Capital University of Economics and Business
Overseas Chinese College
Course Syllabus

Semester and Year	Spring 2023
Course Name	Data Structures and Algorithms Analysis
Course Code	MIS222
Course Type	☐General Education (Required) ☐ General Education (Elective) ☐Professional Course (Required) ☐Professional Course (Elective) ☑ Basic Disciplinary Course
Course Credits	3
Prerequisite Course	C or Java Programming Language
Instructor	Prof. Skipper Smith
Contact Information	Office: C217, Tel: 83951082, Email:skippersmith66@gmail.com

(all email correspondence should have in the Subject field: MIS222Y0X Name ID reason)

Section	IT
OH/LC hours	OH: Mondays, 13:30-14:15 & Thursdays, 13:30-15:05 LC: Thursdays, 18:00-20:00
Time/Place	Mon 9:55-12:20 B208
Textbook	Data Structures and Algorithm Analysis in C, 2nd Edition, Mark Allen Weiss, China Machine Press, ISBN 978-7-111-31280-2. or Data Structures and Algorithm Analysis in Java, 3rd Edition, Mark Allen Weiss, China Machine Press, ISBN 9780-13-257627-7.

Course Description

This course aims to elucidate data structures and methods of organizing large amount of data. Even though computers become faster and faster, the need for programs that can handle large amounts of input becomes more acute. This requires more careful attention to efficiency, since inefficiencies in programs become most obvious when input sizes are large.

Student Learning Objectives

Students should look at problems and see how implementations can reduce the time constraint for large amounts of data. The goal of the textbook is to teach students good programming and algorithm analysis skills simultaneously so that they can develop such programs with the maximum amount of efficiency.

Teaching methods

This course consists of lectures, discussions, hands-on projects, and student presentations. Students must be prepared to discuss the assigned chapters during class.

Reference materials

A First Book of ANSI C, 4th Edition. Gary J. Bronson, Publishing House of Electronics Industry. ISBN 7-121-02531-0

Grade Criterion

Component	Weight	Description
Final Exam	20%	A cumulative final examination will be given based on all of the contents of the class
Mid-Term Comprehensive	20%	A cumulative mid-term comprehensive will be given based on all of the contents of the first half of the class
Homework	10%	Homework problems will be assigned throughout the term, including but not limited to: terminologies, practice exercises, and project assignments
Quizzes	10%	There may be a number of ad-hoc/pop quizzes during the semester and 2 scheduled quizzes. The purpose of the quizzes is to ensure that students keep up with the contents
Participation	10%	Individuals will be asked to participate individually in a question and answer 10 times during the semester. Students are required to meet with their teachers every other week. Their performances should be counted in their participation.
Project & Presentation	20%	Presentation is aiming to test your knowledge and English presentation ability. The mark will be given according to your preparation, knowledge, contribution to the group, PPT, attitude, English, your performance during the presentation and time control. The student who makes the speech will be regarded as an advantage.
Attendance	10%	Refer to attendance policy listed below
Total	100%	

Detailed Grade computation

	Before Midterm	After Midterm
Attendance	5%	5%
Participation	5%	5%
Homework	5%	5%
Quizzes	5%	5%
Midterm Comprehensive	20%	
Presentation		20%
Final exam		20%
Total	40%	60%

Grading policy

A+ 97-100 A 93-96 A- 90–92 B+ 87-89 B 83-86 B- 80–82

C+ 75–79 C 70-74 C- 67–69 D+ 63–66 D 62-60 F 0- 59

Exam Schedule

- Midterm test: April 10, 2023; Final Exam: TBA

  Due to the adjusted schedule, all quizzes and exams may be delayed relative to the stated schedule.

Assessment of student performance *Self-Study and Reading ability Practice*

Instructor will give out the chapters or the reference books to read and use class hours to have discussion, and students should be able to show a proactive attitude and ability for self-study and reading. Knowledge and oral English will be elements of homework or presentation score.

Homework

Students should finish their homework (except for group projects) by themselves. Copying from others will be treated as cheating. Students should hand in all assignments promptly and on time. Late assignments will be accepted at the discretion of the instructor (e.g., when the student was ill or had an excused absence). Assignments turned in late without proof of illness or an excused absence will be reduced in score by at least 50%.

Assignment should be printed out. Anything that cannot be read will be marked wrong. Printing requirements are as followed: single space between lines, double space between paragraphs, font size is 12 (maximum). Grammatical errors can reduce your score up to 20%.

For this semester, homework will be assigned based on the electronic version of the Java book.

Attendance

Attendance in class is required for all students taking courses at the Capital University of Economics and Business Overseas Chinese College.

- Being late for 15 minutes or more is considered an unexcused absence.

- Five hours or above of unexcused absences will result in the lowering of the final grade by one grade band (e.g. from C – to D +). Any excused absence must be discussed directly with the teacher.
- **30% of class hours** of any kind of absences will result in a failing grade (F), but students are welcome to continue attending the class.
- An incomplete grade (I) will be considered in case of medical or family emergencies.

