IB2D40

Programming for Business Application

Individual Assignment, 2024-25

Assignment Instructions
All assignments must be submitted ONLINE via my.wbs by **12pm (midday) UK time** on the date displayed against this assessment.

Please allow sufficient time to complete the automatically generated coversheet, especially if (where permitted) you have used a generative Artificial Intelligence (AI) tool during the process of completing your assessment as you will be asked to briefly outline which AI tool you have used and what you have used it for.

Word Limit
3,000 words

Word Count Policy
WBS has a school-wide policy on word counts. This is strictly enforced to ensure consistency across modules and programme. You can find more information about this policy in the Undergraduate Student Handbook under Academic Practice - 7i. Word count policy.

This is a strict limit not a guideline: any piece submitted with more words than the limit will result in the excess not being marked.

Academic Practice
Please ensure you read the full guidelines for Academic Practice in the Undergraduate Student Handbook and ensure you understand it. **If in doubt, please seek clarification in advance of your submission**. This includes important information on:

- Cheating, plagiarism and collusion
- Correct referencing
- Using internet sources in assessments
- Academic writing
- English Language support
- Word count policy

When you submit this assignment online, you will be required to tick a declaration box indicating that the work involved is entirely your own. Each assignment will be put through plagiarism software to identify any collusion or inadequate referencing of materials used from different sources. Please do not submit images of your typed work unless you have been specifically requested to do so.

We would consider taking action if your work:

1. is too reliant on the words of particular authors (rather than presenting your ideas in your own words), if the essay uses the ideas or words of an author without referencing them or putting their words into quotations (**plagiarism**).

2. suggests that you have worked very closely with another student or students (unless explicitly asked to do so by your Module Leader/Tutor) (**collusion**).

3. includes unreferenced work that you have previously submitted for any accredited course of study (unless explicitly asked to do so by your Module Leader/Tutor) (**self-plagiarism**).

The Use of Artificial Intelligence (AI)

The University recognises an increasing number of technologies such as Artificial Intelligence and that they may be applicable in your completing this assessment. The assessment brief sets out specific requirements or restrictions, and the Undergraduate Student Handbook has further guidance and advice which you should note.

You are reminded that the inappropriate use of such a technology may constitute a breach of University policy, such as the Proofreading Policy or Regulation 11 (Academic Integrity). If you breach these policies, it may have significant consequences for your studies. Please make sure you read and understand the assessment brief and how AI may or may not be used.

If a generative AI or similar is permitted and has been used you MUST make clear why you used such a tool or service, what you used it for and you will be obliged to confirm that you take sole intellectual ownership of any submitted work.

Failure to disclose the use of generative AI (or similar) at the point of submission may be prejudicial in any later investigations should they arise.

For this assessment the use of AI is:

- **Permitted**

Where AI is permitted:

If you use a generative Artificial Intelligence (AI) in the process of completing this assessment you MUST set out clearly the following:

- WHY you used a generative AI
- WHAT it was used for
- WHICH AI was used; and
- If any generated content has been used directly in this submission, if so where.

Note that this declaration does NOT contribute towards the word count for the assessment.

You will also have to confirm in your declaration that the work remains yours and you have intellectual ownership of it. You may be called for viva or other interview to demonstrate such intellectual ownership. A failure to disclose the use of AI, or the use of a misleading description of its use may have significant consequences for your studies. As a result, keeping good records of your interactions is strongly advised.

Extensions and Self-certification
Late submissions will incur a penalty of 5% for every 24 hour period after the due date and time, i.e. this begins one minute after the submission deadline (beginning at 12.01pm).

Requests for **specific extensions** (of up to 15 days) which are typically for longer and more serious concerns must be submitted via my.wbs ideally 72 hours BEFORE the deadline. Extensions can only be approved if you clearly detail your circumstances and provide supporting documentation (or a reason as to why you cannot provide the supporting documentation at the time) as set out in the Mitigating Circumstances Policy.

Self-certification is a university-wide policy whereby you are permitted an automatic extension of 5 working days on eligible written assessed work without the need for evidence. WBS permits self-certification for all types of written, assessed works such as essays and dissertations. It is not permitted for exams, course tests, or presentations.

You can self-certify twice within each year of study, starting from the anniversary of your course start date. This will cover all eligible written assessments that fall within the self-certification period, as long as they have not previously had an extension applied. To find out further details about the self-certification policy please see: https://my.wbs.ac.uk/-/academic/20778/item/id/1244460/.

