COMP3010

Algorithm Theory and Design

Session 2, In person-scheduled-weekday, North Ryde 2024

School of Computing

Contents

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General Information

Unit convenor and teaching staff
Convener, Lecturer (weeks 1-6)
Bernard Mans
bernard.mans@mq.edu.au

Lecturer (weeks 7-12)
Annabelle McIver
annabelle.mciver@mq.edu.au

Credit points
10

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

Corequisites

Co-badged status
COMP6102

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

The final mark for the unit will be calculated by combining the marks for all assessment tasks according to the percentage weightings shown in the assessment summary.

Requirements to Pass this Unit

To pass this unit you must achieve a total mark equal to or greater than 50%. There is no hurdle.

Weekly Exercises

Full marks for these components (10%) can be achieved bytaking your best marks out of 8 weeks (but possibly completing the tasks for 12 weeks).

Late Assessment Submission Penalty

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied for each day a written report or presentation 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. The submission time for all uploaded assessments is **11:55 pm**. A 1-hour grace period will be 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, please apply for Special Consideration.

Assessments where Late Submissions will be accepted

Assignments One and Two: YES, Standard Late Penalty applies

Weekly Tasks: NO, (the marks can be gained in other ways: you only need 10 weeks to get full marks, for example.)

All others: NO, unless Special Consideration is granted

Extension Requests and Special Consideration

The Special Consideration Policy aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through ask.mq.edu.au. (You would **not normally submit Special Consideration requests for Weekly Exercises**, as the marks can be gained in other ways: you only need 8 weeks to get full marks, for example.)

Please note if you cannot submit on time because of illness or other circumstances, please contact the lecturer **before** the due date. If you experience a disruption to studies, you should notify the university. Please note that this is a centralised process, and resolution can take some

time. This may mean, for example, that you are notified that your disruption request has been approved only after any reasonable length extension for an assignment could be granted: for instance, the assignment might have already been handed back. **With respect to assignments, you should therefore also notify the lecturer responsible for the assignment, and submit a solution to the assignment via iLearn, at the same time as you lodge your official disruption notification**. Failure to do so means that an extension may not be possible, leaving only some other remedy listed under the disruption to study outcomes schedule (e.g. partake in assessment task next available session).

Special Consideration for Exams

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period. Please ensure you are familiar with the policy prior to submitting an application. You can check the supplementary exam information page on FSE101 in iLearn (bit.ly/FSESupp) for dates, and approved applicants will receive an individual notification prior to the exam with the exact date and time of their supplementary examination.

Assessment Tasks

Weekly exercises

Assessment Type 1: Participatory task Indicative Time on Task 2: 10 hours Due: weekly on Sundays 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.

  Final Examination

  Assessment Type 1: Examination Indicative Time on Task 2: 15 hours Due: Exam period (weeks 14-16) 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.

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:

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

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

Assignments

Assessment Type 1: Project Indicative Time on Task 2: 32 hours Due: Week 6 and 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.

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

Assessment Tasks

Name	Weighting	Hurdle	Due
Weekly exercises	10%	No	every Sunday 11.55pm
Assignments	40%	No	Sunday 11.55pm of Week 6 and Week 12
In-term tests	15%	No	Friday&Saturday of Week 9
Final Examination	35%	No	Exam period (weeks 14-16)

Weekly exercises

Assessment Type [1]: Practice-based task
Indicative Time on Task [2]: 10 hours
Due: **every Sunday 11.55pm**
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.

Assignments

Assessment Type [1]: Project
Indicative Time on Task [2]: 32 hours
Due: **Sunday 11.55pm of Week 6 and 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: **Friday&Saturday of 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: **Exam period (weeks 14-16)**
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.

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[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

1. Classes

   Materials for COMP3010/6102 will be mainly presented through **face-to-face 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.

   Lectures start in week 1 but **workshops/SGTAs start in week 2.**

2. 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.

Both textbooks are available online via the library website.

• (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

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.

Methods of Communication

We will communicate with you via your university email and through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent to the unit convenor via the contact email on iLearn.

Unit Schedule

Lectures start in week 1 but **workshops/SGTAs start in week 2.**

Topics covered:

1. Week 1: Introduction and Complexity Analysis
2. Week 2: Algorithm Correctness
3. Week 3: Asymptotic Notations
4. Week 4: Greedy Algorithms
5. Week 5: Divide & Conquer
6. Week 6: Dynamic Programming
7. Week 7: Probabilistic Algorithms
8. Week 8: String algorithms
9. Week 9: Graph Algorithms
10. Week 10: Graph Algorithms (continued)
11. Week 11: Continuing with graph algorithms
12. Week 12: Reduction and comparing the hardness of problems
13. Week 13: Revision

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (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). 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) 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 Advocacy provides independent advice on MQ policies, procedures, and processes

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 from Previous Offering

We value student feedback to be able to continually improve the way we offer our units. As such we encourage students to provide constructive feedback via student surveys, to the teaching staff directly, or via the FSE Student Experience & Feedback link in the iLearn page.

The lecture sessions have been extended from 2 to 3 hours in a more interactive format and in a room allowing small group activities to be able to practice and discuss new introduce concepts within the lectures. SGTAs will remain to allow to complete more exercises and prepare for the assessments.

Unit information based on version 2024.02 of the Handbook