



Shih Chien University

STP Program (July 01-Aug 02)

CSC 410 Algorithmic Problem Solving

Course Outline

Course Code: CSC 410

Instructor: TBA

Home Institution: TBA

Office Hours: TBA

Email: TBA

Credits: 4

Class Hours:

This course will have 144 class hours, including 50 lecture hours, professor 30 office hours, 20-hour TA discussion sessions, 10-hour review sessions, 34-hour extra classes.

Course Description:

The purpose of the course is to study how to design and analyze computer program algorithms to solve real-world problems. The course will begin with a review of the concept of algorithm complexity and basic graph algorithms; and then cover algorithm design approaches such as greedy, divide and conquer, and dynamic programming; then, a network flow problem will be introduced and algorithm design by reduction to a network flow problem will be discussed; then, the notion of problem reduction will be used to discuss and prove the computational intractability (i.e., hardness) of a problem; time permitting, approaches to handling intractable problems, such as approximation algorithms and local search algorithms, will be discussed as well.

Academic Inquiry: Shih Chien University

Disclaimer: Course schedule is subject to change.



Course Objectives:

After completing this course the student will be able to abstract a real-world problem to a computational problem and design an algorithm to solve the problem computationally and analyze its running time and storage space complexities.

Required Course Materials:

Jon Kleinberg and Eva Tardos, Algorithm Design, Addison Wesley.

Grading System (1 ~ 100):

Quality Points	Grade	Percentage %
4	A	80-100
3	B	70-79
2	C	60-69
1	D	50-59
0	E	0-49

Course Schedule:

Week1

- Understand Algorithm Complexity
- Graph Algorithm
 - BFS
 - DFS
 - Dijkstra
 - Floyd Warshall
 - Prims
 - Kruskal
- Divide and Conquer
 - Binary Search
 - Merge Sort
- Homework -1

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Week2

- Divide and Conquer
 - Quick Sort
 - Karatsuba Algorithm for fast multiplication
 - Finding convex hull
 - Strassen's matrix multiplication
 - Find the closest pair of points
 - Algorithm for fast Fourier transform
- *Homework -2*

Week3

- Greedy Algorithm
 - Activity Selection Problem
 - Graph Coloring Problem
 - Job Sequencing Problem
 - Huffman Coding
- *Midterm Exam*

Week4

- Dynamic Programming
 - Longest Common Subsequence
 - Longest Increasing Subsequence
 - Edit Distance
 - Minimum Partition
 - Longest Path in Matrix
 - Subset Sum Problem
 - 0-1 Knapsack Problem
 - Boolean Parenthesization Problem
- *Homework - 3*

Week5

- Network Flow Applications
- Computation and Intractability
- NP-Hard Problem
- *Final Exam*

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