NCHU Course Outline

中文

Course Name	(中) 演算法(2347)						
	(Eng.) Algorithms						
Offering Dept	Department of Computer Science and Engineering						
Course Type	Required	Credits	3	Teacher	FAN YAO CHUNG		
Department	Department of Computer Science and Engineering / Undergraduate	Language	Chinese	英文/EMI		Semester	2024-SPRING
Course Description	The objective of this course is to study a broad variety of important and useful algorithms; methods for solving problems that are suited for computer implementations.						
Prerequisites						self-directed learning in the course	N

Relevance of Course Objectives and Core Learning Outcomes(%)			Teaching and Assessment Methods for Course Objectives	
Course Objectives	Competency Indicators	Ratio(%)	Teaching Methods	Assessment Methods
Understand the design of algorithms.	1.Having abilities on computer science literacy, information theory, and mathematical analysis. 3.Having abilities of analyzing, designing, and implementing IT software systems. 6.Having abilities of self-learning, communicating and coordinating team work.	50 40 10	Exercises Discussion Lecturing	Attendance Assignment Quiz

Course Content and Homework/Schedule/Tests Schedule

Week	Course Content
Week 1	Introduction to the goal of algorithm design, Why we study algorithm? Who need Algorithm?
Week 2	Time Complexity, Space Complexity, 3Sum Problem, Binary Search, Union Find Problem
Week 3	The unknown array size problem
Week 4	Element Sorting (Insertion Sort, Selection Sort, Shell Sort, Knuth shuffling)
Week 5	Merge Sort (Natural Sort, Sleep Sort, Top-down, Botton-up) Quick Sort (three way sort, naive quick sort)
Week 6	Counting Sort Heap Sort The Upper Bound and Lower Bound of Sorting
Week 7	Divide and Conquer, Master Theorem
Week 8	Midterm Exam
Week 9	DFS, BFS, Cycle Detection, Connected Component, Topological Sort
Week 10	Minimum Spanning Tree (Prim and Kruskal algorithm)
Week 11	Shortest Path Problem
Week 12	Introduction to Dynamic Programming
Week 13	Introduction to Dynamic Programming
Week 14	P. vs. NP NP-Completeness, NP-Hard Salesman Problem
Week 15	Context Problem
Week	自主學習：利用網路資源，自主學習Knuth-Morris-Pratt Algorithm

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Week 17	自主學習：利用網路資源，自主學習Kosaraju’s Algorithm for computing strong components
Week 18	Final Exam

Evaluation
期中考試 35 % 期末考試 35 % (考試範圍涵蓋自主學習之兩演算法) 作業 30%
Textbook & other References
Sedgewick and Wayne, Algorithms 4th.
Teaching Aids & Teacher's Website
TA
Office Hours
By Appointment
Sustainable Development Goals, SDGs

include experience courses：N