

Capital University of Economics and Business

Overseas Chinese College

Course Syllabus

Year and Semester	2025 Spring						
Course Name	Data Structures and Algorithms Analysis						
Course Code	MIS222						
Course Type	<input type="checkbox"/> General Education (Required) <input type="checkbox"/> General Education (Elective) <input type="checkbox"/> Basic Disciplinary Course <input type="checkbox"/> Professional Course (Required) <input type="checkbox"/> Professional Course (Elective) <input type="checkbox"/> Professional Course (Expanded) <input checked="" type="checkbox"/> Professional Course (Advanced)						
Course Credits	3						
Course Hours	Total Hours	Class	48	Lecture Hours	48	Experiment (Computer) Hours	0
Applicable object	<input type="checkbox"/> Freshman <input checked="" type="checkbox"/> Sophomore <input type="checkbox"/> Junior <input type="checkbox"/> Senior						
	<input type="checkbox"/> Business Administration (Accounting)						
	<input checked="" type="checkbox"/> Information Management and Information Systems (Finance)						
Prerequisites	C or Java Programming Language						
Instructor	Prof. Smith						
Contact Information	Office: C217						
	Tele: (010) 83951082						
	Email: skippersmith66@gmail.com (all email correspondence must have in the Subject field: MIS222IT ID EnglishName reason)						
Office Hour	TBA						
Learning Centre	Tue 18:00-20:00						
Grade/Section	2023 IT						
Course Time/Place	Thu 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.						

Reference Book

Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd Edition [C 程序设计语言 (第 2 版·新版)]. ISBN 978-7-111-12806-9

Mike Banahan, Declan Brady, Mark Doran, The C Book, 2nd Edition. Addison Wesley. Freely available at https://publications.gbdirect.co.uk/c_book/

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

On successful completion of this exam, candidates should be able to:

Knowledge	<ul style="list-style-type: none"> ◆ Understand the fundamental structures on which all algorithms are based. ◆ Understand the formal method of analyzing general algorithm performance. ◆ Describe multiple sort methods and why each might be used. ◆ Describe multiple approaches to using trees for storing and/or organizing data. ◆ Describe multiple data graphing techniques and why they are used.
Capability	<ul style="list-style-type: none"> ◆ Be able to calculate the Big O for basic algorithms.. ◆ Identify when using a linked list. ◆ Identify when to use loops, nested loops, and function calls to simplify code logic. ◆ Utilize arrays for both raw data storage and strings, and being able to identify which is which. ◆ Be prepared to study Data Structures and Algorithm Analysis using C or a similar language.
Mindset	<ul style="list-style-type: none"> ◆ Be logical, methodical, consistent and accurate ◆ Apply critical thinking in the process of decision making

Website Source

<https://www.hackerrank.com> for practicing DS&A problems.

Teaching Methods

This course contains lectures, class discussions, homework, quizzes, presentation and exams. Students must be prepared to discuss the assigned chapters during class. Then real case and practice questions will be delivered to students as a way to test their understanding of the knowledge. This will require individual or group assignment in or after class.

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 Test	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
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.
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.
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%
Presentation		20%
Mid-Term Test	20%	
Final exam		20%
Total	40%	60%

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; 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 by themselves. Copying from others will be treated as plagiarism and the homework scores will be lowered. Students should hand in all assignments on time. Late assignments will be accepted at the discretion of the instructor (i.e., when the student was ill or had an excused absence). Late assignments without reasonable proof will be reduced in score by 50%.

☛ Attendance

Because the course covers a great deal of material, attending every class session is very important for performing well.

- ♦ Being late for 15 minutes or more is considered an absence.
- ♦ Five hours or above of unexcused absences will result in the lower level of the final grade by one grade band (e.g. from C – to D +). Any excused absence must be discussed directly with the teacher.
- ♦ Absence which is more than 1/3 of the total teaching hours will cause an F (a failing grade) directly. but students are welcome to continue attending classes.
- ♦ An incomplete grade (I) will be considered in case of medical or family emergencies.

☛ Participation

- ♦ Students should participate in classes actively. Half of participation grade is determined by their presentation 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 should also use office hours to ask questions or talk with the instructor for good communication and effective learning.
- ♦ Frequently visiting the instructor and chatting in English during office hours is highly recommended.
- ♦ The first student to send me a screenshot of this page will have five points added to their mid-term test score.
- ♦ Any misbehavior and non-class related activities in class will result in the lower level of the participation grade, including ringing cell phones.
- ♦ All above behaviors will be solely evaluated by the instructor for scoring.

☞ *Textbook*

Students must bring the textbook, a computer (if possible), USB drive, pen/pencil, and paper to class.

