# shuspace

**Assessment Brief**

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| Module Leader: Dr. Abayomi (Yomi) Otebolaku | | Level: 7 | |
| Module Name: Programming Concepts and Practice | | Module Code:55-706555 | |
| Assignment Title: Task 1: Stroke Data analytics | | | |
| Individual | Weighting: 60% | Magnitude: 2500 | |
| Submission date/time:  29-04-2025 | Blackboard submission: Yes Turnitin submission: Yes | Format: Word, PowerPoint, source code, and digital media. | |
| Planned feedback date:  20-05-2025 | Mode of feedback: Verbal and written feedback | In-module retrieval: No | |
| In this assessment are students asked to consider: | Inclusivity and accessibility | | Yes |
| Sustainability | | N/A |
|  | | | |
| **Module Learning Outcomes**   * LO1: select appropriate programming techniques and data structures to develop effective software implementations of relatively complex systems using an appropriate programming language such as Python, Java, or C#. * LO2: apply relevant program design strategies to the implementation of software applications using that programming language. * LO3: design and implement well-engineered, domain specific software using that programming language. | | | |

## Assessment Brief

1. **Introduction**

According to the NHS, **cardiovascular disease** is a general term for conditions that affect the heart or blood vessels. It is usually caused by several factors such as build-up of **fatty deposits** in the **arteries** and increased risk of **blood clots**. It is also associated with **damage to arteries** and other vital organs such as brain, heart, kidneys, and eyes. Apart from **leading to strokes**, it can also lead to the **death** of the affected individuals. In the UK, for example, it is recognized as one of the main causes of death.

However, **digital health** is transforming not only how people’s health is managed but also helping to **prevent avoidable deaths** such as those related to cardiovascular diseases. From translating health data and care into actions, it is gradually becoming an integral part of how healthcare providers (and patients themselves) manage health related problems. In addition, the availability of network enabled devices such as smartphone and wearable devices is enabling mobile medical apps and software that can provide support for clinicians to make clinical decisions using available data and artificial intelligence (AI) or machine learning (ML). Digital health can help to manage cardiovascular diseases and to minimize the number of deaths using people’s vital signs or lifestyles to predict the likelihood of an impending fatal organ failures or death.

In this assignment, you have been provided with a **dataset** containing simulated **172,000 records of stroke** related **information** about some **anonymous patients**. It is assumed you have been hired by a healthcare service provider as a data scientist. Part of your job is to **analyze this dataset** and then **design** and implement an **application** that can help clinicians **monitor patients’ vital signs** and lifestyles such as **blood glucose level**, **physical activities**, **stress**, **sleep hours**, **dietary habits**, **smoking habits**, etc. **to prevent an impending fatality**.

The assignment will be assessed in two distinct phases, corresponding to **coursework 1** and **coursework 2**, in line with the module's learning outcomes. The first assignment is linked with the second assignment in that the provided dataset will be used for both assignments. **Both assignments are individual** pieces of work, and your **submission must be** in the form of **implemented modules** and **Jupyter notebook file**, a **20-minute demo** and a **5-page report**.

## Getting Started and General Specifications

The following tasks are to be performed in this assignment.

1. **Loading dataset file**

The [stroke clinical dataset records](https://www.kaggle.com/datasets/ankushpanday1/stroke-predictions-dataset-of-indians) (see the link for more details and Figure 1) has been provided as .csv file consisting of 20 features. Some of these features are age, physical activities, hypertension, sleep hours, stroke risks, region, stroke occurrence, smoking status, average glucose level, dietary habits, gender smoking, hypertension, etc. as shown in Figure 1 below. In this **first task**, you are required to design and implement a **robust module (call it dataset\_module)** containing at least a **function** for loading the data from the provided dataset. The features should be retrieved into a **nested dictionary**, which should be returned by the implemented function. You must not use any high-level python libraries such as Pandas, NumPy, CSV, etc. You are only allowed to use the python file object. The use of any prohibited libraries will result in 5 marks deduction as a penalty.



Figure 1: This figure shows the features in the “data.csv”.

