Date: Monday, 7 October 2024, 6:47 PM

Data Structures and Algorithms in Python Assessments

Project

1. Project

Faculty:	Information Technology
Module Code:	ITDPA2
Module Name:	Data Structures and Algorithms in Python
Content Writer:	Mr. Marc Kishinkwa
Internal Moderation:	Community of Practice
Copy Editor:	Mr. Kyle Keens
Total Marks:	100
Submission Week:	Week 6

This module is presented on NQF level 6.

5% will be deducted from the student's project mark for each calendar day the project is submitted late, up to a maximum of three calendar days. The penalty will be based on the official campus submission date.

projects submitted later than three calendar days after the deadline or not submitted will get 0%. [1]

This is an individual project.

This project contributes 40% towards the final mark.

[1] Under no circumstances will projects be accepted for marking after the projects of other students have been marked and returned to the students.

2. AI Checklist and Declaration

Before you submit an assignment, you should be able to confidently and honestly make all the below statements. For group work, you can also review the list, together, to hold one another accountable.

- I confirm that my submission reflects my personal learning, knowledge, skills, and understanding.
- If AI tools were employed for generating any part of this assignment (even in the drafting/research phase), I have referenced the use of AI in the text and/or declared the use of AI. I am willing to discuss the process and its contribution to my learning.
- I am aware that the lecturer may request a demonstration of my learning, such as explaining choices in approach, research, and the content I am submitting.
- I am aware that, if I did use AI in any phase of preparing this submitted work, it is recommended that I save a copy of the relevant chat history (prompts and answers), as this will help me demonstrate my writing/work process to my lecturer, if I am asked to do so.
- I have read the assignment instructions on whether AI tools are prohibited for this assignment, and if they are prohibited, I can confirm that I did not use AI tools.
- I understand that failure to agree to these terms may be deemed unethical, potentially leading to disciplinary action. I understand my responsibility for the integrity of my work, including seeking clarification from academic staff and adhering to instructions.

It is essential to acknowledge your use of ChatGPT or other generative AI in your learning. If you use ChatGPT or other generative AI to help you generate ideas or plan your process, you should still acknowledge how you used the tool, even if you don't include any AI-generated content in the assignment.

Please note: The following guiding questions that you will be asked in an AI declaration questionnaire below this assignment brief.

AI Declaration

It is compulsory to complete this AI declaration for each of your assignment submissions.

I carefully read the assignment instructions, and the extent to which AI may be used for the assignment.
I used the following AI system(s)/tool(s):
I used it for the following:

If I quoted or paraphrased an AI output, I have referenced the relevant tool, version, and the date I used the tool.
I still consider this work my own. (i.e., I have not outsourced the final product, or significant portions of it, to AI tools/systems).
If required, I can defend my argument/perspective, explain my choices and approach, and can show that I am knowledgeable about the details of my work.

For further guidance on the use of AI at Eduvos, please refer to the AI FAQ glossary. You will locate the FAQs in the Artificial Intelligence tile on the myDocuments page of myLMS.

3. Instructions to Students

1. Please ensure that your answer file (where applicable) is named as follows before submission: **Module Code – Assessment Type – Campus Name – Student Number.**
2. Remember to keep a copy of all submitted assignments.
3. All work must be typed.
4. Please note that you will be evaluated on your writing skills in all your assignments.
5. All work must be submitted through Turnitin. The full originality report will be automatically generated and available for the lecturer to assess. Negative marking will be applied if you are found guilty of plagiarism, poor writing skills, or if you have applied incorrect or insufficient referencing. (See the "instructions to students" book activity before this activity where the application of negative marking is explained.)
6. You are not allowed to offer your work for sale or to purchase the work of other students. This includes the use of professional assignment writers and websites, such as Essay Box. You are also not allowed to make use of artificial intelligence tools, such as ChatGPT, to create content and submit it as your own work. If this should happen, Eduvos reserves the right not to accept future submissions from you.

4. Section A

Section A

Learning Objective

- Implement data structures in Python.
- Implement a suitable data structure or algorithm and effectively justify your decision.

Project Topic

- Question 1: Emergency Room (ER) visit scheduler.
- Question 2: Social Media Connections Manager

Scope

Week 1 - Week 5

4.1. Question 1

Question 1 — 50 Marks

Study the scenario and complete the questions that follow:

ER visit scheduler.

Dr. Lagertha Lothbrok heads a private clinic. Recently, she has acquired an emergency room to expand her services. She typically receives patients with varying levels of conditions, as such[N1] . She has decided on a rating system to prioritise patients with more critical conditions. When patients are added to the schedule, they are given a priority level from 1 to 5 (5 being the highest priority) and patients are seen in order of priority. A patient file (object) is created upon arrival to record the name, surname, and ID number. The patient is then added to the schedule and a priority level is assigned to the patient object. The patient is then consulted when it is his/her turn, and a status is assigned to the patient after consultation (such as, “Follow-up required”, “Referred to specialist” etc…). She would like to store patient information and the status in a text file for review. Dr. Lothbrok wants to use a system to help with the scheduling.

Source: Kishinkwa, (2024)

You are tasked with creating a Python application that helps the emergency room schedule patients for doctor consultations, by implementing a data structure to keep track of incoming patients. You must select an appropriate data structure to maintain the schedule and ensure that critical patients are catered to first. Your

application must have the following:

- A patient class: Stores the patient's name, surname, and ID number. Includes a method to print the patient's information.

(5 Marks)

- A scheduler class: Used to add patient objects to the schedule, retrieve the next patient, print the list of patients waiting, save patient consultations to a file (in order of occurrence), and read the patient consultations file.

(15 Marks)

- A class that implements your data structure: Used to maintain the data structure used to schedule patients.

(20 Marks)

- A main menu: Used for navigating the application. The main menu must display options for all functionalities of the application and must use a sentinel to keep displaying the menu until the application is terminated.

(10 Marks)

End of Question 1

4.2. Question 2

Question 2	**50 Marks**

Study the scenario and complete the questions that follow:

Social Media Connections Manager

Social media networks use network analysis to discover patterns hidden within the structure of the network. To do this, graph theory is relied upon. In these networks, individual users are represented by nodes, and the relationships/connections between these users are represented by edges.

Source: Yuksel, E (2022) [Online] https://medium.com/@emreeyukseel/a-brief-introduction-to-social-network-analysis-2d13427f5189 [Accessed on: 19/01/2024]

Your task is to simulate this analysis by creating a Python application that implements graph theory to achieve this. Your application must have the following:

- A connections manager class with the following methods:
  - Add user.
  - Add connection.
  - View all users.
  - View all connections.
  - Display a graph showing all connections in the network.

(39 Marks)

- A main menu to select options (the menu must be displayed to the user until the application terminates.

(11 Marks)

You must employ OOP in the creation of your application.

End of Question 2