

## Unit Outline

# COMP3001 Design and Analysis of Algorithms Semester 1, 2021

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<b>Unit study package code:</b>	COMP3001										
<b>Mode of study:</b>	Internal										
<b>Tuition pattern summary:</b>	<p>Note: For any specific variations to this tuition pattern and for precise information refer to the Learning Activities section.</p> <p>Lecture: 1 x 2 Hours Weekly Tutorial: 1 x 2 Hours Weekly</p> <p>This unit does not have a fieldwork component.</p>										
<b>Credit Value:</b>	25.0										
<b>Pre-requisite units:</b>	1922 (v.0) Data Structures and Algorithms 120 or any previous version OR COMP1002 (v.0) Data Structures and Algorithms or any previous version										
<b>Co-requisite units:</b>	Nil										
<b>Anti-requisite units:</b>	Nil										
<b>Result type:</b>	Grade/Mark										
<b>Approved incidental fees:</b>	Information about approved incidental fees can be obtained from our website. Visit <a href="https://fees.curtin.edu.au/incidental_fees.cfm">fees.curtin.edu.au/incidental_fees.cfm</a> for details.										
<b>Unit coordinator:</b>	<table><tr><td><b>Title:</b></td><td>Dr</td></tr><tr><td><b>Name:</b></td><td>Sie Teng Soh</td></tr><tr><td><b>Phone:</b></td><td>08 9266 2984</td></tr><tr><td><b>Email:</b></td><td>S.Soh@curtin.edu.au</td></tr><tr><td><b>Location:</b></td><td>Building: 314 - Room: 432</td></tr></table>	<b>Title:</b>	Dr	<b>Name:</b>	Sie Teng Soh	<b>Phone:</b>	08 9266 2984	<b>Email:</b>	S.Soh@curtin.edu.au	<b>Location:</b>	Building: 314 - Room: 432
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<b>Teaching Staff:</b>	<table><tr><td><b>Name:</b></td><td>Sie Teng Soh</td></tr><tr><td><b>Phone:</b></td><td>08 9266 2984</td></tr><tr><td><b>Email:</b></td><td>S.Soh@curtin.edu.au</td></tr><tr><td><b>Location:</b></td><td>Building: 314 - Room: 432</td></tr></table>	<b>Name:</b>	Sie Teng Soh	<b>Phone:</b>	08 9266 2984	<b>Email:</b>	S.Soh@curtin.edu.au	<b>Location:</b>	Building: 314 - Room: 432		
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<b>Administrative contact:</b>	<table><tr><td><b>Name:</b></td><td>Sie Teng Soh</td></tr><tr><td><b>Phone:</b></td><td>08 9266 2984</td></tr><tr><td><b>Email:</b></td><td>S.Soh@curtin.edu.au</td></tr><tr><td><b>Location:</b></td><td>Building: 314 - Room: 432</td></tr></table>	<b>Name:</b>	Sie Teng Soh	<b>Phone:</b>	08 9266 2984	<b>Email:</b>	S.Soh@curtin.edu.au	<b>Location:</b>	Building: 314 - Room: 432		
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<b>Learning Management System:</b>	<a href="https://lms.curtin.edu.au">Blackboard</a> (lms.curtin.edu.au)										

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## Acknowledgement of Country

We respectfully acknowledge the Indigenous Elders, custodians, their descendants and kin of this land past and present. The [Centre for Aboriginal Studies](#) aspires to contribute to positive social change for Indigenous Australians through higher education and research.

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## Syllabus

Algorithms are an essential part of any efficient solutions for computer applications that evolve with the development in computing technologies. Therefore it is imperative for any computing student to have sufficient knowledge of standard algorithm design techniques and analysis. In this unit the students will learn these standard techniques: divide and conquer, greedy, and dynamic programming. The unit shows how the techniques, among others, are used in sorting algorithms, graph algorithms, data compression, 0/1 knapsack, string searching, matrix-chain multiplication, longest common subsequence, and parallel and distributed algorithms. The students will also learn how to use the growth of functions concept to analyse algorithm resource requirement.

## Introduction

Welcome to the Design and Analysis of Algorithms!









New exciting computer applications have been developed to meet rapidly increasing user demand for computing technologies. Good algorithms are needed to produce effective and efficient applications, and therefore computing students must have sufficient knowledge of standard algorithm design techniques and analysis. In this unit, students will learn and use several standard algorithm design techniques to solve basic problems, such as sorting problem. Effective algorithm design techniques such as divide and conquer, greedy and dynamic programming will be covered in the unit. The students will also learn how to use the growth of functions concept to analyse algorithm's resource requirement.

