COMP 2009 DATA STRUCTURES AND ALGORITHMS

Credit Points 10

Legacy Code 300103

Coordinator Dongmo Zhang (https://directory.westernsydney.edu.au/search/name/Dongmo Zhang/)

Description This subject introduces students to fundamental data structures and algorithms used in computing. The material covered forms the basis for further studies in programming and software engineering in later subjects and for further training in programming skills. The subject focuses on the ideas of data abstraction and algorithm efficiency. The issues of computational complexity of algorithms are addressed throughout the semester. The topics covered include the fundamental abstract data types (lists, stacks, queues, trees, hash tables, graphs), recursion, complexity of algorithms, sorting and searching algorithms, binary search trees and graphs.

School Computer, Data & Math Sciences

Discipline Data Structures

Student Contribution Band HECS Band 2 10cp

Check your fees via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 2 subject

Pre-requisite(s) COMP 2014 OR
COMP 2015 OR
COMP 2016 OR
ENGR 1045

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Select appropriate data structures to solve moderately complex programming problems.
2. Discuss time and space tradeoffs among different data structures that could be used to represent specific information.
3. Perform time-complexity analysis against multiple implementations of various abstract data types.
4. Write programs that use the fundamental abstract data types: linked list, stack, queue, hash table, binary search tree, heap, graph.
5. Select efficient sorting and searching algorithms to solve moderately complex programming problems.

Subject Content

- Basic concepts: abstract data types, Big-O concept and Complexity analysis.
- Stacks and queues: ADT specification, implementation strategies and applications.
- variations of linked lists: Doubly linked lists and circular lists.
- recursion: recursive functions and divide-and-conquer approach.
- trees: Binary trees, Binary search trees, AVL trees, and heaps.
- Graphs: Adjacency matrix and Adjacency list implementations, depth-first search, breadth-first search, and minimum spanning tree algorithms.
- Searching: Sequential search, Binary search and hashing.
- Elementary sorting algorithms: insertion sort, selection sort, and bubble sort.
- advanced sorting algorithms: quick sort, heap sort, and shell sort.

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task	Mandatory
Practical	2 hours (each practical)	14	N	Individual	Y
Quiz	30 minutes each	6	N	Individual	Y
Applied Project	Around 600-800 lines of code and up to 4 A4 pages of algorithm description and analysis for each assignment	30	N	Individual	Y
Final Exam	Two-hour	50	N	Individual	Y

Prescribed Texts

- Malik, D.S. (2010). Data Structures Using C++ . (2nd ed.). Cengage Learning/Course Technology

Teaching Periods

Autumn (2025)
Penrith (Kingswood)
On-site
Subject Contact Dongmo Zhang (https://directory.westernsydney.edu.au/search/name/Dongmo Zhang/)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=COMP2009_25-AUT_KW_1#subjects)

Parramatta - Victoria Rd
On-site
Subject Contact Dongmo Zhang (https://directory.westernsydney.edu.au/search/name/Dongmo Zhang/)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=COMP2009_25-AUT_PS_1#subjects)

Sydney City Campus - Term 2 (2025)
Sydney City
On-site
Subject Contact Mahsa Razavi (https://directory.westernsydney.edu.au/search/name/Mahsa Razavi/)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=COMP2009_25-SC2_SC_1#subjects)