



COMP3010

Algorithm Theory and Design

Session 2, In person-scheduled-weekday, North Ryde 2022

School of Computing

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General Information

Unit convenor and teaching staff

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Credit points

10

Prerequisites

130cp at 1000 level or above including (COMP2010 or COMP225) and (MATH2907 or DMTH237)

Corequisites

Co-badged status

Unit description

This unit covers general issues of the theory of computation and algorithm design, including computability and complexity. The general principles are illustrated by designing several very efficient algorithms with applications in telecommunication networks, cryptography and other important fields.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Solve concrete problems and provide adapted algorithmic solutions using advanced algorithmic knowledge.

ULO2: Design and implement algorithms to satisfy specified problem constraints.

ULO3: Communicate clearly and effectively the relevant aspects of algorithms and their performance.

ULO4: Work collaboratively in a small team to design and implement advanced algorithms.

General Assessment Information

Late Assessment Submission Penalty

From 1 July 2022, Students enrolled in Session based units with written assessments will have the following university standard late penalty applied. Please see <https://students.mq.edu.au/study/assessment-exams/assessments> for more information.

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at **11:55 pm**. A 1-hour grace period is provided to students who experience a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for [Special Consideration](#).

Assessments where Late Submissions will be accepted

In this unit, late submissions will accepted as follows:

Assignments: YES, Standard late penalty applies

Weekly Tasks: NO, Unless special consideration is granted

In term test: NO, Unless special consideration is granted

Supplementary Exam

If you receive [Special Consideration](#) for the final exam, a supplementary exam will be scheduled after the normal exam period, following the release of marks. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignments	40%	No	Week 6 & Week12
In-term tests	15%	No	Week 9
Final Examination	35%	No	Examination period
Weekly exercises	10%	No	Weeks 1--12

Assignments

Assessment Type ¹: Project

Indicative Time on Task ²: 32 hours

Due: **Week 6 & Week 12**

Weighting: **40%**

There will be two assignments that assess students' ability to design, implement and understand the algorithms covered during the session.

On successful completion you will be able to:

- Solve concrete problems and provide adapted algorithmic solutions using advanced algorithmic knowledge.
- Design and implement algorithms to satisfy specified problem constraints.
- Communicate clearly and effectively the relevant aspects of algorithms and their performance.
- Work collaboratively in a small team to design and implement advanced algorithms.

In-term tests

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 10 hours

Due: **Week 9**

Weighting: **15%**

There will be one short in-term test to assess the understanding of the course material from the preceding weeks. The questions should be similar in nature to the ones that will be discussed during the workshops.

On successful completion you will be able to:

- Solve concrete problems and provide adapted algorithmic solutions using advanced algorithmic knowledge.

Final Examination

Assessment Type ¹: Examination

Indicative Time on Task ²: 15 hours

Due: **Examination period**

Weighting: **35%**

The final examination will be a written (closed book) examination held during the usual University examination period and will cover all topics.

On successful completion you will be able to:

- Solve concrete problems and provide adapted algorithmic solutions using advanced algorithmic knowledge.
- Communicate clearly and effectively the relevant aspects of algorithms and their performance.

Weekly exercises

Assessment Type ¹: Participatory task

Indicative Time on Task ²: 10 hours

Due: **Weeks 1--12**

Weighting: **10%**

A set of exercises will be made available online every week to be discussed during the workshop, starting from Week 1. You will be expected to attempt and submit a selection of questions for your homework each week.

For each submission, a mark of out of 1 will be given, and your total mark for this assessment will be the total sum of your submission marks to a maximum of 10 (there may be more than 10 submissions throughout the semester).

On successful completion you will be able to:

- Solve concrete problems and provide adapted algorithmic solutions using advanced algorithmic knowledge.
- Design and implement algorithms to satisfy specified problem constraints.
- Work collaboratively in a small team to design and implement advanced algorithms.

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment

- the [Writing Centre](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

Classes

Materials for COMP3010 will be mainly presented through online lectures. The lectures introduce the weekly topic at a more general level and present an opportunity to have live discussions on the content.

Each week, there will also be a two-hour workshop class where you should attempt a set of questions based on the week's topic under the guidance of the tutor. The workshop also gives you a chance to discuss any course-related problem you may have with the tutor and your peers. A submission question will also be made available every week which must be handed in on the Sunday following your workshop. It is important that you keep up with the problems in your workshop classes as doing so will help you understand the material in the unit and prepare you for your assignments, tests and final exam.

Textbooks

The following textbooks are not required for COMP3010, but are highly recommended as we will use them as the basis for most of the course.

- (**CLRS**) T. H. Cormen, C. E. Leiserson, R. L. Rivest, & C. Stein, Introduction to Algorithms (MIT Press) 3rd edition. ISBN 0-262-53305-7.
- (**Skiena**) S. S. Skiena, The Algorithm Design Manual, Springer, 2nd edition, 2008, ISBN: 978-1-84800-069-8.

Both textbooks are available online via the library website.

Technology

The coding component for this course will be presented using the Java programming language using Eclipse IDE as the recommended development environment. You may be expected to use git version control for parts of the course.

Unit Schedule

Unit Schedule

Week	Topic	Reading
1	Algorithm Design and Analysis (1)	CLRS Chapter 1-3, Skiena Chapter 1-2, 10
2	Algorithm Design and Analysis (2)	CLRS Chapter 1-3, Skiena Chapter 1-2, 10
3	Algorithm Correctness	CLRS Chapter 16

4	Greedy Algorithms	Chap 15
5	Divide-and-Conquer Algorithms	CLRS Chapter 4
6	Dynamic Programming	CLRS Chapter 15, Skiena Chapter 8
7	Probabilistic Algorithms	CLRS Chap 5
8	String algorithms	Skiena Chap 18
9	Graph algorithms (1)	Skiena Chaps 5,6
10	Graph algorithms (2)	CLRS topics from Part (V1)
11	Topics in Computational complexity (1)	Skiena Chap 9
12	Topics in Computational complexity (2)	CLRS Chap 34
13	Revision	

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be

made available in [eStudent](#). For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Changes since First Published

Date	Description
20/07/2022	Late submission adjusted.