

CS 201 - Lab 01

Student: Suproteek Banerjee

CWID: A20637525

Deadline: 29th August 2025, 23:59

Objective:

The CS 201 course has the following weighting for the assignments:

Assignment	Weight
Quiz #1	10%
Quiz #2	15%
Midterm Exam	25%
Final Exam	30%
Labs (4 labs)	20%
Total	100%

The goal is to develop a program that calculates a student's weighted average based on the grades entered as integers and outputs the weighted average as a decimal.

***Bonus:** Also tried adding a feature to display the **grade** of the student (e.g. A, B, C, D, F)*

1) Inputs

The program requires the following inputs from the user (all as integers):

1. Quiz #1 score (out of 100)
2. Quiz #2 score (out of 100)
3. Midterm Exam score (out of 100)
4. Final Exam score (out of 100)
5. Lab scores for 4 labs (Lab #1, Lab #2, Lab #3, Lab #4, each out of 100)

Here's a detailed list of **all the variables** used

Variable Name	Type	Purpose / Description
<code>input</code>	<code>Scanner</code>	Used to read user input from the console.
<code>quiz1</code>	<code>int</code>	Stores the score for Quiz #1.
<code>quiz2</code>	<code>int</code>	Stores the score for Quiz #2.
<code>midterm</code>	<code>int</code>	Stores the score for the Midterm Exam.
<code>finalExam</code>	<code>int</code>	Stores the score for the Final Exam.
<code>totalLabScore</code>	<code>int</code>	Accumulates the sum of the 4 lab scores.
<code>i</code>	<code>int</code>	Loop counter used in the for loop to input lab scores.

averageLabScore	double	Stores the average of the 4 lab scores (used for weighted calculation).
weightedAverage	double	Stores the final calculated weighted average of all grades.
<i>Bonus Variable: grades</i>	<i>String</i>	<i>Stores the final letter grade (A, B, C, D, or F) based on the weighted average.</i>

2) Processes / Operations

The program performs the following steps:

1. Prompt the user to enter all required grades.
2. Sum up the 4 lab scores and calculate the **average lab score**.
3. Calculate the **weighted average** using the following formula:

$$\text{Weighted Average} = (\text{Quiz1} \times 0.10) + (\text{Quiz2} \times 0.15) + (\text{Midterm} \times 0.25) + (\text{Final} \times 0.30) + (\text{AverageLab} \times 0.20)$$

4. *Bonus Feature: Determine the **letter grade** based on the weighted average:*

- A: ≥ 90
- B: 80–89
- C: 70–79
- D: 60–69
- F: < 60

5. Display the **weighted average** and **final grade**.
-

3) Outputs

The program outputs:

1. Student's **Weighted Average** (decimal number)
 2. Student's **Final Grade** (letter grade)
-

4) Program Code

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        // Startup
        System.out.println();
        System.out.println("*****");
        System.out.println("Hello Professor Welcome to CS 201 Weighted Average Calculator");
        System.out.println("*****");
        System.out.println();

        // Inputs
        System.out.print("Enter Quiz #1 score (out of 100): ");
        int quiz1 = input.nextInt();

        System.out.print("Enter Quiz #2 score (out of 100): ");
        int quiz2 = input.nextInt();

        System.out.print("Enter Midterm Exam score (out of 100): ");
        int midterm = input.nextInt();

        System.out.print("Enter Final Exam score (out of 100): ");
        int finalExam = input.nextInt();

        // Labs: 4 labs, each out of 100
        int totalLabScore = 0;
        for (int i = 1; i <= 4; i++) {
            System.out.print("Enter Lab #" + i + " score (out of 100): ");
            totalLabScore += input.nextInt();
        }

        // Average lab score (since 4 labs together count for 20%)
        double averageLabScore = totalLabScore / 4.0;

        // Weighted Average Calculation
        double weightedAverage = (quiz1 * 0.10) +
            (quiz2 * 0.15) +
            (midterm * 0.25) +
            (finalExam * 0.30) +
            (averageLabScore * 0.20);

        String grades = "";
        if (weightedAverage >= 90){
            grades = "A";
        }
        if (weightedAverage >= 80 && weightedAverage < 90){
            grades = "B";
        }
        if (weightedAverage >= 70 && weightedAverage < 80){
            grades = "C";
        }
        if (weightedAverage >= 60 && weightedAverage < 70){
            grades = "D";
        }
        if (weightedAverage < 60){
            grades = "F";
        }
    }
}
```

