

## ASSIGNMENT BRIEF

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|--------------------------------------|---|
| <b>HTU Course No:</b><br>40303221    | <b>HTU Course Name:</b><br>Discrete Maths |
| <b>BTEC Unit Code:</b><br>F/618/7429 | <b>BTEC UNIT Name:</b><br>Discrete Maths  |



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|---------------------------------------|---------------------------------|
| <b>Student Name/ID Number/Section</b> |                                 |
| <b>HTU Course Number and Title</b>    | 40303221 Discrete Maths         |
| <b>BTEC Unit Code and Title</b>       | F/618/7429 Discrete Maths       |
| <b>Academic Year</b>                  | 2024-2025 2                     |
| <b>Assignment Author</b>              | Aladeen Albasheer               |
| <b>Course Tutor</b>                   | Rola Musleh - Aladeen Albasheer |
| <b>Assignment Title</b>               | CoreDesign                      |
| <b>Assignment Ref No</b>              | 1 Part I                        |
| <b>Issue Date</b>                     | 26/03/2025                      |
| <b>Formative Assessment dates</b>     | From 27/03/2025 to 29/05/2025   |
| <b>Submission Date</b>                | 14/06/2025                      |
| <b>IV Name &amp; Date</b>             | Radwan Alsmadi 25/03/2025       |
| <b>Submission Format</b>              |                                 |

### **Part I (Take home part)**

The submission of the assignment should be:

Softcopy of your solutions for the questions provided submitted on <https://www.elearning.htu.edu.jo> The softcopy submission for part I should:

- Be written in a concise, formal business style using single spacing and font size 12.
  - Make use of headings, paragraphs, and subsections as appropriate.
  - Be referenced using the Harvard referencing system as needed. Provide a bibliography using the Harvard referencing system.
  - Be word processed document; no handwriting will be accepted.
  - Answers need to be provided following clear and coherent steps, using the correct formulas and equations. Final answers without detailed steps are not accepted.
  - If a schematic, diagram, or photo is copied, the source must be referenced properly. Quotations are not allowed by any means. Only re-wording with proper references is accepted.
  - This is a strictly individual assignment and no collaboration amongst students is allowed, where working with your colleagues is not teamwork, it is plagiarism. Also, if there was any suspicion then a selective oral will be done.
  - The student declaration form attached to this assignment brief must be signed and sent with your work (use electronic signature).
  - You are required to upload your submission files (source files and MS word file to the university's eLearning system through (<https://elearning.htu.edu.jo/>) within the submission date and time stated above.
- \*You are required to upload your submission files (source files and pptx power point presentation file to the university's eLearning system through (<https://elearning.htu.edu.jo/>) within the submission date and time stated above.

***NO SUBMISSION by EMAIL and NO LATE SUBMISSIONS WILL BE ACCEPTED.***

### **Part II of Assignment I (In-class exam).**

- ***The in-class part will be held on Jun 14, 2025***

## Unit Learning Outcomes

**LO1** Examine set theory and functions applicable to software engineering

**LO2** Analyse mathematical structures of objects using graph theory

**LO3** Investigate solutions to problem situations using the application of Boolean algebra.

**LO4** Explore applicable concepts within abstract algebra structures.

## Assignment Brief and Guidance

Since 2023, you have been working as a junior software engineer for Core Design, a leading corporation that develops technical solutions for industrial applications. After spending a few months learning the technology used at Core Design, you were invited to perform work involving the development of solutions for problems in subject matter fields related to computing.

To enable a team of computer engineers to design new technical solutions, your supervisor assigned you the role of solving the following questions.

### **Part 1:**

#### Task 1:

Construct a proof of the Five Color Theorem

#### Task 2:

Prepare a power point presentation that explores an application of group theory in computer sciences. Provide 10-15 slides, you will not be penalized if you go beyond slide limit.

| Learning Outcomes and Assessment Criteria  |   |  |   |
|--|---|--|---|
| Learning Outcome   | Pass  | Merit  | Distinction   |
| <b>LO1</b> Examine set theory and functions applicable to software engineering                   | <b>P1</b> Perform algebraic set operations in a formulated mathematical problem.<br><b>P2</b> Determine the cardinality of a given bag (multiset).  | <b>M1</b> Determine the inverse of a function using appropriate mathematical techniques.   | <b>D1</b> Formulate corresponding proof principles to prove properties about defined sets.                                  |
| <b>LO2</b> Analyse mathematical structures of objects using graph theory                         | <b>P3</b> Model contextualised problems using trees, both quantitatively and qualitatively.<br><b>P4</b> Use Dijkstra's algorithm to find a shortest path spanning tree in a graph.                                 | <b>M2</b> Assess whether a Eulerian and Hamiltonian circuit exists in an undirected graph. | <b>D2</b> Construct a proof of the Five Color Theorem.  |
| <b>LO3</b> Investigate solutions to problem situations using the application of Boolean algebra. | <b>P5</b> Diagram a binary problem in the application of Boolean algebra.<br><b>P6</b> Produce a truth table and its corresponding Boolean equation from an applicable scenario.                                    | <b>M3</b> Simplify a Boolean equation using algebraic methods.                             | <b>D3</b> Design a complex system using logic gates.  |
| <b>LO4</b> Explore applicable concepts within abstract algebra structures.                       | <b>P7</b> Describe the distinguishing characteristics of different binary operations that are performed on the same set.<br><b>P8</b> Determine the order of a group and the order of a subgroup in given examples. | <b>M4</b> Validate whether a given set with a binary operation is indeed a group.          | <b>D4</b> Explore, with the aid of a prepared presentation, the application of group theory relevant to your given example. |
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