This unit, in line with current research and university values, strives to achieve a positive and inclusive educational environment. This supports improved academic performance, increased confidence and creates a greater sense of safety and belonging. Your teaching team is committed to providing a safe and inclusive learning experience and requires students to take reasonable and appropriate measures to actively eliminate discrimination on the basis of ability; cultural and social background; and diverse sex, sexuality, and gender.







## Unit Learning Outcomes

All graduates of Curtin University achieve a set of six Graduate Capabilities during their course of study. These inform an employer that, through your studies, you have acquired discipline knowledge and a range of other skills and capabilities which employers would value in a professional setting. Each unit in your course addresses the Graduate Capabilities through a clearly identified set of learning outcomes. They form a vital part in the process referred to as assurance of learning. The learning outcomes notify you of what you are expected to know, understand or be able to do in order to be successful in this unit. Each assessment for this unit is carefully designed to test your knowledge of one or more of the unit learning outcomes. On successfully completing all of the assessments you will have achieved all of these learning outcomes.

Your course has been designed so that on graduating you will have achieved all of Curtin's Graduate Capabilities through the assurance of learning processes in each unit.

On successful completion of this unit students can:		Graduate Capabilities addressed
1	Identify efficient algorithms to solve computing problems that evolve with the development in computer technologies	 
2	Design and develop algorithms using world-standard design-techniques to solve computing problems	 
3	Use known standard techniques to analyse algorithm's resource requirements	 
4	Access and evaluate information to design and analyse algorithms	 

### Curtin's Graduate Capabilities

	Apply discipline knowledge, principles and concepts		Innovative, creative and entrepreneurial		Effective communicators with digital competency
	Globally engaged and responsive		Culturally competent to engage respectfully with local First Peoples and other diverse cultures		Industry connected and career capable

Find out more about Curtin's Graduate Capabilities at the Curtin Learning and Teaching website: [clt.curtin.edu.au](http://clt.curtin.edu.au)

### Learning Activities

The unit's lectures provide theoretical foundations for achieving the unit learning outcomes. The unit's tutorials further develop on the lectures to enhance the student understanding the unit materials.

All students in this unit are expected to participate in every weekly learning activity, whether they are face to face or online. For online content simply go to Blackboard to attend the live sessions or access recordings as appropriate. Each week there is an expectation that you will arrive in a face-to-face or online class having completed any previous assigned work.

Tutorial: 1 x 2hr

Lecture: 1 x 2hr

### Learning Resources

#### Essential texts

The required textbook(s) for this unit are:

- T. H. Cormen, C. E. Leiserson, and R. L. Rivest, Introduction to Algorithms, third edition, The MIT Press, 2009. (ISBN/ISSN: 9780262533058)  
(ISBN/ISSN: 9780262533058)

### Assessment

#### Assessment policy exemptions

- There are no exemptions to the assessment policy

#### Assessment schedule

	Task	Value %	Date Due	Unit Learning Outcome(s) Assessed	Late Assessments Accepted?*	Assessment Extensions Considered?*
1	Test 1	25%	<b>Week: 5</b> <b>Day: Wednesday</b> <b>Time: 2pm</b>	1,2,3,4	No	No
2	Test 2	25%	<b>Week: 9</b> <b>Day: Wednesday</b> <b>Time: 2pm</b>	1,2,3,4	No	No
3	Examination	50%	<b>Week: TBD</b> <b>Day: TBD</b> <b>Time: TBD</b>	1,2,3,4	No	Yes

\*Please refer to the Late Assessment and the Assessment Extension sections below for specific details and conditions.

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### **Detailed information on assessment tasks**

1. Test 1 will be held during lecture. NO MAKEUP (LATE) TESTS WILL BE GIVEN. To pass the tests, you need to read the lecture notes AND the reading assignments around the subject from the required textbook, AND complete their corresponding tutorial questions. You need to spend approximately 4 hours reading around the subject covered in each lecture. In addition, you also include some extra hours to spend for revising for the tests. Tests will be handed back in tutorial sessions.
2. Test 2 will be held during lecture. NO MAKEUP (LATE) TESTS WILL BE GIVEN. To pass the tests, you need to read the lecture notes AND the reading assignments around the subject from the required textbook, AND complete their corresponding tutorial questions. You need to spend approximately 4 hours reading around the subject covered in each lecture. In addition, you also include some extra hours to spend for revising for the tests. Tests will be handed back in tutorial sessions.
3. Final assessment will include ALL materials in the unit. Help sessions can be arranged during the study week upon student requests.

