**44-542 Object-Oriented Programming**

**Lab04: Control Structures Lab Activity**

**Objective:** Covers the usage of arithmetic, relational, & logical operators, and various control structures (conditions, selections, and repetitions).

**Scenario:** To develop the fee calculator for non-resident MS-ACS graduate students who enroll courses at Northwest Missouri State University. This calculator shall calculate the total amount that students have to pay to the university. This would include the scholarship amounts also.

**Assumptions:**

Any undergraduate and the graduate course is of 3 credit hours.

**NOTE:**

* Check the sample output to know how the results need to be printed.
* Read every instruction carefully and follow them strictly.
* Do not change the name of the attributes, and methods given below.
* Use only the concepts covered in class.
* You are required to validate several values that user will enter through the console. Write your code in the Driver class such a way that it passes all the possible test cases.
  + GPA can only be between 0 and 4
  + Semester should only take the value 1,2,3 or 4
  + Pre-requisites can be at most 2.

**Sample validations:**

All the validations should be done while reading the input in Driver class

|  |
| --- |
| Please enter the full name (Firstname Lastname):  If no name is entered, user should be prompted to enter name again.    Please enter the number of pre-requisites:    Student can have only 0, 1, or 2 prerequisites. If any other number is entered, user should be prompted to enter again.  Please enter the number of semesters you want to calculate the cumulative fee:  If a value other than 1, 2, 3 or 4 is entered, user should be prompted to enter the correct value again.  Enter the cumulative GPA:  The value should be in between 0 – 4.0. User should be prompted to enter again if any other value is given. |

1. Create a New Project and name it as **Lastname\_Lab04ControlStructures** where **Lastname** is your last name.
2. Create a new package and name it as **feecalculator.** All classes in this lab should be in a package named **feecalculator.**
3. Create a new Java class, and name it as **FeeCalculator**. This class provides methods for calculating the total cost for the number of semesters that the user enters by checking the number of prerequisites. The scholarship is calculated based on the GPA entered by the user.
4. You can refer to the below tables for the information. You can use meaningful names of your own for all the constants.

Table I: Tuition and fee values

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Student Type** | **Tuition per credit hour** | **Fees per credit hour** | | | |
| **Incidental** | **Designated** | **Textbook** | **Technology** | **Computer science fee** |
| **Non-Resident Undergraduate** | $406.35 | $104.80 | $6 | $20.70 | $38 |
| **Non-Resident Graduate** | $505.72 | $115.55 | $0 | $20.70 | $38 |

The values given in the Table I cannot be changed. You have to declare them as constants if you want to use any value. For example, the syntax for declaring the constants is

public static final double UG\_INCIDENTAL\_FEE = 406.35

While calculating the cost, prerequisite courses are referred to as undergraduate courses and required courses are referred as graduate courses.

Table II: Distribution of courses

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Semester** | **With one pre-requisite** | | **With two pre-requisite** | | **No pre-requisites** |
| Undergraduate | Graduate | Undergraduate | Graduate | Graduate |
| 1 | 1 | 2 | 2 | 2 | 3 |
| 2 | 0 | 3 | 0 | 3 | 3 |
| 3 | 0 | 3 | 0 | 3 | 3 |
| 4 | 0 | 3 | 0 | 3 | 2 |

The values given in Table II can be hard coded.

Table III: Scholarship details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scholarship Name** | **Scholarship** | | **Comments** | |
| **International Graduate Achievement Scholarship** | | $1,000 (Use this value as constant) | | This scholarship is only for the first semester |
| **Graduate Non-Resident Waiver** | | 50% of incidental tuition (for all the courses in that semester) | | International students achieve this scholarship only in their 2nd , 3rd and 4th semester if their GPA is greater than or equal to 3.33 |

Table IV: Student Insurance details

|  |  |  |
| --- | --- | --- |
| **Insurance** | **Value** | **Description** |
| **Student insurance for semester 1** | $456.48 | Student insurance for the first semester. |
| **Student insurance for semester 2 and semester 3** | $760.2 | Student insurance for both second semester and third semester is $760.20. Use this value only while calculating the second-semester fee. |
| **Student insurance for semester 4** | $456.48 | Student insurance for the fourth semester. |

Table V: Currency details

|  |  |  |
| --- | --- | --- |
| **Currency Name** | **Value** | **Description** |
| **Indian rupee exchange** | 64.55 | Indian Rupee price equal to one US dollar |
| **Euro exchange** | 0.83 | Euro price equal to one US dollar |

Table VI: Other fee details

|  |  |  |
| --- | --- | --- |
| **Other fee** | **Value** | **Description** |
| **International student service fee** | $75 | International student service fee is the fee charged towards every semester for international students. |
| **Orientation Fee** | $75 | Orientation fee is charged only when a new student attends Northwest and will be applied only to the first-semester fee |

1. “**studentName**” is the only private instance variable.
2. Constructor**:**

Create a constructor with one parameter. The parameter is used to set the value of the instance variable.

