

Chapter 0

Course Outline

Data Structures and Algorithms

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Learning outcome

By completing this course, students are able to:

- **USE** fundamental data structures like list, stack, queue, tree, graph, and hash table for programming and particular problems
- **UNDERSTAND** ways to implement an efficient algorithm
- **EXPRESS** algorithms using pseudocode as well as using C++
- **ANALYZE** the computational complexity of algorithms associated with these data structures.



- **Course credit: 4**
- Lectures: 30 period units 10 weeks (Actually 8 sessions in class)
- Lab: 30 period units (10 weeks)
- Teaching from 09/2020 to 12/2020
- Final exam: in 01/2021



- Lectures: Course contents in class, QAs and quiz
- Readings: Course contents (books and references) and course videos at home
- Lab: coding practice
- Assignments: A small projects
- **Bonus** Group (1-3 members) Presentation



Contents and Schedule

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Week	Topics	Quiz	Assignment
1	Course outline, recursion, complexity		A1 - Release
2	List		
3	Searching		
4	Algorithmic toolbox		
5	Tree concept		A2 - Release
	<i>Midterm test</i>		
6	Balanced trees, Heap		
7	Hash, Sorting algorithms		
8	Graph, course conclusion		
9	...		
10	...		

Labs Schedule

Week	Topics
1, 2, 3	C/C++ Review (Online)
4	ArrayList, Singly Linked List
5	Doubly Linked List, Stack, Queue
6	Search/ Algorithmic toolbox
7	-
8	Binary Tree/ Binary Search Tree
9	AVL implementation/ Tree applications
10	Heap - Hashing
11	Sorting algorithms
12	Graph implementation
13	Course review/ conclusion
14	Final test for lab

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- Midterm: 10%
- Lab: 10%
- Assignment: 30% (A1:15%, A2:15%)
- Final Exam: 50% (Open book, 1 A4 paper)

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- ① **"Data Structures and Algorithm Analysis"** - Clifford A. Shaffer (Edition 3.2).
- ② **"Data Structures: a Pseudocode Approach with C++"**, R.F.Gilberg and B.A. Forouzan, Thomson Learning Inc., 2001.
- ③ **"Data Structures and Algorithms in C++"**, A. Drozdek, Thomson Learning Inc., 2005.
- ④ **"C/C++: How to Program"**, 7th Ed. – Paul Deitel and Harvey Deitel, Prentice Hall, 2012.
- ⑤ Internet.



- BK E-learning
 - Common site <http://e-learning.hcmut.edu.vn/course/view.php?id=62853>
 - Class site <http://e-learning.hcmut.edu.vn/course/view.php?id=68735>
- Any question:
 - Using BKeL forum [is faster](#) than send email.

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Preparation for the course

- Materials:
 - Slides of this course
 - E-book: **Data Structures and Algorithm Analysis** - Clifford A. Shaffer (Edition 3.2).
<http://people.cs.vt.edu/~shaffer/Book/>

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- Outside of lecture room
 - Read slides, books
 - Do exercises, labs, assignments
 - Check BK-Elearning
- During lectures:
 - Listen & Discuss



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