TRƯỜNG ĐẠI HỌC FPT

DANANG CAMPUS

KẾ HOẠCH TRIỂN KHAI HỌC PHẦN
PLAN OF COURSE IMPLEMENTATION

1. Tên học phần/*Course name: Discrete Mathematics*

2. Thời gian triển khai: Học kỳ: SUMMER 2023 (50% Social Contructivism)

3. Lịch triển khai môn học

Week	Slot ID	Topic	Content	Traditional / Social Contructivism: Groups: A, B, C, D, E and F; Rounds: 1, 2, 3	Group Round
01:08/05-14/05	1	[1] Logic	Introduction, Propositional Logic Propositional Equivalences Predicates	**Traditional**	
	2	[1] Logic	Quantifiers Nested Quantifiers: introduction, translating Negating Nested Quantifiers	SC01_DN[02] R1_Quantification expresses the extent to which a predicate is true over a range of elements. What are two most important quantifiers? R2_We will often want to consider the negation of a quantified expression. How is Demorgan's law in predicate logic understood? R3_Nested quantifiers commonly occur in mathematics and computer science. How to use nested quantifiers to express mathematical statements and/or English sentences?	A-1 B-2 C-3
02:15/05-21/05	3	[1] Logic	Logically Inference Rules of Inference for Propositional Logic Rules of Inference for Quantified Statements	**Traditional**	
	4	[2] Basic Structures	Sets: introduction, operations Functions: properties, inverse and compositions Sequences & Summations	SC02_DN[04] R1_How many ways to combine Two, or more, sets? R2_The concept of a function is extremely important in mathematics and computer science. What are the important properties of functions? R3_Sequence is an important data structure in computer science. Give two ways to describe the terms of a sequence?	D-1 E-2 F-3
03:22/05-28/05	5	Test 1	**Review [1-2] with MC (multi choices questions)** Progress Test 1 **(50 minutes, 30 questions)** **Discuss**	**Traditional**	
	6	[3] Algorithms	Algorithms The Growth of Functions Complexity of Algorithms	SC03_DN[06] R1_What is used to describe the growth of a function? How can the efficiency of an algorithm be analyzed? R2_Prove that in the the worst case, for an increasing array, the binary search algorithm is more efficient than the linear search algorithm. R3_The bubble sort and the insertion sort are two basic sorting algorithms. Analyze the worst-case complexity of two those algorithms?	A-1 B-2 C-3
04:29/05-04/06	7	[4] Integers	Integers and Division, Greatest Common Divisors Least common multiples, Primes Integer Representations: Algorithms	**Traditional**	
	8	[4] Integers	Modular Exponentiation Applications of Congruences: Cryptography Hashing, generating pseudo-random numbers	SC04_DN[08] R1_It is important to be able to find modular exponentiation. How to use the binary expansion to compute modular exponentiation efficiently? R2_Congruences have many applications to computer science. How to use congruences to generate sequences of pseudorandom numbers and to do hashing? R3_How to encrypt messages using classical ciphers?	D-1 E-2 F-3
05:05/06-11/06	9	Test 2.a	[5.a] Mathematical Induction **Review [3-4] with MC** Progress Test 2.a **(25', 15q)**	**Traditional**	
	10	[5.b] Recursion	Recursive: Definitions, Algorithms Recursion searching/sorting Enumerating problem	SC05_DN[10] R1_Can we solve a problem by reducing it to an instance of the same problem with smaller input? Give simple examples? R2_Can we use recursion to obtain the algorithms for searching and sorting in an array? R3_ Using recursion to list/enumerate the bit strings, combinators?	A-1 B-2 C-3
06:11/06-18/06	11	[6] Counting	Basic Counting Principles Recurrence Relations Divide-and-Conquer Algorithms	**Traditional**	
	12	Test 2.b	**..., Review [5-6] with MC** Progress Test 2.b **(40', 25q)** **Discuss**	**Traditional**	
07:19/06-25/06	13	[7] Graph	Graphs: Terminology, Special Types Representing Graphs Graph Isomorphism	SC06_DN[13] R1_How many vertices and edges do special graphs have? R2_How many ways to represent graphs? Discuss about their pros and cons? R3_Can we determine whether it is possible to draw two graphs in the same way?	D-1 E-2 F-3
	14	[7] Graph	Paths, Circuits and Connectedness Euler path and circuit Hamilton path and circuit	SC07_DN[14] R1_Give definitions of paths, circuits and connectedness in graphs? R2_Can we travel all edges of a graph starting at a vertex and returning to it by traversing each edge of the graph exactly once? R3_Can we find the simple paths and circuits that contain every vertex of the graph exactly once?	A-1 B-2 C-3
08:26/06-02/07	15	[7] Graph	Shortest Path Problems Dijkstra's Algorithm Traveling Salesperson Problem	**Traditional**	
	16	Test 3.a	**..., Review [7] with MC** Progress Test 3.a **(40', 25q)** **Discuss**	**Traditional**	
09:10/07-16/07	17	[8] Tree	Trees: terminologies and properties Binary search tree Decisions tree	SC08_DN[17] R1_Trees have been employed to solve problems in a wide variety of disciplines. Give some terminologies and properties of trees? R2_How should items in a list be stored so that an item can be easily located? R3_What series of decisions should be made to find an object with a certain property in a collection of objects of a certain type?	D-1 E-2 F-3
	18	[8] Tree	Prefix code and Huffman tree Tree Traversal Prefix and Postfix form	SC09_DN[18] R1_How should a text be efficiently coded by bit strings using a tree? R2_Ordered rooted trees are often used to store information. How many ways to visit each vertex of an ordered rooted tree to access data? R3_How to convert an expression from infix form to postfix one?	A-1 B-2 C-3
10:17/07-23/07	19		Spanning Trees: Depth First Search and BFS Minimum Spanning Trees: PRIM Kruskal's algorithm for Minimum Spanning Trees	SC10_DN[19] R1_How many ways to find a connected subgraph with the minimum number of edges containing all vertices of the original simple graph? R2_To find a spanning tree in a weighted graph such that the sum of the weights of the edges in the tree, we can use the algorithm PRIM. How it works? R3_A different algorithm to find minimum spanning tree is Kruskal's algorithm. Describe how it works and its difference compared to PRIM?	D-1 E-2 F-3
	20	Tests: 3.b & FINAL	**Review [8] with MC** Progress Test 3.b **(25 ', 15q)** FINAL Test **(60' minutes, 50 questions)**	**Traditional**	
Assignments (30%): A1 10%, A2 10%, A3 10%; Tests (30%): T1 10%, T2.a 5%, T2.b 5%, T3.a 5%, T3.b 5%; **FINAL+phát biểu: điểm cộng.**					

Người phê duyệt/*Approver* *GĐCS/Campus's Director*	Người kiểm tra/*Reviewer* *TBĐT/Head of Academic Affairs Board)*	Người lập/*Creator* *CNBM/Head of department*
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