

COS 135 Individual Assignment 4

Due: Monday 02/20/23 End of the day

What to submit:

- .c source codes for each task.

[10 pts] Comments are required in the following locations (in each C source code):

- At the top of each source code, comment your name and a short program description.
- Comment the purpose of each variable.
- Comment major sections of code such as input, processing, and output.

Program Design: Your program is a professional document and must be neat and easy to read. All programs should follow these specifications.

- Comments should be aligned and entered in a consistent fashion
- Blank lines should be added to aid readability
- Code within blocks should be indented
- Comments should not contain spelling mistakes
- Variables names should be meaningful

Write C programs for following tasks and submit your source codes (you must submit .c files without errors). Sample Program inputs are highlighted in yellow.

(a) **[10 pts]** Write a C program to input temperature in Fahrenheit and convert to Celsius. The output should **only show maximum three decimal points**.

Use following mathematical formula for temperature conversion:

$$F = (1.8 * C) + 32$$

where,

F = Temperature in Fahrenheit

C = Temperature in degree Celsius

Sample program input:

Enter temperature in Fahrenheit = **200**

Output:

Temperature in Celsius = 93.333 C

(b) **[30 pts]** Write a C program to input a student's name, and grades of four subjects (a single character subject code and final grade, a pair at a time). Then, the program outputs the total and average grade (**up to two decimal points**) for the student.

Finally, your program should generate a letter grade as follows:

- If average is greater than or equal to 90 → A
- If average is greater than or equal to 80 and less than 90 → B
- If average is greater than or equal to 70 and less than 80 → C
- If average is less than 70 → F

Two example program inputs and outputs are shown below.

<p><u>Sample program output and input:</u></p> <p>Enter the student's name: James Teh</p> <p>Enter subject code 1 and grade: S 90</p> <p>Enter subject code 2 and grade: T 89</p> <p>Enter subject code 3 and grade: E 79</p> <p>Enter subject code 4 and grade: M 85</p> <p><u>Output:</u></p> <p>Final grades for James Teh</p> <p>Total for STEM: 343</p> <p>Average: 85.75%</p> <p>Grade: B</p>	<p><u>Sample program output and input:</u></p> <p>Enter the student's name: Tim Merrit</p> <p>Enter subject code 1 and grade: C 84</p> <p>Enter subject code 2 and grade: A 99</p> <p>Enter subject code 3 and grade: P 100</p> <p>Enter subject code 4 and grade: B 93</p> <p><u>Output:</u></p> <p>Final grades for Tim Merrit</p> <p>Total for CAPB: 357</p> <p>Average: 94.00%</p> <p>Grade: A</p>
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(c) **[50 pts]** This program will help a student to stay within a monthly budget. First, ask the user for the monthly expense goal. Next, ask the user for the amount spend on rent, utilities, transportation, and food. **Assume an additional fixed expense of a car payment of \$581.99 that should be set up as a variable.**

As shown below, report in a neat chart with each item, its amount and percentage (% of total expenses). Under the chart, report the goal, the total expenses, and the amount leftover. Precision **should be set to two decimal places**. The chart **should use field width** (not multiple blanks) to neatly align columns. The chart should **include your name** (replace 'Student' with your name) in the chart heading and should use blank lines as shown to separate content.

Finally,

- if the leftover amount is greater than or equal to $1/5^{\text{th}}$ of the expense goal (i.e., at least \$500 from \$2500) display "Good job. You are saving enough!"
- if the leftover amount is less than $1/5^{\text{th}}$ of the expense goal (i.e., less than \$500 from \$2500) display "Try to save more!"

Test your program on several data sets.

Use the following datasets to verify the final submission.

Enter monthly expense goal (USD): 3600
Enter rent (USD): 500
Enter utilities (USD): 400
Enter transportation (USD): 200
Enter food costs (USD): 700

Budget Chart for COS135:

Expense	Amount \$	Percent %
Car payment	581.99	24.43
Rent	500.00	20.99
Utilities	400.00	16.79
Transportation	200.00	8.40
Food	700.00	29.39

Expense Goal 3600.00
Total expenses 2381.99
Leftover amount 1218.01
Good job. You are saving enough!

Enter monthly expense goal (USD): 2500
Enter rent (USD): 700
Enter utilities (USD): 450.50
Enter transportation (USD): 175.50
Enter food costs (USD): 400

Budget Chart for COS135:

Expense	Amount \$	Percent %
Car payment	581.99	25.22
Rent	700.00	30.33
Utilities	450.50	19.52
Transportation	175.50	7.60
Food	400.00	17.33

Expense Goal 2500.00
Total expenses 2307.99
Leftover amount 192.01
Try to save more!