```

// Output
System.out.println();
System.out.println("-----");
System.out.println("Student's Weighted Average: " + weightedAverage);
System.out.println("Student's Final Grade: " + grades);
System.out.println("-----");
System.out.println();
System.out.println("THANK YOU FOR USING THE CS 201 Weighted Average CALCULATOR!");
}
}

```

5) Test Plan

Test Case	Sample Data	Expected Output
All perfect scores	Quiz1=100, Quiz2=100, Midterm=100, Final=100, Labs=100,100,100,100	Weighted Average = 100.0, Grade = A
Average student	Quiz1=80, Quiz2=85, Midterm=75, Final=90, Labs=80,85,90,95	Weighted Average = 84.75, Grade = B
Low scores	Quiz1=50, Quiz2=55, Midterm=60, Final=50, Labs=40,50,60,70	Weighted Average = 54.5, Grade = F
Boundary A/B	Quiz1=90, Quiz2=80, Midterm=85, Final=90, Labs=80,80,80,80	Weighted Average = 85.25, Grade = B
Boundary D/F	Quiz1=60, Quiz2=59, Midterm=62, Final=61, Labs=60,60,60,60	Weighted Average = 60.35, Grade = D

6) Expected Outputs

Test Case 1 – All perfect scores

Input: Quiz1 = 100, Quiz2 = 100, Midterm = 100, Final = 100, Labs = 100,100,100,100

```
Enter Quiz #1 score (out of 100): 100
Enter Quiz #2 score (out of 100): 100
Enter Midterm Exam score (out of 100): 100
Enter Final Exam score (out of 100): 100
Enter Lab #1 score (out of 100): 100
Enter Lab #2 score (out of 100): 100
Enter Lab #3 score (out of 100): 100
Enter Lab #4 score (out of 100): 100
```

```
-----
Student's Weighted Average: 100.0
Student's Final Grade: A
-----
```

Test Case 2 – Average student

Input: Quiz1 = 80, Quiz2 = 85, Midterm = 75, Final = 90, Labs = 80,85,90,95

```
Enter Quiz #1 score (out of 100): 80
Enter Quiz #2 score (out of 100): 85
Enter Midterm Exam score (out of 100): 75
Enter Final Exam score (out of 100): 90
Enter Lab #1 score (out of 100): 80
Enter Lab #2 score (out of 100): 85
Enter Lab #3 score (out of 100): 90
Enter Lab #4 score (out of 100): 95
```

```
-----
Student's Weighted Average: 84.75
Student's Final Grade: B
-----
```

Test Case 3 – Low scores

Input: Quiz1 = 50, Quiz2 = 55, Midterm = 60, Final = 50, Labs = 40,50,60,70

```
Enter Quiz #1 score (out of 100): 50
Enter Quiz #2 score (out of 100): 55
Enter Midterm Exam score (out of 100): 60
Enter Final Exam score (out of 100): 50
Enter Lab #1 score (out of 100): 40
Enter Lab #2 score (out of 100): 50
Enter Lab #3 score (out of 100): 60
Enter Lab #4 score (out of 100): 70
```

```
-----
Student's Weighted Average: 54.5
Student's Final Grade: F
-----
```

Test Case 4 – Boundary A/B

Input: Quiz1 = 90, Quiz2 = 80, Midterm = 85, Final = 90, Labs = 80,80,80,80

Enter Quiz #1 score (out of 100): 90
Enter Quiz #2 score (out of 100): 80
Enter Midterm Exam score (out of 100): 85
Enter Final Exam score (out of 100): 90
Enter Lab #1 score (out of 100): 80
Enter Lab #2 score (out of 100): 80
Enter Lab #3 score (out of 100): 80
Enter Lab #4 score (out of 100): 80

Student's Weighted Average: 85.25
Student's Final Grade: B

Test Case 5 – Boundary D/F

Input: Quiz1 = 60, Quiz2 = 59, Midterm = 62, Final = 61, Labs = 60,60,60,60

Enter Quiz #1 score (out of 100): 60
Enter Quiz #2 score (out of 100): 59
Enter Midterm Exam score (out of 100): 62
Enter Final Exam score (out of 100): 61
Enter Lab #1 score (out of 100): 60
Enter Lab #2 score (out of 100): 60
Enter Lab #3 score (out of 100): 60
Enter Lab #4 score (out of 100): 60

Student's Weighted Average: 60.35
Student's Final Grade: D