Topical Course Outline (original)

Week	Topics	Platform	Homework
1	● Syllabus	Classroom	—
	● Chapter 1 Introduction (self-study) ● Chapter 2 Algorithm Analysis	Classroom	—
	• Big O calculation • Checking analysis	Classroom	CH02 2.1, 2.2, 2.5abc, 2.13abcdef, 2.18abcd
2	● Chapter 3 Lists, Stacks, & Queues • Abstract data types	Classroom	—
	• Linked Lists • Structure implementation • Big O analysis	Classroom	—
	• Doubly/circularly linked lists	Classroom	CH03 3.1, 3.3ab, 3.11 (Due Week 4)
3	● Chapter 3 Lists, Stacks, & Queues • Stacks • Big O analysis	Classroom	—
	• Stacks in arrays vs. linked lists • Queues • Big O analysis	Classroom	—
	• Queues in arrays vs linked lists • Circular queues	Classroom	CH03 3.17a, 3.19
4	● Quiz 1	Classroom	—
	● Chapter 4 Trees • Definitions • General Trees • Binary Search tree ADT • Big O analysis • Binary Search tree practice	Classroom	—
	• AVL Trees • Big O analysis • AVL Tree practice • Splay Trees (self-study)	Classroom	CH04 4.1ab, 4.2abcde, 4.3, 4.4, 4.5, 4.8, 4.9ab (due Week 6)
5	● Chapter 4 Trees • B-Tree explanation	Real world	—
	• B-Tree insertion	Real world	—

	<ul style="list-style-type: none"> • B-Tree insertion practice 		
	<ul style="list-style-type: none"> • B-Trees deletion • B-Tree deletion practice 	Real world	CH04 4.16, 4.23, 4.36ab
6	<ul style="list-style-type: none"> ● Chapter 6 Priority Queues (Heaps) • Applications of Priority Queues 	Classroom	—
	<ul style="list-style-type: none"> • Priority Queues using trees • Practice 	Classroom	—
	<ul style="list-style-type: none"> • Priority Queues in arrays • Linear Priority Queues • Practice 	Classroom	CH06 6.2ab, 6.6
7	<ul style="list-style-type: none"> ● Chapter 7 Sorting • Insertion sort • Big O analysis • Practice 	Classroom	—
	<ul style="list-style-type: none"> • Shellsort • Practice 	Classroom	—
	<ul style="list-style-type: none"> • Mergesort • Heapsort 	Classroom	CH07 7.1, 7.2, 7.4, 7.9a, 7.11, 7.13 (due Week 9)
8	<ul style="list-style-type: none"> ● Chapter 7 Sorting • Quicksort • Big O analysis 	Classroom	—
	<ul style="list-style-type: none"> • Practice 	Classroom	—
	<ul style="list-style-type: none"> • Bucketsort 	Classroom	CH07 7.17, 7.18ab, 7.20, 7.25
9	<ul style="list-style-type: none"> ● Review 	Classroom	—
	<ul style="list-style-type: none"> ● Mid-term test 	Classroom	—
	<ul style="list-style-type: none"> ● Mid-term test 	Classroom	—
10	<ul style="list-style-type: none"> ● Chapter 5 Hashing • Hashing explained • Terminology • Separate Chaining • Big O analysis 	Classroom	—
	<ul style="list-style-type: none"> • Linear Probing • Quadratic Probing 	Classroom	—
	<ul style="list-style-type: none"> • Double Hashing • Rehashing 	Classroom	CH05 5.1abcd, 5.2, 5.4, 5.6
11	<ul style="list-style-type: none"> ● Chapter 9 Graphing • Graphing Explained 	Classroom	—
	<ul style="list-style-type: none"> • Terminology and examples • Adjacency Lists & Arrays 	Classroom	—
	<ul style="list-style-type: none"> • Topological Sort • Shortest Path Algorithms 	Classroom	CH09 9.1, 9.2, 9.5ab (due Week 14)
12	<ul style="list-style-type: none"> ● Review 	Classroom	—
	<ul style="list-style-type: none"> ● Review 	Classroom	—
	<ul style="list-style-type: none"> ● Quiz 2 	Classroom	—
13	<ul style="list-style-type: none"> ● Chapter 9 Graphing • Minimum Spanning Trees 	Classroom	—
	<ul style="list-style-type: none"> • Depth First Search • Strong Components 	Classroom	—
	<ul style="list-style-type: none"> • Maximum Flow 	Classroom	CH09 9.11, 9.15ab, 9.26

14	● Presentations	Classroom	—
	● Presentations	Classroom	—
	● Presentations	Classroom	—
15	● Presentations	Classroom	—
	● Presentations	Classroom	—
	● Presentations	Classroom	—
16	● Presentations or Review	Classroom	—
	● Presentations or Review	Classroom	—
	● Presentations or Review	Classroom	—

Teacher's Office Hour

- ♦The instructor's office hours are shown in the front of the office door.
- ♦Students are suggested to use the instructor's office hour and learning center to ask questions or talk with the instructor once at least per week for good communication and effective learning, which is recorded in the students' participation.
- ♦The time can be scheduled by instructors or students, or both.

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. 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. **If any student is caught cheating on any homework assignment, the highest score the student can earn in that course is a "C".**

Important Dates

Midterm Test	Week 9
Final Exam	Week 17 (Refer to the notice of the Academic Affairs Office)

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. Smith

Department Head: Prof. Li