1. **Query Module**

In this task, you will design and implement a module called the **query\_module** that contains several functions for querying the loaded dataset for various information and insights.

1. A function for computing the average age, modal age, median age of those who smoked and had hypertensions that resulted in stroke.
2. A function for computing the average age, modal age, median age, and average glucose level of those who had heart disease that resulted in stroke.
3. A function for computing the average age, modal age, median age of patients based on genders of those whose hypertensions resulted in stroke and of those whose hypertensions did not result in stroke.
4. A function for computing the average age, modal age, median age of those whose smoking habits result in stroke and for those whose smoking habit did not result in stroke
5. A function for computing the average age, modal age, median age of those who lived in urban areas and for those in rural areas that had stroke.
6. A function to retrieves the dietary habit(s) of those who had stroke and those who did not have stroke.
7. A function that returns anyone whose hypertension resulted in stroke.
8. A function to retrieve those who hypertension did not result in stroke and those whose hypertension resulted in stroke
9. A function that returns everyone with heart disease that has stroke.
10. A function that returns the descriptive statistics of any of the features of the dataset. This function should ask for which feature to analyse and then return the statistics. The descriptive statistics are mean, standard deviation, minimum, maximum, 25%, 50%, and 75%.
11. A function to retrieve the average sleep hours of those who had stroke and those who did not have stroke
12. The outputs of any of these functions should be persisted into an external file in csv format.
13. **User Interface Module**

The third module (ui\_module), the test module contains a function that implements a friendly and interactive user interface functionality. The module will provide the functionality for querying the systems for any of the information in (b) above and displaying answers. The queries and the displayed results should be user friendly. The module should allow users to continue with the system as long as they want or quit when they are done. Note that this module will integrate the previous two modules (dataset\_module and the query\_module).

d. Design and implement the main function as a Jupyter Notebook file that integrates the ui\_module of the previous task (UI).

1. **Report**

You will write a report of your implementation, summarising your implementation decisions, justifications, and programming processes you have explored in the implementation of your deliverable. Provide instructions in your report on how to execute your application. Also, your report should contain structure of your program. It should also contain a reflection section explaining what you have learnt and how this has contributed to your professional development. Also reflect on what went well or not, and what you would have done better if given another opportunity to do this project again. Non submission of report will attract loss of 5% of the total marks. The report should be properly structured with page numbers, etc., consisting of an abstract, introduction, design and implementation, discussion, reflection, conclusion, and references.

1. Demonstration

You are required to demonstrate your deliverable showing and walking through how it meets the assessment criteria. Note that your demonstration will not exceed 10 minutes. There will be question and answer session that will last for a maximum of 10 minutes.

1. You may decide to implement one or more extensions. An extension could be a GUI or a database system. Please clarify with your tutor what could considered as an extension. An implemented and demonstrated extension(s) will be rewarded with 5%.
2. **Implementation**

The implementation of the deliverable will be in modules. Three modules will be designed and implemented. The first module is the *dataset\_module*, second module is the query\_module, and the third module is ui\_module. The user interaction can be implemented using GUI (as an extension) or ordinary user-friendly text-based UI. These three components of the system should be seamlessly integrated so that during your walkthrough it should be clear how they all interact. Your implementation should be in Python. The modules will be implemented as python scripts (.py files) and your main function should be implemented as a Jupyter notebook file (. ipynb)

