

CTY Course Syllabus

Data Structures and Algorithms

Day	Time	What (Knowledge, concepts, reading)
DAY 1 Monday	Morning	<ul style="list-style-type: none"> • Pre-Assessment • Algorithms and Data Structures at a glance • Recursion – Programming
	Afternoon	<ul style="list-style-type: none"> • Recursion – More programming • Recursion – Inductive Mathematics • Recursion - Role in Divide-and-Conquer
	Evening	<ul style="list-style-type: none"> • Recursion exercises • Programming review
Day 2 Tuesday	Morning	<ul style="list-style-type: none"> • Lists – ADT • Lists – Array implementation and programming • Lists – Linked lists (LL)
	Afternoon	<ul style="list-style-type: none"> • LL and doubly LL in general • Lists – Cont.
	Evening	<ul style="list-style-type: none"> • Lists and LL exercises
Day 3 Wednesday	Morning	<ul style="list-style-type: none"> • Stacks – Array/LL • Stacks – Cont.
	Afternoon	<ul style="list-style-type: none"> • Queue – Array/LL
	Evening	<ul style="list-style-type: none"> • Lists/Stacks/Queues exercises
Day 4 Thursday	Morning	<ul style="list-style-type: none"> • Algorithm Analysis – Examples • Analysis – Pseudocode • Analysis – Mathematics
	Afternoon	<ul style="list-style-type: none"> • Analysis – Big-Oh, Theta, Omega • Examples: List traversal and Doubly Linked Lists
	Evening	<ul style="list-style-type: none"> • Analysis exercises
Day 5 Friday	Morning	<ul style="list-style-type: none"> • Sorting Algorithms – selection, insertion
	Afternoon	<ul style="list-style-type: none"> • Sorting Cont. – bubble, merge
	Evening (Sunday)	<ul style="list-style-type: none"> • Sorting Cont. – quick • Sorting exercises
Day 6 Monday	Morning	<ul style="list-style-type: none"> • Week one review
	Afternoon	<ul style="list-style-type: none"> • Trees – Definitions • Trees – Traversal algorithms

Day	Time	What (Knowledge, concepts, reading)
		<ul style="list-style-type: none"> • Trees – ADT and algorithm programming and exercises
	Evening	<ul style="list-style-type: none"> • More tree exercises
Day 7 Tuesday	Morning	<ul style="list-style-type: none"> • Dictionary ADT and Binary tree types
	Afternoon	<ul style="list-style-type: none"> • Continued
	Evening	<ul style="list-style-type: none"> • Exercises
Day 8 Wednesday	Morning	<ul style="list-style-type: none"> • Hash table and more tree implementations
	Afternoon	<ul style="list-style-type: none"> • Priority Queue
	Evening	<ul style="list-style-type: none"> • Heap • Exercises
Day 9 Thursday	Morning	<ul style="list-style-type: none"> • Graphs – Undirected and math sampler • Graphs – Weighted/directed graphs
	Afternoon	<ul style="list-style-type: none"> • Graphs – Continued • Graph applications
	Evening	<ul style="list-style-type: none"> • Math and programming exercises
Day 10 Friday	Morning	<ul style="list-style-type: none"> • Graph algorithms – Depth/Bredth
	Afternoon	<ul style="list-style-type: none"> • Graph algorithms cont. • Topological Sort
	Evening (Sunday)	<ul style="list-style-type: none"> • Heuristics introduction • Exercises
Day 11 Monday	Morning	<ul style="list-style-type: none"> • Week Two review • Spanning Trees
	Afternoon	<ul style="list-style-type: none"> • Shortest path searches
	Evening	<ul style="list-style-type: none"> • Heuristics • Exercises
Day 12 Tuesday	Morning	<ul style="list-style-type: none"> • Dijkstra's algorithm
	Afternoon	<ul style="list-style-type: none"> • Dijkstra's algorithm cont. • A* overview and examples
	Evening	<ul style="list-style-type: none"> • Summary Time • Exercises
Day 13 Wednesday	Morning	<ul style="list-style-type: none"> • Dynamic programming
	Afternoon	<ul style="list-style-type: none"> • Dynamic programming cont. • Complexity Theory – P/NP/Intractible
	Evening	<ul style="list-style-type: none"> • Complexity cont. • Exercises

Day	Time	What (Knowledge, concepts, reading)
Day 14 Thursday		<ul style="list-style-type: none">• Other algorithms as time allow:• Hill Climbing• Simulated Annealing• Genetic• Evolutionary Programming
Day 15 Friday		<ul style="list-style-type: none">• Other algorithms cont.• Post-assessment