MATH1007

Discrete Mathematics I

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

School of Mathematical and Physical Sciences

Contents

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General Information

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Credit points
10

Prerequisites

Corequisites

Co-badged status

Unit description
This unit provides a background in the area of discrete mathematics to provide an adequate foundation for further study in computer science. It is also of great interest to students wishing to pursue further study in mathematics. In this unit, students study propositional and predicate logic; methods of proof; fundamental structures in discrete mathematics such as sets, functions, relations and equivalence relations; Boolean algebra and digital logic; elementary number theory; graphs and trees; and elementary counting techniques.

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: Demonstrate knowledge of the basic concepts of discrete mathematics, including

logic, sets, functions relations, proofs, counting arguments, elementary number theory, matrices, and graph theory.

ULO2: Construct logical, clearly presented and justified mathematical arguments in the context of discrete mathematics.

ULO3: Apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.

ULO4: Demonstrate appropriate interpretation of information communicated in mathematical form and formulate ideas and language from discrete mathematics.

ULO6: Communicate to a general audience the relevance of mathematics to computer science.

ULO7: Demonstrate foundational learning skills including active engagement in your learning process.

General Assessment Information

HURDLES: SGTA participation is a hurdle assessment, which will be evaluated by your active participation in the SGTA classes. To meet the SGTA hurdle you must participate in 10 of the 12 SGTAs throughout semester.

ASSIGNMENT SUBMISSION: Assignment submission will be online through the appropriate link on the MATH1007 iLearn page.

A personalised cover sheet is not required with online submissions. Read the submission statement carefully before accepting it as there are substantial penalties for making a false declaration.

You should upload your work as a single scanned PDF file.

Please make sure that each page in your uploaded assignment corresponds to only one A4 page (do not upload an A3 page worth of content as an A4 page in landscape). If you are using an app like Clear Scanner, please make sure that the photos you are using are clear and shadow-free.

It is your responsibility to make sure your assignment submission is legible.

If there are technical obstructions to your submitting online, please email us to let us know.

You may submit as often as required prior to the due date/time. Please note that each submission will completely replace any previous submissions. It is in your interests to make frequent submissions of your partially completed work as insurance against technical or other problems near the submission deadline.

LATE SUBMISSION OF WORK: From 1 July 2022, Students enrolled in Session based units with written assessments will have the following late penalty applied. Please see https://student s.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.

In this unit, late submissions will accepted as follows:

- Assignments - YES, Standard Late Penalty applies
- Weekly quizzes - NO, unless Special Consideration is granted
- Module exams - NO, unless Special Consideration is granted

FINAL EXAM POLICY: All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period. The only excuse for not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these special circumstances, you may apply for special consideration via ask.mq.edu.au.

SUPPLEMENTARY EXAMINATIONS:

IMPORTANT: 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. If you apply for special consideration, you must give the supplementary examination priority over any other pre-existing commitments, as such commitments will not usually be considered an acceptable basis for a second application for special consideration. 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 (https://bit.ly/FSESupp) for dates, and approved applicants will receive an individual notification sometime in the week prior to the exam with the exact date and time of their supplementary examination.

Assessment Tasks

Name	Weighting	Hurdle	Due
Participation in SGTA classess	0%	Yes	Weekly
Weekly Online Quizzes	10%	No	Weeks 2-13
Module Examinations	48%	No	Weeks 5,9,13
Assignment 1	18%	No	Week 7
Assignment 2	24%	No	Week 11

Participation in SGTA classess

Assessment Type [1]: Practice-based task
Indicative Time on Task [2]: 0 hours
Due: **Weekly**
Weighting: **0%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Development of knowledge and skills requires continual practice. During SGTAs you will practice a range of mathematical techniques. To pass this hurdle assessment, you must be able to demonstrate your progress in developing and communicating knowledge and skills in 10 out of 12 SGTAs.

On successful completion you will be able to:
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- Construct logical, clearly presented and justified mathematical arguments in the context of discrete mathematics.
- Apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
- Demonstrate appropriate interpretation of information communicated in mathematical form and formulate ideas and language from discrete mathematics.
- Demonstrate foundational learning skills including active engagement in your learning process.

Weekly Online Quizzes

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 10 hours
Due: **Weeks 2-13**
Weighting: **10%**

The quizzes are competency tests to ensure that all students who pass this unit possess certain basic skills.