Participation

- Students should participate in classes actively**.** Half of the participation grade is determined by their activity in class. They are encouraged to ask questions relevant to the subject and express their own opinions. Every student should respect the ideas, opinions, and questions of their classmates.
- Students are recommended to build study groups, which can be helpful for any group projects and presentations.
- Students should also use office hours to ask questions or talk with the instructor for good communication and effective learning. Any misbehavior and non-class related activities in class will result in the lowering of the participation grade, including inappropriate use of **cell phones or other digital devices.**
- All above behaviors will be solely evaluated by the instructor for scoring.

Topical Course Outline

Week	Date	Topics
1	2.13	Syllabus Chapter 1: Introduction Math review, self-study Chapter 2: Algorithm Analysis Run-time Calculations What is Big-O Why is it important How is it used Checking your analysis Homework 1: 2.1, 2.2, 2.6, 2.13, 2.18 (Due 3.06)
		Exams
		Exams
2	03.06	Chapter 3: Lists, Stacks, and Queues: Abstract Data Types and The List ADT What is an Abstract Data Type What are List Functions Implementing Singly Linked Lists Implementing Doubly Linked Lists Implementing Circularly Linked Lists Big O Analysis Radix Sort, self-study, revisited in chapter 7 Homework: 3.1, 3.3, 3.11, 3.12 (a only), 3.17 (Due 3.13)
3	03.13	Chapter 3: Lists, Stacks, and Queues: The Stack ADT What is the Stack Model Implementation of Stacks Big O Analysis Applications The Queue ADT What is the Queue Model Implementation of Queues Big O Analysis Applications Homework: 3.18 (b only), 3.20 (a only), 3.25 (Due 3.20)
4	03.20	**Quiz 1** Chapter 4: Trees: Preliminaries and Binary Trees Search tree ADT, AVL Trees, Splay Trees Implementation of Binary Trees Uses of Binary Trees and Expression Trees Implementation of AVL Trees Implementation of Splay Trees, self-study Big O Analysis Homework: 4.2, 4.3, 4.4, 4.5, 4.8, 4.9, 4.10, 4.16, 4.23 (Due 4.03)
5	03.27	Chapter 4: Trees: B-Trees B-Trees (not Binary Trees!) Uses of B-Trees Implementation of 3-Trees and 4-Trees Big O Analysis Homework: 4.36 (Due 4.03 combined with previous week)

6	04.03	Chapter 6: Priority Queues (Heaps): Binary Heaps (aka Priority Queues) Implementations of Heaps Application of Priority Queues Big O analysis Review for Midterm Test Homework: 6.2 (Due 4.10)
7	04.10	**Midterm Test**
8	04.17	Chapter 7: Sorting Why Bubble Sort is bad A Lower Bound for Simple Sorting Methods Insertion Sort Method Shell-sort Method Heapsort Method Merge-sort Method Big O analysis Homework: 7.1, 7.2, 7.4, 7.11, 7.13 (Due 4.24)
9	04.24	Chapter 7: Sorting Quick-Sort Method A General Lower Bound for Sorting Stability in Sorting Radix Sort Method Bucket Sort Method (self-study) Big O Analysis Homework: 7.17, 7.25, 7.39 (Due 5.08)
10	05.01	May Day Holiday
11	05.08	Chapter 5: Hashing: Hashing Functions Separate Chaining Linear Probing Quadratic Probing What is Clustering Double Hashing Re-Hashing Big O Analysis Homework: 5.1, 5.2 (use table size 13), 5.4, 5.6 (Due 5.15)
12	05.15	Chapter 9: Graphing Algorithms: What is graphing Definitions & Terminology Adjacency Lists Degree calculations Depth First Search Breadth First Search Finding Strong Components Topological Sort Big O Analysis **Quiz 2** Homework: 9.1, 9.2, 9.26 (Due 05.29)
13	05.22	Chapter 9: Graphing Algorithms: Dijkstra's Shortest Path Algorithm Minimum Spanning Tree Prim's Algorithm

		Kruskal's Algorithm Maximum Flow Big O Analysis Euler Circuits and Hamiltonian Cycles explained Homework: 9.5, 9.11, 9.15 (Due 5.20 combined with previous week)
14	05.29	**Presentations**
15	06.05	**Final Exam**

Note: The chapters or sections marked with * above are left for your self–study, it the students responsibility to learn and understand these, as they also may be included in the quizzes or exams.

Teacher's Office Hour

- The instructor's office hours are shown in the front of the office door.
- Students are strongly encouraged to use the instructor's office hours and Learning Center to ask questions or talk with the instructor at least once per week for good communication and effective learning, and which is recorded in the students' participation.
- Additional one-on-one meeting times can be scheduled on a case-by-case basis.

Cheating and Plagiarism

- **Cheating is not tolerated**. Any student caught cheating on a quiz; test, or exam will be given a mark of zero (0) for the particular work. Additional penalties related to school rules are in addition to this.
- At the beginning of the semester the definition of plagiarism will be carefully explained, when any thoughts or writings of another person are used, they must be clearly identified (usually one uses quotation marks) and the source notes.

Note: *This syllabus is tentative and may be changed or modified throughout the semester. All students will be notified and a new syllabus will be given.*

Instructor: Prof. Skipper Smith Department Head: Prof. Jingning Li