Course Outline



Course Details

Course Code	COMP9024
Course Title	Data Structures and Algorithms
Convenor	Michael Thielscher (/users/z3343107)
Lectures	Tuesday 16:00-18:00 → Livestream lecture on Blackboard Collaborate Thursday 16:00-18:00 → Livestream lecture on Blackboard Collaborate
Consultations	Thursday 15:00-16:00 K17 401J, Email, Course Forum
Units of Credit	6
Course Website	http://www.cse.unsw.edu.au/~cs9024 (http://www.cse.unsw.edu.au/~cs9024)
Handbook Entry	http://www.handbook.unsw.edu.au/postgraduate/courses/current/COMP9024.html (http://www.handbook.unsw.edu.au/postgraduate/courses/current/COMP9024.html)

Course Summary

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, trees and text processing.

Assumed Knowledge

There are no prerequisites for this course. However, the course goes at a fast pace through the necessary programming fundamentals at the beginning, and students may find it helpful if at the start of the course they

- are able to design, implement and test programs written in a procedural language;
- know simple data types (characters, numbers, strings, arrays);
- are able to use fundamental control structures and programming techniques (conditionals, loops, recursion).

These may have been acquired in the course COMP9021.

Student Learning Outcomes

After successfully completing this course, students will know fundamental data structures and algorithms, and they will be able to reason about their applicability, effectiveness and efficiency.

This course contributes to the development of the following graduate capabilities:

Graduate Capability	Acquired in
scholarship: understanding of their discipline in its interdisciplinary context	lectures
scholarship: capable of independent and collaborative enquiry	problem sets, assignments, in-class (live or recorded) quizzes
scholarship: rigorous in their analysis, critique, and reflection	in-class (live or recorded) exercises, problem sets, assignments
scholarship: able to apply their knowledge and skills to solving problems	problem sets and assignments
scholarship: capable of effective communication	forum
scholarship: information literate	lectures, problem sets, assignments
scholarship: digitally literate	lectures, problem sets, assignments
professionalism: capable of independent, self-directed practice	problem sets and assignments
professionalism: capable of operating within an agreed Code of Practice	all course-work, by doing it yourself
global citizens: culturally aware and capable of respecting diversity and acting in socially just/responsible ways	interaction with your fellow students

Teaching Strategies

- **Lectures** introduce concepts and show examples
- **Problem sets** reinforce concepts, provide additional examples and allow students to solve problems
- **Assignments** further reinforce concepts and allow students to solve larger problems

Teaching Rationale

Lectures will include exercises where we examine the practice of understanding and applying specific data structures and algorithms. Problem sets aim to deepen analysis and understanding via additional examples, problems and programming exercises. The large assignment gives you the chance to practice what you have learnt on a larger problem.

Student Conduct

The **Student Code of Conduct** (Information (https://student.unsw.edu.au/conduct) , Policy (https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf)) sets out what the University expects from students as members of the UNSW community. As well as the learning, teaching and research environment, the University aims to provide an environment that enables students to achieve their full potential

and to provide an experience consistent with the University's values and guiding principles. A condition of enrolment is that students *inform themselves* of the University's rules and policies affecting them, and conduct themselves accordingly.

In particular, students have the responsibility to observe standards of equity and respect in dealing with every member of the University community. This applies to all activities on UNSW premises and all external activities related to study and research. This includes behaviour in person as well as behaviour on social media, for example Facebook groups set up for the purpose of discussing UNSW courses or course work. Behaviour that is considered in breach of the Student Code Policy as discriminatory, sexually inappropriate, bullying, harassing, invading another one's privacy or causing any person to fear for their personal safety is serious misconduct and can lead to severe penalties, including suspension or exclusion from UNSW.

If you have any concerns, you may raise them with your lecturer, or approach the School Ethics Officer (mailto:ethics-officer@cse.unsw.edu.au) , Grievance Officer (mailto:grievance-officer@cse.unsw.edu.au) , or one of the student representatives.