### **Pass requirements**

must have attempted both Test 1 and Test 2, and  
must achieve a mark of at least 45% in the final assessment and  
must have the overall unit assessment of at least 50%.

## Assessment Moderation

### Fair assessment through moderation

Moderation describes a quality assurance process to ensure that assessments are appropriate to the learning outcomes, and that students work is evaluated consistently by assessors. Minimum standards for the moderation of assessments are described in the Assessment and Student Progression Manual, available from [policies.curtin.edu.au/findapolicy/](https://policies.curtin.edu.au/findapolicy/)

### Pre-marking moderation

This unit complies with moderation of assessments as described in the Assessment and Student Progression Manual, available from [policies.curtin.edu.au/findapolicy/](https://policies.curtin.edu.au/findapolicy/)

### Intra-marking / Post-marking moderation

This unit complies with moderation of assessments as described in the Assessment and Student Progression Manual, available from [policies.curtin.edu.au/findapolicy/](https://policies.curtin.edu.au/findapolicy/)

### Late assessment

Where the submission of a late assessment is permitted, late penalties will be consistently applied in this unit.

Where a late assessment **is** permitted for an assessment item or the entirety of the unit (refer to the Assessment Schedule table in this Unit Outline) and the student does not have an approved assessment extension:

1. For assessment items submitted within the first 24 hours after the due date/time, students will be penalised by a deduction of 5% of the total marks allocated for the assessment task;
2. For each additional 24 hour period commenced an additional penalty of 10% of the total marks allocated for the assessment item will be deducted; and
3. Assessment items submitted more than 168 hours late (7 calendar days) will receive a mark of zero.

Where late assessment **is NOT** permitted for an assessment item or the entirety of the unit (refer to the Assessment Schedule table in this Unit Outline) and the student does not have an approved assessment extension:

1. All assessment items submitted after the due date/time will receive a mark of zero.

### **Assessment extension**

Where an application for an assessment extension **is** permitted for an assessment item(s) within this unit (refer to the Assessment Schedule table in this Unit Outline):

1. A student who is unable to complete an assessment item by/on the due date/time as a result of exceptional circumstances beyond the student's control, may apply for an assessment extension on the Assessment Extension Application Form as prescribed by the Academic Registrar. The form is available on the Forms page at <https://students.curtin.edu.au/essentials/forms-documents/forms/> and also within the student's OASIS (My Studies tab – Quick Forms) account.
2. The student will be expected to submit their application for an Assessment Extension with supporting documentation:
  - a. Australian Campuses: via the online form
  - b. Offshore campuses: to the School representative nominated below
3. Timely submission of this information supports the assessment process. For applications that are declined, delayed submission may have significant ramifications on the possible marks awarded.
4. An application may be accepted up to five working days after the due date/time of the assessment item where the student is able to provide a verifiable explanation as to why they were not able to submit the application prior to the assessment due date/time

Where an application for an assessment extension **is NOT** permitted for an assessment item(s) within this unit (refer to the Assessment Schedule table in this Unit Outline):

1. All assessment items submitted after the due date/time will be subject to late penalties or receive a mark of zero depending on the unit permitting late assessment submissions.

Australian campuses – School contact for Assessment Extension enquiries (submission is via the online form):  
EECMS-Students <EECMSstudents@curtin.edu.au>

### **Deferred assessments**

If your results show that you have been granted a deferred assessment you should immediately check OASIS for details.

Deferred examinations/tests will be held from 19/07/2021 to 23/07/2021 . Notification to students will be made after the Board of Examiners' meeting via the Official Communications Channel (OCC) in OASIS.

### **Further assessment**

Further assessments, if granted by the Board of Examiners, will be held between 19/07/2021 and 23/07/2021 . Notification to students will be made after the Board of Examiners meeting via the Official Communications Channel in OASIS.

It is the responsibility of the student to be available to complete the requirements of a further assessment. If your results show that you have been granted a further assessment you should immediately check OASIS for details.

