

Heart Health

Create a C program that provides the user with a menu of options: BMI (Body Mass Index) calculation, blood pressure assessment, or cardiac risk score assessment. Each option should be implemented as a separate function within the program (see the full details in the sections below).

BMI Calculation:

- This option allows the user to input their weight and height, and the program calculates their BMI using the formula: $\text{BMI} = \text{weight (kg)} / \text{height (m)}^2$.

Blood Pressure Assessment:

- This option prompts the user to input five blood pressure readings, including systolic and diastolic measures (in mmHg). The program then calculates the average systolic and diastolic readings and determines the blood pressure category based on a reference chart.

Cardiac Risk Score Assessment:

- This option asks the user for the minimum necessary information to calculate their ERICE risk score category (low, mild, moderate, moderate-high, high, or very high) according to predefined charts. The ERICE score estimates the risk of a first fatal or non-fatal cardiac event in the next ten years.

Each of these options should be implemented as separate functions in the program, allowing for modularity and ease of maintenance. The user should be able to select any option from the menu and perform the corresponding assessment.

Part 1

If the user chooses the BMI calculation option, the program will prompt them to input their weight in kilograms and height in metres. Using these inputs, the program will calculate the user's BMI (Body Mass Index) using the formula:

$$\text{BMI} = \text{weight (kg)} / \text{height}^2 (\text{m}^2)$$

Values should be rounded to 1 decimal place.

Additionally, the program will determine the user's Weight Category based on the calculated BMI. The interpretation of the BMI result is as follows:

- Underweight: BMI less than 18.5
- Normal weight: BMI between 18.5 and 24.9
- Overweight: BMI between 25 and 29.9
- Obesity: BMI 30 or greater

Part 2

If the user chooses the blood pressure assessment option, the program will prompt them to input five blood pressure readings, including both systolic and diastolic measures (in mmHg). Subsequently, the program will calculate the average systolic and diastolic readings from the input data. Based on this [reference chart](#), the program will determine whether the blood pressure falls into the categories of high, pre-high, ideal, or low.

The key functionality of the function includes: Storing the readings in an array; Calculating the average systolic and diastolic readings; Determining the blood pressure category based on the calculated averages and reference chart.

Part 3

If the user opts for cardiac risk assessment, the program will prompt them for the necessary information to calculate their ERICE risk score category. The ERICE score is a native cardiovascular (study the charts below) risk score designed for the Spanish population, providing an estimate of the risk of a first fatal or non-fatal cardiac event over the next ten years.

Users will be asked to provide essential information, such as systolic blood pressure (SBP), as part of the assessment process. It's assumed that the patient is not undergoing antihypertensive treatment/medication.

Advise

To ensure a robust program, it's crucial to implement appropriate error handling mechanisms to handle unexpected inputs effectively. Additionally, the output should be presented in a clear and user-friendly manner, providing concise results.

Key considerations for the program include determining suitable data types, handling edge cases, providing clear instructions to users, implementing effective error handling strategies, formatting the output for readability, including a program description and author information in the header, utilizing white space and comments for readability and understanding, and optimizing efficiency by avoiding unnecessary variables and using appropriate loops where applicable.

Academic Integrity

Plagiarism, unauthorised collaboration with classmates, and the use of artificial intelligence (AI) tools or other web platforms to complete assignments are serious violations of academic integrity. As a student enrolled in this module, it is your responsibility to adhere to the highest standards of honesty and ethical conduct in all academic endeavours. Failure to do so may result in academic penalties as outlined in the slides.

Plagiarism: Plagiarism is the act of presenting someone else's work, ideas, or words as your own without proper attribution. This includes, but is not limited to, copying text from sources without citation, and submitting someone else's work as your own.

Collaboration: While collaboration with classmates can be beneficial for learning, it is essential to maintain academic integrity at all times. Assignments should be completed individually, and each student's work should represent their own efforts. Unauthorised collaboration, including sharing solutions, code, or answers with classmates, is strictly prohibited.

Use of AI Tools: The use of artificial intelligence (AI) tools, including language models, code generators, or automated writing assistants, to complete assignments is not permitted in this module. While AI can be a valuable resource for research and learning, relying on AI-generated content without proper understanding or acknowledgment of its source undermines the educational process and constitutes academic dishonesty.

Consequences of Academic Dishonesty: Violations of academic integrity will be thoroughly investigated, and appropriate disciplinary actions will be taken in accordance with the school's policies and procedures.

By submitting your assignment, you acknowledge that you have read and understood the academic integrity statement and agree to comply with all policies and expectations outlined herein.

Submission

Your submission should be made through Brightspace. The deadline is flexible, allowing you to submit your code anytime before the deadline displayed on Brightspace.

Code Writing Environment:

You are encouraged to write your code using Sublime Text. Please format all your code according to this style guide:

<https://www.cs.umd.edu/~nelson/classes/resources/cstyleguide/>

File Naming and Format:

Submit your program as a single C file through Brightspace. The file should follow the naming convention: "123456A.c", where "123456" represents your student number and "A" indicates Assignment.

