential (or procedural) programming is used in simpler scripts where the execution follows a top-to-bottom flow without requiring an organized object.
3. How is it that there are variables of the same name such account_firstname and account_lastname that exist but have different values?
 - This is the reason why encapsulation and scoping are being used in programming. Each variable is tied to a different object or a different object, an instance of a class. For example, in case of two Account objects (account1 and account2) you create, they each have their own independent account_firstname and account_lastname values. Therefore, despite the names being identical, the values are different as they belong to different objects.



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4. Explain the constructor function's role in initializing the attributes of the class? When does the Constructor function execute or when is the constructor function called?
- The constructor function is the part that gets almost all of the attention as it is what makes the attributes of the class set to their initial values when an object is created. It marks its presence that an object, when either the default arguments are present or are fed explicitly, gets initialized when a construction is run. The constructor function is automatically executed by the time an instance of the class is born, and thus it is called refracted when the object is created. This saves the hassle of dealing with the objects by hand, i.e. by setting the attributes, say name and age, etc. after the object is already created.
5. Explain the benefits of using Constructors over initializing the variables one by one in the main program?
- This makes your code more efficient because you don't have to write each value again and again, and they all can be initialized in one place. It also minimizes the possibility of errors arising from either the omission or wrong assignment of values. Apart from that, the addition of these functions results in a greater level of maintainability since now the new logic will need to be done only in the constructor, not in every spot. They coexist with the encapsulation quality that is realized when the steps of initializing objects are hidden inside the classes, the instructions are well separated, and the main program has a good structure that is less complex.

7. Conclusion:

- Object-Oriented Programming classes demonstrate an organized manner to define objects which are modular, reusable, and scalable. The constructor function automatically initializes attributes which results in decreased manual assignments and improved efficiency. Through constructors, one can have more organized, maintainable, and error-free programs, thus, the code structure and scalability will be perceptible.

8. Assessment Rubric: