UNSW Course Outline

COMP9024 Data Structures and Algorithms - 2024

Published on the 21 May 2024

General Course Information

Course Code : COMP9024
Year : 2024
Term : Term 2
Teaching Period : T2
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Computer Science and Engineering
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Postgraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Data structures are about how data is stored inside a computer for effective and efficient use. An algorithm is a step-by-step process for solving a problem within a finite amount of space and time. Data structures and algorithms are not only important in software design, but also in

hardware design. Being proficient in data structures and algorithms are essential for good software developers, hardware developers, and system architects.

The actual content is taken from a list of subjects that constitute the basis of the tool box of every serious practitioner of computing: data types and data structures, abstract data types, dynamic data structures, analysis of algorithms and a variety of fundamental algorithms for graphs, search trees and text processing.

Course Aims

This course aims to make students into confident Computer Scientists, armed with a rigorous understanding of useful data structures and algorithms, and ready to continue with their study in more advanced computing courses.

Since it is a pre-requisite for many later computing courses, it is normally taken early in Masters program.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Explain a range of fundamental data structures and algorithms
CLO2 : Evaluate the efficiency of software
CLO3 : Analyse the correctness of algorithms
CLO4 : Apply data structures and algorithms to problems in Computer Science
CLO5 : Create new data structures and algorithms for problems in Computer Science

Course Learning Outcomes	Assessment Item
CLO1 : Explain a range of fundamental data structures and algorithms	• Final Exam • Lab work • Midterm test
CLO2 : Evaluate the efficiency of software	• Assignment • Final Exam • Lab work • Midterm test
CLO3 : Analyse the correctness of algorithms	• Final Exam • Lab work • Midterm test
CLO4 : Apply data structures and algorithms to problems in Computer Science	• Assignment • Final Exam • Lab work
CLO5 : Create new data structures and algorithms for problems in Computer Science	• Assignment • Final Exam

Learning and Teaching Technologies

Moodle - Learning Management System

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Assignment Assessment Format: Individual	12%	Start Date: Not Applicable Due Date: Week 10: 29 July - 04 August
Final Exam Assessment Format: Individual	60%	Due Date: During Exam Period
Lab work Assessment Format: Individual	16%	Due Date: Week 2: 03 June - 09 June, Week 3: 10 June - 16 June, Week 4: 17 June - 23 June, Week 5: 24 June - 30 June, Week 7: 08 July - 14 July, Week 8: 15 July - 21 July, Week 9: 22 July - 28 July, Week 10: 29 July - 04 August
Midterm test Assessment Format: Individual	12%	Due Date: Week 6: 01 July - 07 July

Assessment Details

Assignment

Assessment Overview

The assignment is a substantial programming exercise. It involves adapting and using one or more of the data structures studied during term and creating your own algorithms to build a large program. Students are also required to analyse the time complexity of their program.

The submission is auto-marked for correctness, and the tutor awards marks for the complexity analysis and programming style.

Course Learning Outcomes

- CLO2 : Evaluate the efficiency of software
- CLO4 : Apply data structures and algorithms to problems in Computer Science
- CLO5 : Create new data structures and algorithms for problems in Computer Science

Final Exam

Assessment Overview

The final exam consists of questions with short answers and questions that require long answers. Questions will be on the mathematical properties of data structures and algorithms studied in this course, on how to construct data structures and algorithms and on how to apply

these to given problems.

Course Learning Outcomes

- CLO1 : Explain a range of fundamental data structures and algorithms
- CLO2 : Evaluate the efficiency of software
- CLO3 : Analyse the correctness of algorithms
- CLO4 : Apply data structures and algorithms to problems in Computer Science
- CLO5 : Create new data structures and algorithms for problems in Computer Science

Lab work

Assessment Overview

There are weekly assessed practical exercises over the course of the term. Students work on these in their own time and submit their work online. Submissions are partly auto-marked and partly hand-marked by the course staff. Students are given detailed electronic feedback.

Course Learning Outcomes

- CLO1 : Explain a range of fundamental data structures and algorithms
- CLO2 : Evaluate the efficiency of software
- CLO3 : Analyse the correctness of algorithms
- CLO4 : Apply data structures and algorithms to problems in Computer Science

Midterm test

Assessment Overview

The mid-term quiz consists of multiple-choice questions, questions with numerical answer or short text answer. The quiz is automatically marked. Students are given detailed electronic feedback.

Course Learning Outcomes

- CLO1 : Explain a range of fundamental data structures and algorithms
- CLO2 : Evaluate the efficiency of software
- CLO3 : Analyse the correctness of algorithms

General Assessment Information

Grading Basis

Standard

Course Schedule

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

General Schedule Information

Week 1 Elementary data and control structures in C

Week 2 Dynamic data structures

Week 3 Analysis of algorithms

Week 4 Graph data structures

Week 5 Graph algorithms

Week 7 Search tree algorithms

Week 8 Search tree algorithms

Week 9 String algorithms

Week 10 Randomised algorithms, Ethics, Course review

Course Resources

Prescribed Resources

Textbook

Algorithms in C, Parts 1-4, Robert Sedgewick

Algorithms in C, Part 5, Robert Sedgewick

Supplementary textbook

Alistair Moffat

Programming, Problem Solving, and Abstraction with C

Pearson Educational, Australia, Revised edition 2013, ISBN 978-1-48-601097-4

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
	Changwei Zou					Yes	Yes
	Mingqin Yu					No	No

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/student-resources/program-design.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School Contact Information

CSE Help! - on the Ground Floor of K17

- For assistance with coursework assessments.

The Nucleus Student Hub - https://nucleus.unsw.edu.au/en/contact-us

- Course enrolment queries.

Grievance Officer - grievance-officer@cse.unsw.edu.au

- If the course convenor gives an inadequate response to a query or when the courses convenor does not respond to a query about assessment.

Student Reps - stureps@cse.unsw.edu.au

- If some aspect of a course needs urgent improvement. (e.g. Nobody responding to forum queries, cannot understand the lecturer)

You should **never** contact any of the following people directly:

- Vice Chancellor

- Pro-vice Chancellor Education (PVCE)

- Head of School

- CSE administrative staff

- CSE teaching support staff

They will simply bounce the email to one of the above, thereby creating an unnecessary level of indirection and a delay in the response.