## **Reasonable adjustments for students with disabilities/health circumstances likely to impact on studies**

A [Curtin Access Plan](#) (CAP) is a document that outlines the type and level of support required by a student with a disability or health condition to have equitable access to their studies at Curtin. Carers for people with disability may also be eligible for support. This support can include alternative exam or test arrangements, study materials in accessible formats, access to Curtin's facilities and services or other support as discussed with an advisor from [AccessAbility Services](#).

Documentation is required from your treating Health Professional to confirm your health circumstances or carer responsibilities.

If you think you may be eligible for a CAP, please contact AccessAbility Services. If you already have a CAP please provide it to the Unit Coordinator in week 1 of each study period.

## **Referencing style**

The referencing style for this unit is Chicago 17th B.

More information can be found on this style from the Library web site:  
<http://libguides.library.curtin.edu.au/referencing>.

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## **Privacy**

As part of a learning or assessment activity, or class participation, your image or voice may be recorded or transmitted by equipment and systems operated by Curtin University. Transmission may be to other venues on campus or to others both in Australia and overseas.

Your image or voice may also be recorded by students on personal equipment for individual or group study or assessment purposes. Such recordings may not be reproduced or uploaded to a publicly accessible web environment. If you wish to make such recordings for study purposes as a courtesy you should always seek the permission of those who are impacted by the recording.

Recording of classes or course materials may not be exchanged or distributed for commercial purposes, for compensation, or for any other purpose other than personal study for the enrolled students in the unit. Breach of this may subject a student to disciplinary action under Statute No 10 – Student Disciplinary Statute.

If you wish to discuss this please talk to your Unit Coordinator.

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## **Copyright**

The course material for this unit is provided to you for your own research and study only. It is subject to copyright. It is a copyright infringement to make this material available on third party websites.

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## **Academic Integrity (including plagiarism and cheating)**

### **Academic Integrity**

Curtin's [Student Charter](#), [Academic Integrity Program \(AIP\)](#), and core [Values](#) guide expectations regarding student behaviour and responsibilities. Information on these topics can be found on the [Student Essentials Website](#) or the Academic Integrity tab in Blackboard.

### **Academic Integrity Warnings**

An Academic Integrity Warning may be issued to a New-to-Curtin student if they have inadequately acknowledged sources or collaborated inappropriately. [The Management of Academic Integrity Warnings for New to Curtin Students Procedures](#) provide further information and explain who is considered to be New-to-Curtin.

### **Academic Misconduct**

Students with an academic breach that do not meet the New-to-Curtin criteria will be managed through the misconduct process. [Academic Misconduct](#) means conduct by a student that is dishonest or unfair in connection with any academic work. This includes all types of plagiarism, cheating, collusion, falsification or fabrication of data or other content, and Academic Misconduct Other, such as falsifying medical certificates for extension. More details can be found on the [Student Essentials Website](#) or on the [Academic Integrity Website](#).

Staff members are required to report suspected misconduct and an inquiry may take place. If misconduct is determined it will result in penalties, which may include a warning, a reduced or nil grade, a requirement to repeat the assessment, an annulled grade (ANN) or termination from the course. Some penalties may impact on future enrolment.

Academic work under inquiry will not be graded until the process has concluded. If your work is the subject of an inquiry you will be notified by email and Official Communication with an opportunity to respond. Appropriate support will be provided. For more information refer to [Statute No.10 Student Discipline and Academic Misconduct Rules](#).

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## **Information and Communications Technology (ICT) Expectations**

Curtin students are expected to have reliable internet access in order to connect to OASIS email and learning systems such as Blackboard and Library Services.

You may also require a computer or mobile device for preparing and submitting your work.

For general ICT assistance, in the first instance please contact OASIS Student Support:  
[oasisapps.curtin.edu.au/help/general/support.cfm](https://oasisapps.curtin.edu.au/help/general/support.cfm)

For specific assistance with any of the items listed below, please contact The Learning Centre:  
[life.curtin.edu.au/learning-support/learning\\_centre.htm](https://life.curtin.edu.au/learning-support/learning_centre.htm)

- Using Blackboard, the I Drive and Back-Up files
- Introduction to PowerPoint, Word and Excel

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## **Additional information**

### **Enrolment**

It is your responsibility to ensure that your enrolment is correct - you can check your enrolment through the eStudent option on OASIS, where you can also print an Enrolment Advice.