If you wish to self-certify for an extension of 5 working days, please select 'Self-certification' in the Extension Type field. If you wish to request a longer extension than 5 working days, please leave the Extension Type as 'Standard'.

Your assignment instructions begin below.

The NHS is looking for a way to better understand the patterns in London's Accident and Emergency (A&E) admissions data to improve hospital resource planning and patient care. As a data analyst, your task is to analyse a dataset provided by the NHS, which contains information on the number of A&E admissions over a weekly period with a reason of attendance and generate particularly relevant insights.

Dataset Description:

The dataset contains the following columns:

- *Weekday*: The day of the week when A&E hospital admission was reported.
- *Hour of Arrival*: For each hour of a given weekday, number of admissions that were reported.
- *Reason of A&E attendance*: Different categorisation of the problem due to which A&E visit was made.

Assignment Question:

1. Using the coding skills you've learned in Python, you are required to write a Python program/script that:

i. Reads the dataset and stores it into a format suitable for data analysis (i.e. loading and exploring the data).

ii. Ensures that there are no missing and/or incorrect data, such as negative values or NULL values in the dataset. If any such values exist, use appropriate code to either remove or fill these entries (i.e. data cleaning).

iii. Performs data analysis and generates *three key insights*, such as A&E attendance in London by weekday for each hour; highest number of total admissions over the datasets for each hour or weekday; most occurring reason of A&E attendance on a particular day or hour, etc. These are just some of the examples, but you are encouraged to use your own creativity to generate *three particularly relevant insights* implementing the coding concepts you have learned (e.g. conditional statement, loops, functions, python libraries, such as pandas, etc.)

iv. Visualises the results of your analysis using Python libraries like Matplotlib by generating two visualisations. You can visualise the insights you generate in task iii or you can create two additional insights just for the visualisation purpose.

(50 marks)

2. Produce a written PDF report (maximum 3000 words) that includes:

a. A description of the steps you took to clean and analyse the data.
b. Key insights from the analysis and how these can be valuable to the NHS in decision making, whilst planning A&E resources at hospitals.
c. Visualisations generated using Python (graphs and charts).
d. A discussion and proposal on what additional data can be collected by the NHS and how future versions of the program you wrote can be enhanced/evolved to enhance decision making at the NHS. You are encouraged to reflect on some key software engineering principles (such as, version control and agile software development) in this discussion.
e. A reflection on:

   If an AI tool was used for solving the assignment: Reflect on how the AI tool (e.g. a tool, such as ChatGPT) helped you (or didn't). Whether an AI tool provided useful solutions or insights, and how you applied or adapted that information to inform and enhance your work.

   OR

   If you did not use an AI tool for solving the assignment: Reflect on your problem-solving approach without external AI tools, discussing the challenges you faced and how you researched solutions to overcome these challenges (e.g. using online sources).

(50 marks)

Assignment Deliverables:
Two files need to be submitted:

1. An executable python script/program saved in filename format *studentID_IB2D40.ipynb.* For example, if the student ID is u123456, the python program/script file can be saved as u123456_IB2D40.ipynb. The code should be executable on Google Colab notebook IDE environment.

   *Note: The credit element assigned to the code shows 0% on the module assessment submission page on the MYWBS IB2D40 page but the code element of this assessment has 50 marks bearing as stated above in Part 1, so this should be considered. You **must** submit **both** components by the deadline to avoid late penalties.*

2. A PDF report.

Assessment Criteria

To succeed in this assessment, you need to:

Demonstrate a knowledge of how programming and software development methodologies plays an important role in designing the business application. You will need to demonstrate an understanding of programming concepts (**Comprehension**).

Present a reasonable argument supported by evidence to justify and explain the approach chosen to design a program or analyse data is beneficial for business relevant insights (**Analysis**).

Demonstrate a capability to devise a creative and logical approach that would extend the functionality of the program and offer additional features to a business application, reflecting on the value it offers for business decisions/insights (but also its limitations). (**Critical Evaluation**).

Present a clear (e.g., readable, logically coherent and consistent), structured, and convincing (e.g., citing relevant sources – URLs or academic literature) answers to questions. Present a program code which is self-explanatory with the presence of clear commenting and adhering to good coding practices (**Academic Writing**).

Design a program code that executes without an error (syntax or logical) and generates an output asked in the question. Use data effectively to draw out insights and conclusions well supported by interesting visualisation to illustrate discussions and arguments. This includes the use of appropriate coding techniques and an adoption of good coding practices in a program code (**Technical**).