Assessment**Demonstration of Application (60%):**

During practical sessions in weeks 10 and 11, students will need to demonstrate their application to a demonstrator. The demonstrator will request various tests to be performed to ensure that the code functions correctly and produces accurate output for specified inputs covering the three parts of the assignment.

Usability (15%):

Alongside demonstrating the application, the usability of the application will be evaluated by the demonstrator. This assessment will consider factors such as ease of use and how the application handles user errors.

Assessment of Code (25%):

Separately, the code itself will be evaluated for correctness, efficiency, and adherence to coding standards, including the use of comments and appropriate spacing.

Additionally, students may be asked to provide explanations for sections of their code as part of this assessment process

Men without antihypertensive treatment										Men without antihypertensive treatment									
Diabetics										Non diabetics									
Non smokers					Smokers					Non smokers					Smokers				
Cholesterol	< 5.2	5.2-6.4	6.5-7.7	≥ 7.8	< 5.2	5.2-6.4	6.5-7.7	≥ 7.8	< 5.2	5.2-6.4	6.5-7.7	≥ 7.8	< 5.2	5.2-6.4	6.5-7.7	≥ 7.8			
≥ 80	SBP	≥ 180	56	57	58	55	66	67	69	65	48	47	48	45	56	57	58	55	
		160-180	54	54	56	52	64	65	67	63	44	45	46	43	54	54	56	52	
		140-160	51	51	53	49	61	62	64	60	41	42	44	40	51	51	53	49	
		< 140	38	38	40	36	47	47	49	45	30	30	32	30	38	38	40	36	
70-79	SBP	≥ 180	35	35	37	34	43	44	45	42	27	28	29	27	35	35	37	34	
		160-180	33	33	35	32	41	42	43	40	26	26	28	25	33	33	35	32	
		140-160	31	31	33	30	39	39	41	37	24	25	26	23	31	31	33	30	
		< 140	22	22	23	21	28	28	29	27	17	17	18	16	22	22	23	21	
60-69	SBP	≥ 180	24	24	25	23	30	30	32	32	18	19	19	18	24	24	25	23	
		160-180	22	23	24	22	28	29	30	30	17	18	18	17	22	23	24	22	
		140-160	21	21	22	20	27	27	28	26	16	16	17	15	21	21	22	20	
		< 140	14	15	15	15	19	19	19	18	11	11	12	11	14	15	15	15	
50-59	SBP	≥ 180	12	12	13	12	16	16	17	15	9	10	10	10	12	12	13	12	
		160-180	12	12	12	11	15	15	16	16	9	9	9	9	12	12	12	11	
		140-160	11	11	11	10	14	14	14	13	8	8	9	8	11	11	11	10	
		< 140	7	7	8	7	9	10	10	9	6	6	6	5	7	7	8	7	
40-49	SBP	≥ 180	5	5	5	5	6	6	6	6	3	3	4	3	4	5	5	5	
		160-180	4	4	5	5	6	6	6	5	3	3	3	3	4	4	5	5	
		140-160	4	4	4	4	5	5	5	5	3	3	3	3	4	4	4	4	
		< 140	3	3	3	3	3	4	4	3	2	2	2	2	3	3	3	3	
30-39	SBP	≥ 180	2	2	3	2	3	3	3	3	2	2	2	2	2	2	3	2	
		160-180	2	2	2	2	3	3	3	3	2	2	2	2	2	2	2	2	
		140-160	2	2	2	2	3	3	3	3	2	2	2	2	2	2	2	2	
		< 140	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	
Cholesterol		< 5.2	5.2-6.4	6.5-7.7	≥ 7.8	< 5.2	5.2-6.4	6.5-7.7	≥ 7.8	< 5.2	5.2-6.4	6.5-7.7	≥ 7.8	< 5.2	5.2-6.4	6.5-7.7	≥ 7.8		

Low: < 5

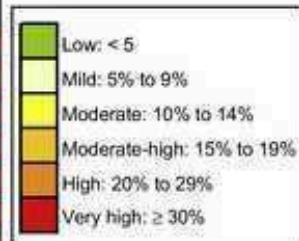
Mild: 5% to 9%

Moderate: 10% to 14%

Moderate-high: 15% to 19%

High: 20% to 29%

Very high: ≥ 30%



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		140-160	56	57	55	48	71	72	70	83	41	42	40	34	55	55	54	47
		< 140	54	54	53	46	69	69	68	60	39	40	38	33	53	53	52	45
70-79	SBP	≥ 180	39	39	38	33	53	53	52	45	27	28	27	22	38	38	37	32
		160-180	24	25	24	20	34	35	34	30	16	17	16	15	24	24	23	20
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		140-160	8	8	8	7	12	12	12	10	5	6	5	5	8	8	8	6
		< 140	8	8	8	6	12	12	11	10	5	5	5	5	8	8	7	6
30-49	SBP	≥ 180	2	2	1	1	2	2	2	2	1	1	1	1	1	1	1	1
		160-180	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1
		140-160	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1
		< 140	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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Further information on ERICE Score is available [here](#).