# Luminus Technical University College - Assignment Brief (RQF)

## Higher National Diploma in computing

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| **Student Name** | | **Abdelrahamn Saleh** | | | **Language of assessment** | | | **AR** | **EN** |
| **College ID:** | | | **22030961** | |
| **Pearson ID:** | | | **PG76228** | |
| **Unit Number and Title** | |  | **20 Advanced Programming** | | | | | | |
| **Academic Year** | | **2022/2023** | | | | | | | |
| **Unit Tutor** | | **Abdelbaset Assaf, Hazem Al-Najjar** | | | | | | | |
| **Internal Verifier Name and Approval (Signature)** | | **Safa Bani Essa** | | | | **Approval Date:** | | | |
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| **Assignment number and Title** | | **2** | **Design patterns usage and implementation** | | | | | | |
| **Issue Date (1St Submission)** | | **09/05/2023** | | **Submission Date (1st Submission)** | | | **27/05/2023** | | |
| **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 | | | | | | | | | |
| Understanding how to translate a scenario into UML class diagrams and implementing it using OOP concepts | | | | | | | | | |
| **Vocational scenario:** | | | | | | | | | |
| You are a software developer at Magic solutions. You are tasked with designing an online shopping system for a clothing store that offers a variety of products for both men and women. Your goal is to create a system that allows customers to sign up for notifications when a particular product becomes available, while also being flexible enough to accommodate new products in the future without requiring significant changes to the underlying code.  To achieve this goal, you decide to create a modular system that consists of separate classes for different types of products. For example, you create a class for women's clothing, with sub-classes for skirts, dresses, and tops, as well as a class for men's clothing, with sub-classes for shirts, pants, and jackets.  Overall, your goal is to create an online shopping system that is both flexible and user-friendly, allowing the store to easily add new products and services while providing a seamless shopping experience for customers. | | | | | | | | | |
| Assignment activity and guidance | | | | | | | | | |
| **Task 1**  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**  In order to improve the system, your manager asked you to look into the following points:  To support product variations and customization options, consider defining a family of algorithms that can be applied to different product attributes, such as size, color, and material. This will enable customers to customize their shopping experience while maintaining a flexible and extensible codebase.  To manage inventory and reduce memory usage, ensure that each product variation is represented by a single instance in the system. This can be achieved by using a design pattern that restricts the instantiation of objects or by implementing a caching mechanism that stores frequently used objects in memory.  For products with shared intrinsic properties, such as name and description, consider storing these properties in a separate object to reduce memory usage. This object can be shared across multiple product instances using a design pattern that emphasizes object sharing and reduces the number of objects created by the system.   1. Based on the previous points, 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 you chose and other design patterns or solutions? | | | | | | | | | |
| **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. |