# Luminus Technical University College - Assignment Brief (RQF)

## Higher National

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| **Student Name** | | **Rashed Hassan Qahah** | | | **Language of assessment** | | | **AR** | **EN** |
| **College ID:** | | |  | |
| **Pearson ID:** | | |  | |
| **Unit Number and Title** | |  | **20 Advanced Programming** | | | | | | |
| **Academic Year** | |  | | | | | | | |
| **Unit Tutor** | |  | | | | | | | |
| **Internal Verifier Name and Approval (Signature)** | | **Safa Bani Essa** | | | | **Approval Date:** | | | |
|  | | | |  | | | |
| **Assignment number and Title** | | **2** | **Advanced design pattern development** | | | | | | |
| **Issue Date (1St Submission)** | |  | | **Submission Date (1st Submission)** | | |  | | |
| **Issue Date (2nd Submission)** | |  | | **Completion Date (2nd Submission)** | | |  | | |
| **Submission Format** | | | | | | | | | |
| **The submission form is an individual written report, should be written in a concise formal business style using single spacing and font size 12. You are required to make use of headings paragraphs, and subsections as appropriate, your work must be referenced using Harvard or APA reference style.** | | | | | | | | | |
| **Unit Learning Outcomes** | | | | | | | | | |
| **LO1** | **Examine the key components related to the object-orientated programming paradigm, analysing design pattern types** | | | | | | | | |
| **LO2** | **Design a series of UML class diagrams** | | | | | | | | |
| **LO3** | **Implement code applying design patterns** | | | | | | | | |
| **LO4** | **Investigate scenarios with respect to design patterns** | | | | | | | | |
| Transferable skills and competencies developed | | | | | | | | | |
| Discussing several design patterns categories.  Create UML class diagrams for different design patterns and implement them. | | | | | | | | | |
| **Vocational scenario:** | | | | | | | | | |
| General Solution Global (GSG) is an international development company. You work there as a team leader who is responsible on the design of all the projects in this company. | | | | | | | | | |
| Assignment activity and guidance | | | | | | | | | |
| **Task 1**  You have been assigned to work on the design of a shopping cart. The shopping cart has a price and has the option to add or remove items. Every time an item is added or removed the price of the cart will be changed accordingly. Also, it has a pay option which can be one of three options as follow:   1. Pay using credit card, in which several attributes must be implemented which are card number, card holder name, expiry date and cvv. 2. Pay using paypal, in which an email and password must be provided. 3. Pay using Bitcoin, in which wallet id, email and password must be provided.   Each payment option must have a pay action that will complete the payment by printing a message with the list of items that have been bought, the price of each item. This should empty the shopping cart and reset the values. However, if the credentials of the payment method were wrong, then the payment should be declined and a message must be printed stating that the payment was rejected.  Based on the given scenario, answer the following questions:   1. Assess a design pattern that can be used to implement this project, explain your choice by examining the strengths and weaknesses. 2. Specify class diagram for your suggested design by drawing an appropriate UML. 3. Evolve the UML from the previous question by implementing it using an appropriate programming language.   **Task 2**   1. Consider three real life examples each represent a design pattern from the three categories which are Creational, Behavioural and Structural. 2. Based on your examples, investigate the connection between Object Oriented paradigm and design patterns.   **Task 3**  Another project was given to you to design. It is a car rental system, in which a client can rent a car. The client can choose from three types of cars which are sedan, SUV and sport. Also, the client has the option to customise the car by adding specific upgrades such as tinted windows and stereo systems. Bear in mind, that more modifications can be added to your system, so it must be flexible enough to handle that.  Many clients can login to the system, but any given client can’t login from different devices at the same time.  Also, the system must have one admin. You should prevent the system from making another admin.   1. Based on the previous scenario, what is the suitable design pattern to be used in designing this project and how it will fulfils the scenario‘s requirements? 2. Critically judge your decision by drawing a comparison between the design patterns and give a valid example for each design? | | | | | | | | | |
| **Recommended Resources**  **Please note that the resources listed are examples for you to use as a starting point in your research – the list is not definitive.**  **Textbooks** | | | | | | | | | |

**Learning Outcomes and Assessment Criteria**

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| Pass | Merit | | Distinction |
| **LO1** Examine the key components related to the object orientated programming paradigm, analysing design  pattern types | | |  |
| **P1** Examine the  characteristics of the  object-orientated  paradigm as well as the  various class  relationships**.** | **M1** Determine a design  pattern from each of the  creational, structural and behavioural pattern types. | | **D1** Analyse the relationship between the object-orientated paradigm and design patterns.  **D2** Analyse how class  diagrams can be derived from a given code scenario using a  UML tool. |
| **LO2** Design a series of UML class diagrams | | |
| **P2** Design and build class diagrams using a UML tool. | **M2** Define class diagrams for specific design patterns using a UML tool. | |
| **LO3** Implement code applying design patterns | | |  |
| **P3** Build an application  derived from UML class  diagrams. | | **M3** Develop code that  implements a design  pattern for a given purpose. | **D3** Evaluate the use of design patterns for the given purpose specified in M3.  **D4** Critically evaluate a range  of design patterns against the  range of given scenarios with  justification of your choices. |
| **LO4** Investigate scenarios with respect to design  patterns | | |
| **P4** Discuss a range of  design patterns with  relevant examples of  creational, structural and  behavioural pattern  types. | | **M4** Reconcile the most  appropriate design pattern  from a range with a series  of given scenarios. |