# Department of Electrical Engineering

**CS212**

**Object Oriented Programming**



# Lab 5: Static Data Members, Constants, Copy Constructors and Destructors

**Class**: BEE - 12C

**Date**: October 25th, 2021

**Time**: Monday (1400 – 1700)

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**Introduction**

In this lab Students will implement tasks using Class objects and will come to know how they can use static variables & static member functions

**Objectives**

The objective of this lab is an introduction to the concept of classes & objects in C++. Moreover, we will also explore access modifiers in today’s lab.

**Tools**

* Microsoft Visual Studio 2013

**Description**

You may consult lecture slides for the recent lectures and related book chapters during the lab session whenever you feel necessary points to note.

**Lab Tasks**

Create a SavingsAccount class. Use a static data member annualInterestRate to store the annual interest rate for each of the savers. Each member of the class contains a private data member savingsBalance indicating the amount the saver currently has on deposit. Provide member function calculateMonthlyInterest that calculates the monthly interest by multiplying the savingsBalance by annualInterestRate divided by 12; this interest should be added to savingsBalance. Provide a static member function modifyInterestRate that sets the static annualInterestRate to a new value.

Write a driver/test program (main program) to test class SavingsAccount.

* Provide constructors and destructors for your program
* Instantiate two different objects of class SavingsAccount, saver1 and saver2, with balances of $2000.00 and $3000.00, respectively.
* Instantiate third objects of class SavingsAccount, saver3 with balance of saver1 using default copy constructor.
* Set the annualInterestRate to value of 3 percent.
* Then calculate the monthly interest and
* print the new balances for each of the savers using constant function
* Then set the annualInterestRate to 7 percent, calculate the next month's interest and print the new balances for each of the savers.

**Code**

#include <iostream>

using namespace std;

class SavingsAccount {

private:

    double savingsBalance;

public:

    static double annualInterestRate;

    static void modifyInterestRate(double);

    void calculateMonthlyInterest(int n)

    {

        double monthlyInterest;

        monthlyInterest = savingsBalance \* annualInterestRate / 12;

        savingsBalance += monthlyInterest;

        cout << "Saver " << n << "'s"

             << " Monthly Interest: " << monthlyInterest << endl;

        cout << "\tNew Balance: " << savingsBalance << endl;

    }

    SavingsAccount(double n)

        : savingsBalance(n)

    {

    }

    ~SavingsAccount() { cout << "Destructor was called!" << endl; }

};

double SavingsAccount::annualInterestRate = 0;

void SavingsAccount::modifyInterestRate(double n)

{

    annualInterestRate = n;

}

int main()

{

    SavingsAccount saver1(2000.00), saver2(3000.00);

    SavingsAccount saver3(saver1);

    // FIRST MONTH

    SavingsAccount::modifyInterestRate(0.03);

    cout << "\tCurrent Interest Rate: " << SavingsAccount::annualInterestRate << "\n\n";

    saver1.calculateMonthlyInterest(1);

    saver2.calculateMonthlyInterest(2);

    saver3.calculateMonthlyInterest(3);

    // NEXT MONTH

    cout << endl

         << "\t Next Month's Calculations\n\n";

    SavingsAccount::modifyInterestRate(0.07);

    cout << "\tCurrent Interest Rate: " << SavingsAccount::annualInterestRate << "\n\n";

    saver1.calculateMonthlyInterest(1);

    saver2.calculateMonthlyInterest(2);

    saver3.calculateMonthlyInterest(3);

    cout << "\n\n";

    return 0;

}

**Terminal Output**

PS D:\NUST\Semester 3\Object Oriented Programming\Labs> lab5.exe

        Current Interest Rate: 0.03

Saver 1's Monthly Interest: 5

        New Balance: 2005

Saver 2's Monthly Interest: 7.5

        New Balance: 3007.5

Saver 3's Monthly Interest: 5

        New Balance: 2005

         Next Month's Calculations

        Current Interest Rate: 0.07

Saver 1's Monthly Interest: 11.6958

        New Balance: 2016.7

Saver 2's Monthly Interest: 17.5438

        New Balance: 3025.04

Saver 3's Monthly Interest: 11.6958

        New Balance: 2016.7

Destructor was called!

Destructor was called!

Destructor was called!