

2309 CS220 Course Outline

Subject Code : CS220
Subject Title : DESIGN AND ANALYSIS OF ALGORITHMS
Course Type : Compulsory
Level : 2
Credits : 3
Teaching Activity : Lecture 45 hours

Class Schedule :

Class	Week	Time	Classroom	Date
D1	MON	09:00-11:50	C309	04/09/2023 ~ 17/12/2023

Instructor : Professor Hon-Cheng WONG
Contact Number : 88972052
E-mail Address : hcwong@must.edu.mo
Office : Room A316
Office Hour : Monday 12:00-14:00
Tuesday 09:30-11:30
Wednesday 14:30-17:30
Friday 09:30-12:30

COURSE DESCRIPTION

This course aims to provide an introduction to the analysis and design of algorithms for graduate students. The course will cover: elementary data structures, analyzing and designing algorithms, characterizing running times, divide-and-conquer, probabilistic analysis and randomized algorithms, heapsort, quicksort, medians and order statistics, sorting in linear time, hash tables, binary search trees, dynamic programming, greedy algorithms, elementary graph algorithms, and maximum flow.

TEXTBOOK AND REFERENCE BOOKS

Required Text Book:

1. Book title: *Introduction to Algorithms*
Author/Editor: T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein
Edition: 4
ISBN: 978-0-262-04630-5
Publisher: MIT Press
Date: 2022

Reference Books:

1. Book title: *Introduction to Computation and Programming Using Python*
Author/Editor: J. V. Guttag
Edition: 3
ISBN: 978-0262045780
Publisher: The MIT Press
Date: 2021

1. Book title: *Introduction to the Design and Analysis of Algorithms*
Author/Editor: A. Levitin
Edition: 3
ISBN: 978-7-302-31185-0
Publisher: Tsinghua University Press
Date: 2013

INTENDED LEARNING OUTCOMES

Upon successful completion of this subject, students will be able to:

1. Understand the basic concepts of algorithms
2. Compare various algorithms using asymptotic notations
3. Understand how to mathematically analyze algorithms
4. Understand the probabilistic analysis of algorithms
5. Understand various sorting algorithms
6. Understand hash tables
7. Solve problems using dynamic programming
8. Understand maximum flow

Weekly Schedule

Index	Topic	Hours	Teaching Method
1	Introduction; Elementary data structures	3	Lecture
2	Analyzing and designing algorithms	3	Lecture
3	Characterizing running times	3	Lecture
4	Divide-and-Conquer	3	Lecture
5	Probabilistic analysis and randomized algorithms	3	Lecture
6	Heapsort	3	Lecture
7	Quicksort	3	Lecture
8	Midterm	3	----
9	Medians and order statistics	3	Lecture
10	Sorting in linear time; Hash tables	3	Lecture
11	Binary search trees	3	Lecture
12	Dynamic programming; Greedy algorithms	3	Lecture
13	Elementary graph algorithms	3	Lecture
14	Maximum flow	3	Lecture
15	Final Exam	3	----

ASSESSMENT APPROACH

<u>Assessment method</u>	% weight
1. In-class exercises	10%
2. Midterm	30%
3. Final exam	60%
Total	100 %

Guideline for Letter Grade:

Marks	Grade
93-100	A+
88-92	A
83-87	A-
78-82	B+
72-77	B
68-71	B-
63-67	C+
58-62	C
53-57	C-
50-52	D
0-49	F

Notes:

Students will be assessed on several assessment items (i.e. in-class exercises, midterm, and final exam.).

Midterm and final exam are used to evaluate the student's understanding of the analysis of algorithms.