PROG7312 Lesson Plan

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| Module Name | PROG7311 |
| Learning Unit | Learning Unit 1:Introduction to Data Structures and Lists |

| Theme | Textbook Reference | Topics of recorded videos in Blackboard Collaborate | **VCLearn Activities** *These activities are designed to help you work out what you know and what you need assistance with. They must be completed before the relevant Q&A session.* | Other "non-VCLearn" resources |
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| **Theme 1 : Data Structures** *By the end of this section you should be able to:* • Compare different Types of Data Structures •Explain Algorithmic Complexity | Nakov chapter 16 & 19 | The Stack and the Heap : https://youtu.be/qZgotP4fWx4 (please embed into Learn) Linear and Non Linear Data Structures: https://youtu.be/sMpJUmw5dg4 | | Please see : *Comparisons of DataStructures.docx * Lesson1.pptx *The Heap and the Satck .pptx *Data Structures.pptx *LinkedLists.pptx * The big O: https://www.youtube.com/watch?v=v4cd1O4zkGw *Code Walk through big O: https://youtu.be/D6xkbGLQesk *10 most important Data structures and Algorithms to know: https://www.linkedin.com/pulse/10-must-know-algorithms-data-structures-software-pablo-g-cisneros/?trackingId=%2B7vLaguR6MUDi2PXb6raGg%3D%3D * Boxing: https://www.youtube.com/watch?v=Iod4m852YqQ * Unboxing: https://www.youtube.com/watch?v=8HnXXOLb-TQ |
| **Theme 2: Arrays** *By the end of this section you should be able to:* • Use Multi Dimensional Arrays •Use Jagged Arrays | Jamro chatper two | *Arrays are covered extensively in PROG5111,PROG6112,and again in PROG6211 . We have thus decided that students can complete a Hackkerank custom challenge on arrays rather than covering the material again. The respective lecturer is welcome to then reteach the areas that the challenge highlights as problematic.* | Activity 1.2.1: Use multi-dimensional arrays to do vector algebra | * **Please use the following link to acces the Hackerrank Challenge**: www.hackerrank.com/all-about-arrays * Code Resources (Lecturer Only ) Jagged Array * Code Resources (Lecturer Only) Multi Dem Array *Jagged Arrays: https://www.youtube.com/watch?v=2inKIi6Z_zI |

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| **Theme 3 Sorting Algorithms:**<br>*By the end of this section you should be able to:*<br>•Compare different sorting algorithms. | Jamro chatper two | *sorting algorithms are covered in both PRLD5121 and PROG6112 - You can make use of the following Youtube videos to allow students to compare the different algorithms* | Activity 1.3.1: Investigate the performance of List<T>.Sort | * Sorting algorithms visualised: https://www.youtube.com/watch?v=tPtvKYinUzc<br>Bubble sort:<br>* Part 1: https://www.youtube.com/watch?v=iITyT7NnNSo&feature=youtu.be<br>* Part 2: https://www.youtube.com/watch?v=PQjWGP6-VAw&feature=youtu.be<br>* Part 3: https://www.youtube.com/watch?v=GeDERbIBsDQ&feature=youtu.be<br>Insertion Sort: https://www.youtube.com/watch?v=m6wqcbArRUE&feature=youtu.be |
| **Theme 4: Lists**<br>*By the end of this section you should be able to:*<br>**2.**Compare different Types of Lists<br>3.Use Lists to solve programming problems | | **Singly Linked Lists**<br>* **Theoretical explanation linked lists**: https://youtu.be/LtMQ60lColk<br>* **Code Walk through linked** lists:https://youtu.be/ayqIO5F-0ng<br>* **Code Implementation append method LinkedList:** https://youtu.be/hWkpu5bSdKo<br>* **Return a Node Count:** https://youtu.be/89aRE3npTUo<br>* **Print all the values in a linked list:** https://youtu.be/XLD03RfdBbY<br>* **Final code walk through Linked Lists:** https://youtu.be/ZBdD-3CKYhQ<br>**Doubly linked Lists:**<br>*** Appending to a Doubly Linked List** https://youtu.be/T1DllQngljU<br>***Verifying that the append method is working:** https://youtu.be/OH3-MxeGWGM<br>***Insert After in Doubly Linked List:** https://youtu.be/0riFgnqA7jo<br>*** Insert After [Code] DoublyLinked list and Display Values in reverse:** https://youtu.be/PqXBgKS8Ylk<br>**Circular Linked Lists:**<br>***** Appending to a Singly Circular linked list | Activity 1.4.1: Use a circular linked list to store the notes in a looping song | ***GitHub Repo (Lecturers Only):** https://github.com/TillCM/LinkedLists<br>*Code Resources Lecturer only GameDataStructures<br>*Linked Lists.pptx<br>* **LinkedList + Indexes** : https://www.hackerrank.com/topics/linked-lists<br>***GitHub Repo(Lecturers Only):** https://github.com/TillCM/Doubly-Linked-Lists-<br>***YouTube Doubly Circular Linked lists:** https://www.youtube.com/watch?v=KaV7BmfbhlQ<br>**&** youtube.com/watch?v=SMuL7ld3r5M |