Data Structures and Algorithms 2
Course Syllabus

		Start of term 24/09/2023
Week 1 **Chap. 1 - Programming: A General Overview** **1 Lecture** **Week 2** **Chap. 2 - Algorithm Analysis** **1 Lecture**	26/09 03/10	1.1 Introduction 1.2 Mathematics Review 1.3 A Brief Introduction to Recursion 1.4 C++ Classes *(self study)* 1.5 C++ Details *(self study)* 1.6 Templates *(self study)* 1.7 Using Matrices *(self study)* 2.1 Mathematical Background 2.2 Model 2.3 What to Analyse 2.4 Running-Time Calculations
Week 3 + Week 4 **Chap. 3 - Lists, Stacks, and Queues** **2 Lectures**	03/10 & 10/10 **12/10** ➔	3.1 Abstract Data Types (ADTs) 3.2 The List ADT 3.3 **vector** and **list** in the STL 3.4 Implementation of **vector** 3.5 Implementation of **list** 3.6 The Stack ADT 3.7 The Queue ADT **==========➔ HOMEWORK 1 OUT**
Week 5 + Week 6 **Chap. 4 - Trees** **2 Lectures**	17/10 & 24/10 **Thur. 19/10** **14:30-15:00** **26/10** ➔	4.1 Preliminaries 4.2 Binary Trees 4.3 The Search Tree ADT—Binary Search Trees **Quiz # 1** 4.4 AVL Trees 4.5 Splay Trees *(self study)* 4.6 Tree Traversals (Revisited) 4.7 B-Trees 4.8 Sets and Maps in the Standard Library *(self study)* **==========➔ MINI-PROJECT OUT**
Week 7 + Week 8 **Chap. 5 - Hashing** **2 Lectures**	31/10 & 7/11	5.1 General Idea 5.2 Hash Function 5.3 Separate Chaining 5.4 Hash Tables without Linked Lists 5.5 Rehashing 5.6 Hash Tables with Worst-Case O(1) Access 5.7 Universal Hashing 5.8 Extendible Hashing

	02/11 ➔	**==========➔ HOMEWORK 1 DUE**
Sun. 12/11	**09:00 – 11:00**	**Midterm Exam**
Week 9 + Week 10 **Chap. 6 - Priority Queues (Heaps)** **2 Lectures**	21/11 & 28/11 **25/11 ➔**	6.1 Model 6.2 Simple Implementation 6.3 Binary Heap 6.4 Applications of Priority Queues 6.5 d-Heaps 6.6 Leftist Heaps 6.7 Skew Heaps 6.8 Binomial Queues 6.9 Priority Queues in the Standard Library *(self study)* **==========➔ HOMEWORK 2 OUT**
Week 11 & Week 12 & Week 13 **Chap. 7 - Sorting** **3 Lectures**	05/12 & 12/12 & 19/12 **Thu. 14/12 14:30 – 15:00** **14/12/2023 ➔**	7.1 Preliminaries 7.2 Insertion Sort 7.3 A Lower Bound for Simple Sorting Algorithms 7.4 Shellsort 7.5 Heapsort 7.6 Mergesort 7.7 Quicksort 7.8 A General Lower Bound for Sorting 7.9 Decision-Tree Lower Bounds for Selection Problems 7.10 Adversary Lower Bounds 7.11 Linear-Time Sorts: Bucket Sort and Radix Sort 7.12 External Sorting **Quiz # 2** **==========➔ MINI-PROJECT DUE**
Week 14 **Chap. 9 - Graph Algorithms (Brief Intro.)** **2 Lectures**	**07/01/2024 ➔** 09/01/2024 & 16/01/2024	**==========➔ HOMEWORK 2 DUE** 9.1 Definitions 9.2 Topological Sort 9.3 Shortest-Path Algorithms 9.4 Network Flow Problems 9.5 Minimum Spanning Tree 9.6 Applications of Depth-First Search 9.7 Introduction to NP-Completeness (if time allows)
Last day of classes 18/01/2023 **FINAL EXAM (During the week 21–25/01/2024)**		