## Pay attention to the following requirements

1. In-module retrieval is **NOT** available for this assessment.
2. This assignment is an individual piece of work, and your submission must be in the form of **three module files (.py) and a Jupyter Notebook file (.ipynb)**. The Jupyter notebook contains the main function integrating the 3 modules. **If the submission is not in the specified format or if this is not demonstrated in the demo video, 5% of the total marks will be deducted as penalty.**
3. You will submit a report. The report should provide analysis and design artefacts of the problem being solved, justification for your design decisions and pseudocodes of the functions you have designed and developed. It should explain the relationships between the modules. A good report should provide evidence of critical analysis of the implemented system. Even if your application does not work correctly, you should still submit the report explaining what you have done, what works and what has not worked. Please note that you are required to submit your report both to the Turnitin submission point as well as the main assessment submission point. Failure to submit your report to both will attract a 5% penalty.
4. Any evidence of collusion/plagiarism will be penalised! If there is some doubt about the authenticity of a particular piece of work, then the person submitting it will be expected to defend such work, including reasons for the programming decisions taken. You must document with references any use of libraries or existing code in your report.
5. Appropriate use of variable names for clearer understating is desirable. Adequate commenting of your code for easier understanding is also desirable.
6. Please note that the use of high-level libraries such as Pandas, NumPy, CSV, etc. is not allowed in the first assessment. Please clarify with your tutors about any libraries you are allowed to use. The use of any of these libraries will attract a penalty as stated in section 2(a).
7. You are not allowed to use AI tools to generate code and submit such as your own implementation. This will be regarded as an academic misconduct and appropriate penalty will be applied as deem fit by the academic misconduct panel.

## Submission Process

Your assignment should be submitted electronically through the module's Blackboard site as a single ZIP file that contains all source codes and report, not more than 5 pages. Check your upload to ensure you have submitted the correct files successfully as any issues will not be considered after the deadline. Please, note that the submission deadline is Tuesday**, 29th, April 2025, 3:00 pm**

## Assessment Criteria

This assignment assesses the module’s learning outcomes (LO) in the following way:

* This assignment focuses on designing and implementing python modules for loading and extracting data from real-world datasets, using appropriate data structures, string manipulation, iteration, selection, etc. (LO1) and programming design strategies (LO2).
* This assignment will be assessed by testing and video demonstration of the submitted codes using the data files accompanying this brief. You should submit a video demo of a maximum of 10 minute, demonstrating how your solution meets the assessment criteria. In addition, the coursework will be assessed against the Learning Outcomes (LOs) using a set of assessment criteria. This set of assessment criteria allows assessing how successful you have met the LOs. To ensure consistent use of the relevant criteria, the assessment criteria are summarised in the following assessment matrix and grid. This is an indicator of how the marks will scale across each category of the learning outcomes it covers.

## Table 1: Assessment Matrix

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| --- | --- | --- | --- | --- | --- |
| **Assignment** | **Assessment Criteria** | **Marks** | **Learning Outcomes Covered** | | |
| LO1 | LO2 | LO3 |
| Assignment 1 | Problem analysis and elicitation of solution requirements | 10% | X | X | X |
| Program development using design concepts | 10% | X |  | X |
| Implementation of software solution using relevant programming concepts | 15% | X | X | X |
| Quality and usefulness of mini-report, deliverable and demonstration. | 10% | X | X | X |
|  | Extension and weekly programming exercises | 15% | x | x | x |