Academic Honesty and Plagiarism

Plagiarism is defined as using the words or ideas of others and presenting them as your own. UNSW and CSE treat plagiarism as academic misconduct, which means that it carries penalties as severe as being excluded from further study at UNSW. There are several on-line sources to help you understand what plagiarism is and how it is dealt with at UNSW:

- Plagiarism and Academic Integrity (https://student.unsw.edu.au/plagiarism)

In particular you should take note of the new Plagiarism Policy effective 1 June 2020:

- UNSW Plagiarism Management Procedure (https://www.gs.unsw.edu.au/policy/documents/plagiarismprocedure.pdf)

Make sure that you read and understand these. Ignorance is not accepted as an excuse for plagiarism. In particular, you are also responsible that your assignment files are not accessible by anyone but you by setting the correct permissions in your CSE directory and code repository, if using. Note also that plagiarism includes paying or asking another person to do a piece of work for you and then submitting it as your own work.

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW staff and 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.

The pages below describe the policies and procedures in more detail:

- Student Code Policy (https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf)
- UNSW Student Misconduct Procedure (https://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)

You should also read the following page which describes your rights and responsibilities in the CSE context:

- Essential Advice for CSE Students (https://www.engineering.unsw.edu.au/computer-science-engineering/about-us/organisational-structure/student-services/policies/essential-advice-for-cse-students)

Assessment

Component	Maximum Mark
Assignment 1 (weekly; weeks 2-5, 7-10)	8 × 2 = 16

Assignment 2 (midterm online assessment on Thursday Week 6)	12
Assignment 3 (released Friday Week 6, due Monday Week 10)	12
Final Exam (exam period)	60

Your final overall mark will be the sum of your marks for each component provided that you pass the final exam.

To pass the course, the sum of your marks must be 50 or higher **and** the mark for the final exam must be 25 or higher.

Course Schedule

Elementary data structures and algorithms in C	week 1
Analysis of algorithms	week 2
Dynamic data structures	week 3
Graph data structures and algorithms	week 4-5
Search tree data structures and algorithms	week 7-8
String algorithms, Approximation	week 9
Randomised algorithms, Course review	week 10

Resources for Students

The recommended textbooks associated with this course are

- Robert Sedgewick, *Algorithms in C, Parts 1–4* 3rd edition, Addison Wesley, 1998.
- Robert Sedgewick, *Algorithms in C, Part 5* 3rd edition, Addison Wesley, 2002.

The following introduction to the C programming language is recommended as a supplementary textbook:

- Alistair Moffat, *Programming, Problem Solving, and Abstraction with C* 5th edition, Pearson, 2003.

Course Evaluation and Development

This course is being continuously improved and we will conduct a survey through UNSW's myExperience process at the end of session to obtain feedback on the quality of the various course components. Your participation in the survey will be greatly appreciated. Students are also encouraged to provide informal feedback during the session, and to notify the lecturer-in-charge of any problems as soon as they arise. In 2019 student satisfaction was very high probably also because of changes based on the previous session's feedback, which resulted in the addition of a weekly assessment component. We will continue to have these weekly programming assignments & quizzes in this offering.

Resource created about a year ago (Monday 18 May 2020, 03:04:50 PM), last modified 7 months ago (Wednesday 02 December 2020, 11:37:32 AM).

Comments

(/COMP9024/20T2/forums/search?forum_choice=resource/45950)
(/COMP9024/20T2/forums/resource/45950)



Sebastian Novoa Peralta (/users/z5284814) 10 months ago (Fri Aug 21 2020 09:25:42 GMT+1000 (Australian Eastern Standard Time))

Hi Michael,

I was thinking of a **very tiny** suggestion: to have the lectures in Echo 360 labeled with their topics. Right now they are only distinguishable by the dates and I found that when studying for the exam it would be nice to know which one to choose based on topics.

The course has been **great** and I take this opportunity to thank you for your dedication and your style of teaching.



Michael Thielscher (/users/z3343107) 10 months ago (Fri Aug 21 2020 15:41:27 GMT+1000 (Australian Eastern Standard Time))

Fair point. These names are chosen automatically, however I'll check if that can be manually adjusted.