1. Methods**:**

Methods are described below. All methods are private unless specified.

* 1. Write a getter and setter for the private instance variable.
  2. **getNameInitials():** This is a public method of return type String. This method returns the first letter of every word from the student name in uppercase. For example

Student name: margaret Mary emily Anne Hyra

Return value: M.M.E.A.H.

**Validation:**

The **studentName** cannot be an empty string and can contain any number of words.

* 1. **calcPrereqCost(int):** This method takes number of prerequisite(s) as a parameter and returns the cost of prerequisite course(s) of type double. To calculate the cost, refer to the appropriate values given in the Table I. A student can either have 0, 1 or 2 prerequisites. As you read from assumptions, one pre-requisite course is three credit hours.
  2. **findReqCoursesForSem1(int):** This method takes number of prerequisite(s) as a parameter and returns the number of required course(s) of type integer. To find the number of required courses in the first semester, refer to Table II for more details.
  3. **calcReqCourseCostForOneCourse():** This method does not take parameters and returns the required course cost for a course of type double. Refer to Table Ifor calculating the required course cost.

**Note:** Required courses does not include undergraduate courses.

* 1. **calcScholarship(int, int, double):** This method takes semester, prerequisites and GPA as parameters and returns the scholarship for a particular semester of type double. The scholarship should be calculated based on the semester and GPA.

Refer to Table III for calculating the scholarship.

* 1. **calcTotalScholarship(int, int, double):** This method takes semester, prerequisites and GPA as the parameters and returns the total scholarship of type double up to that semester.

**Example:** If the value of semester is 4, scholarship should be calculated for all the four semesters and the total should be returned.

First semester scholarship + scholarship achieved for second semester + scholarship achieved for third semester + scholarship achieved for fourth semester,

i.e. 1000 + 2500 + 2000 + 2000 =7500 is the total scholarship.

Use **calcScholarship()** method to calculate total scholarship.

* 1. **calcSemCost (int, int, double):** This public method takes semester, prerequisites and GPA as the parameters and returns the cost for a semester of type double. Use switch case to calculate the semester cost.
     1. To calculate the first-semester cost, you should be able to know the cost for the pre-requisites if any, the number of required courses and cost for those courses, student insurance for the respective semester, international student service fee, orientation fee and International Graduate Achievement Scholarship.
     2. To calculate the cost of the second, third and fourth semester, you should be able to know the cost for required courses, student insurance for the respective semester, international student service fee, and scholarship for that respective semester.

**Note**: Use existing methods.

* 1. **calcTotalCost(int, int, double):** This public method takes semester, prerequisites and GPA as the parameters and returns a value of type double. The value will be the total cost for all the semesters passing to this method. Use **calcSemCost()** to get the total cost.

* 1. **exchUSDToINR(double):** This public method takes the total cost as a parameter in USD and returns the Indian currency value of type double. Use Indian rupee exchange to calculate the return value.
  2. **exchUSDToEuro(double):** This public method takes the total cost as a parameter in USD and returns value in Euros of type double. Use Euro exchange to calculate the return value.
  3. **toString():** This method calls **getNameInitials()** and returns the initials of the name.
  4. **printReceipt(int, int, double):** Use **totalScholarship()** and **calcTotalCost()** to print the receipt. Look at the below example for the format. This is a public method.

For example**,** your print receipt method should print the following

M.M.E.A.H., on a whole the total scholarship till semester 4 is: $ 7827.22

Total cost till semester 4 is: $ 20115.05

1. Include Javadoc comments, using the @author, @param, and @return annotations when appropriate.
2. Generate documentation for your project by clicking on Run from the NetBeans menu bar and then selecting Generate Javadoc. The documentation will be placed in a javadoc subfolder of the dist subfolder inside your project folder. To view the documentation, open the index.html file that is created.

**Driver Class**

**Instructions:**

* Create a class named **FeeCalculatorDriver**. This class has a method **main** and uses one **Scanner** object to read input from the Console.
* Please look at the sample output and print the necessary statements in the same format.
* Look at the sample output and read the input values from console appropriately.
* Invoke **getNameInitials()** to print the initials of the name entered by the user.
* Invoke **calcSemCost()** to print semester wise details.
* Invoke **exchUSDToINR()** to print the total cost in Indian currency
* Invoke **exchUSDToEuro()** to print the total cost in Euros.
* Invoke **printReceipt()** to print the total scholarship value and total cost.
* The system should prompt the user whether the user wants to calculate again.