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## Student Rights and Responsibilities

It is the responsibility of every student to be aware of all relevant legislation, policies and procedures relating to their rights and responsibilities as a student. These include:

- the Student Charter
- Values and Signature Behaviours
- the University's policy and statements on plagiarism and academic integrity
- copyright principles and responsibilities
- the University's policies on appropriate use of software and computer facilities

Information on all of the above is available through the University's "Student Rights and Responsibilities" website at: [students.curtin.edu.au/rights](https://students.curtin.edu.au/rights).

## Student Equity

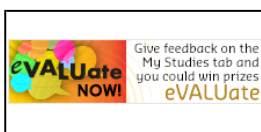
There are a number of factors that might disadvantage some students from participating in their studies or assessments to the best of their ability, under standard conditions. These factors may include a disability or medical condition (e.g. mental illness, chronic illness, physical or sensory disability, learning disability), significant caring responsibilities, pregnancy, religious practices, living in a remote location, or another reason. If you believe you may be unfairly disadvantaged on these or other grounds please contact the appropriate service below. It is important to note that the staff of the University may not be able to meet your needs if they are not informed of your individual circumstances, so please get in touch with the appropriate service if you require assistance.

To discuss your needs in relation to:

- Disability or medical conditions, contact AccessAbility Services: <https://students.curtin.edu.au/personal-support/disability/>
- Elite athletes, contact Elite Athlete Coordinator: <https://stadium.curtin.edu.au/sport/academy/elite-athlete-program/>
- All other grounds, contact the Student Wellbeing Advisory Service: <https://students.curtin.edu.au/personal-support/counselling-guidance/wellbeing/>

## Recent unit changes

Students are encouraged to provide unit feedback through **eVALUate**, Curtin's online student feedback system. For more information about **eVALUate**, please refer to [evaluate.curtin.edu.au/info/](https://evaluate.curtin.edu.au/info/).

	To view previous student feedback about this unit, search for the Unit Summary Report at <a href="https://evaluate.curtin.edu.au/student/unit_search.cfm">https://evaluate.curtin.edu.au/student/unit_search.cfm</a> . See <a href="https://evaluate.curtin.edu.au/info/dates.cfm">https://evaluate.curtin.edu.au/info/dates.cfm</a> to find out when you can <b>eVALUate</b> this unit.
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Recent changes to this unit include:

N/A

### Program calendar

Week	Begin Date	Lecture/ Seminar	Pre- readings	Tutorial/Other	Assessment Due
Orientation	22 February	Orientation Week			
1.	1 March	<b>Lecture 1:</b> Introduction, Maths revision, Big-O	Chapter 1- 4, Appendix-A	No Tutorial	
2.	8 March	<b>Lecture 2:</b> Introduction, Maths revision, Big-O (Cont.)	Chapter 1- 4, Appendix-A	Worksheet 1	
3.	15 March	<b>Lecture 3:</b> Divide and Conquer – Mergesort, Quicksort, Matrix Multiplication	Chapter 2, 7	Worksheet 2	
4.	22 March	<b>Lecture 4:</b> Heaps, Heapsort, Priority Queues, Leftist Trees	Chapter 6	Worksheet 3	
5.	29 March	<b>TEST 1:</b> Materials from Lecture 1, 2 and 3, and Worksheet 1, 2 and 3.  <b>Lecture 5:</b> Graphs - DFS, BFS	Chapter 22	Worksheet 4	2-4pm Wednesday, 31 March 2021
6.	5 April	Tuition Free Week			
7.	12 April	<b>Lecture 6:</b> Greedy Algorithms - Introduction, MCST, Shortest Path	Chapter 16, 23, 24	Worksheet 5	
8.	19 April	<b>Lecture 7:</b> Data Compression Algorithms	Chapter 16	Worksheet 6	
9.	26 April	<b>TEST 2:</b> Materials: Lectures 4, 5, and 6 and Worksheet 4, 5 and 6.  <b>Lecture 8:</b> String Searching Algorithm, Chapter	Chapter 32	Worksheet 7	2-4pm Wednesday, 28 April 2021
10.	3 May	<b>Lecture 9:</b> Dynamic Programming – 0/1 Knapsack, Matrix chain	Chapter 15	Worksheet 8	
11.	10 May	<b>Lecture 10:</b> Dynamic Programming - LCS	Chapter 15	Worksheet 9	
12.	17 May	<b>Lecture 11:</b> Parallel and Distributed Algorithms		Worksheet 10	
13.	24 May	<b>Unit Review</b>		Worksheet 11	
14.	31 May	Study Week			

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15.	7 June	Examinations
16.	14 June	Examinations