**Faculty of Engineering, Environment and Computing**

##### STW210CT Programming Algorithm and Data Structures

**AssignmentBrief 2019/20**

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| ModuleTitle  Programming Algorithm and Data Structures | Individual | | Cohort:  Sept 2019 | ModuleCode  STW210CT |
| Coursework Title  CW1: Viva | | | | Hand out date:  6 December 2019 |
| Lecturer  Manish Khanal | | | | Due date:  14 February 2020 |
| EstimatedTime(hrs):  \* | | Coursework type:  Coursework 1 –Viva | | % ofModuleMark  70% |
| Submissionarrangement online via Softwairca LMS:  File types and method of recording: Single Document (PDF / Open Office / Word)  Mark and Feedback date: Within three of assignment submission.  Mark and Feedback method:Softwarica LMS | | | | |

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| Module Learning Outcomes Assessed:   1. Write software to solve a range of problems. 2. Implement and use simple searching and sorting algorithms. 3. Use libraries to extend the functionality of the base language. 4. Use basic design and testing strategies |
| Notes:   1. You are expected to use the [CUHarvard](https://curve.coventry.ac.uk/open/file/bdfb947c-9d43-48d3-8ec8-f511682e1dd1/1/The%20CU%20Guide%20to%20Referencing%20in%20Harvard%20Style.pdf) referencing format. For support and advice on how this students can contact [Centre for Academic Writing (CAW)](http://www.coventry.ac.uk/study-at-coventry/student-support/academic-support/centre-for-academic-writing/?theme=main). 2. Please notify your registry course support team and module leader for disability support. 3. Any student requiring an extension or deferral should follow the university process as outlined [here](https://share.coventry.ac.uk/students/Registry/Pages/Deferrals-and-Extension.aspx). 4. The University cannot take responsibility for any coursework lost or corrupted on disks, laptops or personal computer. Students should therefore regularly back-up any work and are advised to save it on the University system. 5. If there are technical or performance issues that prevent students submitting coursework through the online coursework submission system on the day of a coursework deadline, an appropriate extension to the coursework submission deadline will be agreed. This extension will normally be 24 hours or the next working day if the deadline falls on a Friday or over the weekend period. This will be communicated via email and as a Softwarica LMS announcement. 6. Assignments that are more than 10% over the word limit will result in a deduction of 10% of the mark i.e. a mark of 60% will lead to a reduction of 6% to 54%. The word limit includes quotations, but excludes the bibliography, reference list and tables. |

# Week 1

1. Write a method to reverse the characters from a string. (4 marks)
2. Write the pseudocode for finding duplicate values in an array. (4 marks)

# Week 2

1. Read the degree of two polynomials and their coefficients, all integers, from the standard input. The polynomial is of the form ( ) = ∗ + ⋯ + 1 ∗ 1 + , where 0 ≠ 0.
   1. Write the pseudocode for adding two polynomials. (4 marks)
2. Write the pseudocode and code for a function that determines whether given word is palindrome. What is the time complexity (expressed using BigO notation)? (4 marks)

# Week 3

1. Write a program that accepts a string and return the reversed string using recursive function. (4 marks)
2. Write a recursive version of linear search on an array of integers. What is the time complexity of the algorithm? Use the BigO notation to express it. (4 marks)

# Week 4

1. Implement a function to search an element in sequence using binary search. (4 marks)
2. Use binary search in implementing a guessing game. One thinks of a number between 1 and 20000, the program attempts to guess the number and feedback is given whether my number is higher or lower. The program then makes a new guess and so on until it guesses the right number. (4 marks)

# Week 5

1. Using Java, implement a function that deletes duplicate value nodes from the list. (8 marks)

# Week 6

1. Implement a function that inserts a node in a given binary tree. (8 marks)

# Week 7

1. Implement an unweighted, undirected graph structure in the programming language of your choice. Implement the BFS or DFS traversal for this graph. (6 marks)

# Week 8

1. Implement a directed graph in the programming language of your choice. (6 marks)

# Week 9, 10, 11

1. Create an examination application in Java. Admin should be able to create multiple sets of MCQ questions under each category/subject (6 marks). Admin will create login token (username, password) for the registered examinee (6 marks). Examinee will get random question sets when he/shelogin to attend the exam (4 marks). Examinee should not get the same question set again (2 marks). Mark statement should be generated at the end of each exam (4 marks) and should also be viewable in examinees dashboard later(2 marks). Implement suitable data structures to achieve above-mentioned functional requirements wherever possible (4 marks). Implement the unit testing frameworks like JUnit to perform unit testing for at least 3 functionalities with in this application (6 marks). Students are encouraged to use GUI frameworks like Swing while building the application (6 marks). -40 marks total