ASSUMPTION UNIVERSITY
FACULTY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE
COURSE OUTLINE
CSX3003/ITX2010/IT2230/BIS4787 DATA STRUCTURE AND ALGORITHM

Course Status : Major Required
Pre-requisite :
Semester : 1 / 2022
Instructor : Asst. Prof. Dr. Thitipong Tanprasert (Sec 541)
Wednesday 9:00 – 12:00
Room: VMS0204

Office
VMS 608, VMS. Building 6th floor
Email : thitipong@scitech.au.edu
Office Hours : 12:00 – 13:00 Thursday
10:00 – 12:00 Friday

References:
Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, The MIT Press, 3rd Edition (2nd Edition is applicable)

Course Description
Analysis of complexity of algorithms, various data structures including array, string, stack, queue, dequeue, tree, graph, set and heap, applications and analysis of algorithms developed employing the data structures mentioned above including time and memory requirement analysis of various searching and sorting algorithms.

Course Objectives
- To equip students with fundamental concepts and skills required to understand, and apply essential data structures, including identify advantages and disadvantages of the studied data structures in terms of time and memory complexity, implement data structures as indexed- or linked-structure depending on appropriateness particular to each data structure, implement basic algorithms prescribed with certain data structures, apply the data structures in problem solving in order to maximize the solution performance.
- To balance theoretical foundation with practical skills so that students completing the course can continue with advanced courses in computer science subjects.

Lecture Schedule:

Weeks	Topics	Remarks
1	Introduction	Getting familiarized with the learning process and programming environment
2	Essential Coding Environment, Time Complexity	A simple workshop on programming, running time measurement, and asymptotic bounds
3	Insertion sort and Merge sort	Different algorithmic paradigms for solving the same problem and how theoretical comparison is carried out
4	Quicksort	In-place O(nlgn) sorting and how balance affects recurrence tree
5	Heap, Heapsort, Prioirty Queue	Speeding up $O(n^2)$ algorithm to O(nlgn)
6	Dynamic Set, Stack, Queue	

7	Dictionary: Direct-Address Table, Hash Table	
8	Binary Search Tree	Tree-structured dynamic set
9	Introduction to Red-Black Tree	Balance is the critical issue
	Midterm Examination	
10	Disjoint Sets	
11	Graph: representation, elementary lgorithms	
12	Weighted Graph, Minimum Spanning Trees	Kruskal's
13	Prim's and Dijsktra's Algorithms	Variance of BFS
14	Topological sort	Application of graph and DFS
15	Term project presentation	
	Final Examination	

Mark Allocation:

Term Project	20%
Assignments (4)	20%
Midterm Examination	30%
Final Examination	30%

Other Requirements:

1. 80% attendance (checked **ONLY** within the first 15 minutes of each 90 minutes)
   IMPORTANT : The class attendance checking has been strongly enforced for many semesters and students who missed checking more than 20% had been withdrawn from the course. Therefore, it is emphasized here that ***the percentage of attendance is calculated from the checking in the first 15 minutes***. A student who walks in later than the specified checking period may be allowed to sit in the class, *but he or she will not be checked for attending the session*.
2. Participating in the project presentation

Term Project Description :

A group of **no more than three** members will study an implementation of actual data structure in certain programming language. Alternatively, a study of an advanced data structure beyond the scope of the course may also be a project topic.