TRƯỜNG ĐẠI HỌC FPT

KẾ HOẠCH TRIỂN KHAI HỌC PHẦN *Data structures and Algorithms in Java*
COURSE IMPLEMENTATION PLAN – *FALL 2023: 05/09-13/11/2023*
(DANANG CAMPUS, GV: *Trần Ngọc Anh*, Social Contructivism: 10 Slot)

Slot	Topic	Contents / Presentations (Rounds: 1, 2, 3; Groups: A, B, C, D, E, F)	Action	Mark
01	[1] Linked List	Introduction to Data Structures and Algorithms (in Java).	Code 1	A1
		Build a singly linked list: insert, traverse.		
		Basic operators on singly linked list: remove, reverse....		
02	[2] Stacks and Queues	1A_What is a circular linked list (CL)? Use a CL to solve the Josephus problem?	P01(02)	
		2B_How to implement a stack using an array. Give ≥ 2 applications?		
		3C_Can we evaluate a prefix expression using a linked-list-based stack?		
03		1D_How to convert an infix expression to a prefix one using a stack?	P02(03)	
		2E_How to implement an queue using a circular array. Give ≥ 2 applications?		
		3F_How to implement priority queue using linked list. Give ≥ 2 applications?		
04	[3] Recursion	1B_Give examples of **linear/binary/multiple; tail/non-tail** recursions? ...	P03(04)	
		2C_Using recursion to enumerate bit strings, combinators and permutations?		
		3A_Enumerate bit strings, combinators and permutation without recursion?		
05	[1-3]	**Review [1-3] with multiple choice (MC) questions** *[Presenting backup]*	Teacher	
		(1) Progress Test 1.A (45', 30q: [1]-10, [2]-10, [3]-10)		
		Question & Answer		
06	[4] Binary Trees, Binary Search (BST) and AVL Tree	Build a BST: search, insert. Traverse binary tree by in/post/pre order using recursion.	Code 2	A1
		Determine the average with accumulator. Compute the height with recursion.		
		To visualize display/draw a binary tree in a console window?		
07		1E_Deleting a node in a BST with two methods of merging and copying?	P04(07)	
		2F_Print the in-order/pre-order traversal of the given binary tree using loop with stack?		
08		1D_Build a BST of the smallest/largest height from an integer array?	P05(08)	A2
		2C_Comprise binary tree from inorder & postorder traversals using recursion/loop?		
09		What are rotations in AVL tree and their applications?	Teacher	
		Review [4] with MC questions & (2) Progress Test 1.B (35', 25q: [4])		
10	[5] Graph	1A_How to traverse a graph by depth/breadth first search using recursion/ loop?	P06(10)	A2
		2B_Colour map with minimum number of colors using backtracking/sequential algorithm?		
11		To obtain file to save the weighted graph. Read the file to adjacency list, matrix.	Code 3 edu[11]	
		DIJKSTRA: find the shortest path between 2 vertices in a graph? *[AdjList]*		
		FLOYD: find all shortest path between every pair of vertices? *[AdjMatrix]*		
12		1F_How to find minimum spanning tree with two algorithms of PRIM and Kruskal?	P07(12)	
		2D_Check whether Euler cycle/path exists. If yes, how to find them?		
13	[6] Sorting	Find one(all) Hamilton cycle(s) using backtracking.	Code 4 edu[13]	
		Heap sort: using heap data structure for sorting an array of integers.		
		Sorting an array and a linked list of integers by Quick sort?		
14		1E_To efficiently implement Radix sort on an array with Count sort?	P08(14)	
		2A_Can you implement Merge sort with/without using recursion?		
15	[5-6]	**Review [5-6] with MC questions**	Teacher	
		(3) Progress Test 2.A (45', 30q: [5]-18, [6]-12)		
16	[7] Hash	1B_What is hashing? Implement hash table with separate chaining? Give ≥ 2 applications?	P09(16)	A2
		2C_Implement hash table with opening addressing: linear and quadratic probing?		
17	[8] Text	1D_Use binary tree (and priority queue) to encrypt a text file with Huffman's algorithm?	P10(17)	
		2E_How to encrypt (decrypt) text with two algorithms of LZW and Run length?		
18	for PE	*Training for Practical Exam(30%, Java, Topics: [1, 2, 3, 4, 6])*	edu[18]	
		Find min/max, average with accumulator, draw based on NLR (using recursion), calculate BF,		
19	[7-8]	1F_How the algorithm KMP solve the problem of string matching?	P11(19)	A2
		Review [7-8] with MC questions & (4) Progress Test 2.B (35', 25q: [7]-13, [8]-12)	Teacher	
20	[1-8]	**Review [1-8] with MC questions for Final Exam(30%)**		
		(5) FINAL QUIZ (60', 50q: [1]-6, [2]-6, [3]-6, [4]-7, [5]-7, [6]-6, [7]-6, [8]-6)		