**Note that extension is 5% and weekly programming exercises are also 10%**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 2: Assessment Marking grid** | | | |
| **Fail (<50%)** | **Pass (50-59)** | **Merit (60-69)** | **Distinction (70% +)** |
| **Problem analysis and elicitation of solution requirements (/10) ￼** | | | |
| No evidence of understanding of problem being solved. No solution requirements. | Good evidence of understanding of the problem, its definition and analysis. Good understanding of important solution requirements, may lack some clarity, missing requirements, etc. | Very good demonstration of knowledge and understanding of the problem. Very good understanding of the system requirements and its analysis. | Excellent demonstration of understanding of the problem being solved. Excellent details of solution requirements and analysis. |
| **Program development using design concepts (/10)** | | | |
| No application of design strategies. Limited use of design strategies | Good use of appropriate design strategies in the program development process. Minor issues, such as lack of use of some design strategies such as missing such as pseudocodes or architectural figures/flowcharts | Very good use of appropriate design strategies in the program development process. Use of pseudocodes, algorithms, flowcharts, use of figures e.g. high-level architectural diagram showing key aspects of your solution, etc. | Excellent use of appropriate design strategies in the program development process. |
| **Implementation of solution using relevant programming concepts (/15)** | | | |
| Lack/poor use of programming concepts. | Good understanding and use of appropriate programming concepts such as selection, repetition, sequences, functions, and parameters, etc. Use of appropriate data types, data structures, etc. | Very good understanding and use of appropriate programming concepts such as selection, repetition, sequences, functions and parameters, exception handling, etc. Software does not crash when being run. Entering wrong input does not crash the program but gracefully handles such exceptions, etc. | Excellent, professional level use of programming concepts in the implementation, robust application delivered. |
| **Quality and usefulness of report, deliverable and demonstration (/10) ￼** | | | |
| Report lacking good structure, no personal reflection, no description of the deliverable or explanation and justification of decisions. Poor use of language, no demonstration. | Good structure, evidence of personal reflection on what went well or not. Good justification for design and implementation decisions. Effective use of language, good demonstration of deliverable. | Particularly good structure, evidence of personal reflection on what went well or not. Very good justification for design and implementation decisions. Particularly effective use of language, and very good demonstration of deliverable. | Excellent structure, excellent personal reflection on what went well or not. Good justification for design and implementation decisions. Excellent use of language. Evidence of innovation in the deliverable, e.g. excellent user interaction through UI, etc. Excellent, professional level demonstration of the deliverable. |
| **Extension (/5%)** | | | |
| No extension is submitted. Extension submitted but does not work. | Extension submitted, and demonstrated, works as intended but has some limitation, e.g. A GUI that does not aesthetic or not friendly. | Extension submitted, demonstrated, works as intended, no noticeable limitation. | Extension submitted, demonstrated works as intended, no limitations, professional level extensions. |
| **Weekly Programming Exercises (10%)** | | | |
| No submission of weekly exercise solutions and no participation in weekly presentation | Some submissions, some participation but there is inconsistency | Submitted most solutions to most of the exercises and participated in most of the presentations | Submitted all solutions and participated in all presentations. Professional conducted during presentations. |

## University Grade Descriptor (UGD)

A screenshot of a document

Description automatically generated

## Figure 4: The University Grade Descriptor for Level 7. Your final class, category and grade for the module will be determined using the UGD.

## Artificial Intelligence and Academic Integrity – AI&AI

It is important you do not use AI tools to generate an assignment and submit it as if it were your own work. Our regulations state:

Contract cheating/concerns over authorship: This form of misconduct involves another person (or artificial intelligence) creating the assignment which you then submit as your own. Examples of this sort of misconduct include buying an assignment from an ‘essay mill’/professional writer; submitting an assignment which you have downloaded from a file-sharing site; acquiring an essay from another student or family member and submitting it as your own; attempting to pass off work created by artificial intelligence as your own. These activities show a clear intention to deceive the marker and are treated as misconduct.

Further guidance is available here: [https://blogs.shu.ac.uk/assessment4students/preparing-to-submit-work/#AI](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fblogs.shu.ac.uk%2Fassessment4students%2Fpreparing-to-submit-work%2F%23AI&data=05%7C02%7Cm.jacobi%40shu.ac.uk%7Ce43edfef59d143757cc808dc9077c828%7C8968f6a1ac13472fb899f7316e439f43%7C0%7C0%7C638544091847747773%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=Mu35s2bWJFR7ESDUdLI4GvdJiCwl6CyBS42osK5Z468%3D&reserved=0)

**University Study Rules and Regulations**

See Grades and Marks > University grade descriptors

<https://www.shu.ac.uk/myhallam/university-life/university-rules-and-regulations/study>

**Assessment Regulations – staff page**

University Grade Descriptors: This version also includes guidance on UGD3 and FAQs

[Assessment, Progression and Awards webpage](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fsheffieldhallam.sharepoint.com%2Fsites%2F3007%2Facademicservices%2FASSMTPROG%2FSitePages%2FAssessment-Regulations.aspx&data=05%7C01%7Cs.beckingham%40shu.ac.uk%7C4f74fd6645b649768f4708dba3beff31%7C8968f6a1ac13472fb899f7316e439f43%7C0%7C0%7C638283812939062360%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=4jy5P%2FfFgeZufuzKyTYwgO3ydBdD7Q2gZ%2BVykNmVfPg%3D&reserved=0)

Please also refer to: BTE Assessment page for other college guidance

<https://sheffieldhallam.sharepoint.com/sites/3020/SitePages/Assessment-information.aspx>