**Hint:** Use **do-while** concept.

* If the user does not want to calculate close the **scanner object** and the process should exit.

Hint: All the validations should be done while reading the input in Driver class.

**Sample output:**

|  |
| --- |
| \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  \*\*\*Northwest Cost Calculator\*\*\*  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Please enter the full name (Firstname Lastname): **Margaret Mary Emily Anne Hyra**  Please enter the number of pre-requisites: **2**  Please enter the number of semesters you want to calculate the cumulative fee: **4**  Enter the cumulative GPA: **3.33**  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  \* Hello, M.M.E.A.H.  \*------------------------------------  \* Your Account Summary  \*------------------------------------  \*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \* Semester 1 fee is: $ 7141.40 \*  \* Semester 2 fee is: $ 4679.19 \*  \* Semester 3 fee is: $ 3918.99 \*  \* Semester 4 fee is: $ 4375.47 \*  \*----------------------------------  \* Total cost: $ 20115.05  \*----------------------------------  \*  \* USD to INR: Rs. 1298426.48  \* USD to Euro: € 16695.49  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  M.M.E.A.H., on a whole the total scholarship till semester 4 is: $ 7827.22  Total fee till semester 4 is: $ 20115.05  Do you want to calculate again?(Y/N): **y**  Please enter the full name (Firstname Lastname): **Margaret Mary Emily Anne**  Please enter the number of pre-requisites: **1**  Please enter the number of semesters you want to calculate the cumulative fee: **1**  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  \* Hello, M.M.E.A.  \*------------------------------------  \* Your Account Summary  \*------------------------------------  \*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \* Semester 1 fee is: $ 5413.85 \*  \*----------------------------------  \* Total cost: $ 5413.85  \*----------------------------------  \*  \* USD to INR: Rs. 349464.02  \* USD to Euro: € 4493.50  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  M.M.E.A., on a whole the total scholarship till semester 1 is: $ 1000.00  Total fee till semester 1 is: $ 5413.85  Do you want to calculate again?(Y/N): **Y**  Please enter the full name (Firstname Lastname): **Margaret Mary Emily**  Please enter the number of pre-requisites: **3**  You have entered invalid number, please re-enter either 0 or 1 or 2: **1**  Please enter the number of semesters you want to calculate the cumulative fee: **5**  You have entered invalid number, please re-enter either 1 or 2 or 3 or 4: **3**  Enter the cumulative GPA: **5**  The GPA value should be in between 0 and 4, please re-enter: **3.6**  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  \* Hello, M.M.E.  \*------------------------------------  \* Your Account Summary  \*------------------------------------  \*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \* Semester 1 fee is: $ 5413.85 \*  \* Semester 2 fee is: $ 4679.19 \*  \* Semester 3 fee is: $ 3918.99 \*  \*----------------------------------  \* Total cost: $ 14012.03  \*----------------------------------  \*  \* USD to INR: Rs. 904476.54  \* USD to Euro: € 11629.98  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  M.M.E., on a whole the total scholarship till semester 3 is: $ 5551.48  Total fee till semester 3 is: $ 14012.03  Do you want to calculate again?(Y/N): **y**  Please enter the full name (Firstname Lastname): **Margaret Mary**  Please enter the number of pre-requisites: **0**  Please enter the number of semesters you want to calculate the cumulative fee: **2**  Enter the cumulative GPA: **3**  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  \* Hello, M.M.  \*------------------------------------  \* Your Account Summary  \*------------------------------------  \*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \* Semester 1 fee is: $ 5726.21 \*  \* Semester 2 fee is: $ 6954.93 \*  \*----------------------------------  \* Total cost: $ 12681.14  \*----------------------------------  \*  \* USD to INR: Rs. 818567.59  \* USD to Euro: € 10525.35  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  M.M., on a whole the total scholarship till semester 2 is: $ 1000.00  Total fee till semester 2 is: $ 12681.14  Do you want to calculate again?(Y/N): **n**  Thank You! All the best. |

**Submit your solution by following the steps below:**

* Save your files in **NetBeans**.
* Zip your entire Project. (It should be called ***Lastname*\_Lab04ControlStructures**.zip where the **Lastname** is your last name.)
* Submit the Zip file to the **Lab04ControlStructures** dropbox.
* Download the Zip file you have submitted.
* Look in the Zip file and verify the class files, javadocs in the Zip folder are updated. If not, resave your project in **NetBeans** and resubmit.