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sets, functions relations, proofs, counting arguments, elementary number theory, matrices, and graph theory.

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Module Examinations

Assessment Type [1]: Examination
Indicative Time on Task [2]: 20 hours
Due: **Weeks 5,9,13**
Weighting: **48%**

The content of this unit is structured and delivered as modules. At the end of each module students complete a module exam which is offered during their SGTA or Lecture class. They are offered a second opportunity to complete a different version of each module exam during the final exam period. If a student makes two attempts at an exam for a module, the final mark awarded is the maximum of the marks attained in each attempt.

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- Construct logical, clearly presented and justified mathematical arguments in the context of discrete mathematics.

- Apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.

- Demonstrate appropriate interpretation of information communicated in mathematical form and formulate ideas and language from discrete mathematics.

- Demonstrate foundational learning skills including active engagement in your learning process.

Assignment 1

Assessment Type [1]: Problem set
Indicative Time on Task [2]: 10 hours
Due: **Week 7**
Weighting: **18%**

Problems are chosen to explore concepts and techniques learned in the unit. Students will solve the problems using logical mathematical arguments and submit clearly written solutions

On successful completion you will be able to:
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- Construct logical, clearly presented and justified mathematical arguments in the context of discrete mathematics.
- Apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
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- Communicate to a general audience the relevance of mathematics to computer science.
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Assignment 2

Assessment Type [1]: Problem set
Indicative Time on Task [2]: 15 hours
Due: **Week 11**
Weighting: **24%**

Problems are chosen to explore concepts and techniques learned in the unit. Students will solve the problems using logical mathematical arguments and submit clearly written solutions

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- Apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
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- Demonstrate foundational learning skills including active engagement in your learning process.

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

Learning activies

Content videos: the mathematical content of the unit will be available via short weekly videos, approximately eight videos of around 10-15 minutes for each week. These videos can be accessed via iLearn and ECHO360. In total you should expect to spend around two hours per week watching these videos.

Live lectures: live lectures will be delivered on campus, and are also livestreamed and recorded via ECHO360. These lectures give an alternative and more interactive take on the content in the videos. You should expect to spend a total of two hours each week attending lectures and/or reviewing lecture videos.

Small Group Teaching Activities (SGTA): you should register for and participate in one two-hour SGTA class on campus every week between week 2 and week 13. These give the chance to try problems for yourself in small groups of your peers, with assistance from the class instructors.

Workshops: the Numeracy Centre runs regular workshops for students in this unit.

Required and Recommended Texts and/or Materials

The recommended texts for MATH1007 are:

- Kenneth H Rosen, Discrete Mathematics and Its Applications, McGraw-Hill, any edition.
- The open text Discrete Mathematics, An Open Introduction by Oscar Levin, which is freely available online.

Other useful resources and materials will be made available via the MATH1007 iLearn site.

Technology Used and Required

Students are expected to have access to an internet-enabled computer with a web browser and Adobe Reader software. Most areas of the university provide wireless access for portable devices. There are computers for student use in the Library.

Difficulties with your home computer or internet connection do not constitute a reasonable excuse for lateness of, or failure to submit, assessment tasks.

Unit Schedule

WEEK	MODULE	TOPIC	ASSESSMENT DUE
	Graphs	Introduction to graph theory: undirected, directed and weighted graphs, degree of a vertex, equivalent graphs, complete and bipartite graphs.	
	Graphs	Walks, paths and cycles, trees and forests, Euler's formula.	
	Graphs	Algorithms on graphs: minimal spanning trees and shortest paths.	
	Logic	Propositional logic, truth tables, boolean algebra.	
	Logic	Laws of logic, predicate logic and negation, proofs.	Module exam 1
	Logic	Logic gates, digital circuits and minimisation.	
	Logic	Sets: Operations on sets, Cartesian products, powersets. Relations: symmetry, reflexivity, transitivity, equivalence.	Assignment 1
	Numbers	Number bases. The Euclidean algorithm.	
	Numbers	Numerical sequences. Convolution.	Module exam 2
	Numbers	Induction and strong induction.	
	Numbers	Functions (injectivity, surjectivity, invertibility) and Principles of Counting.	Assignment 2
	Numbers	Counting: extended problems.	
		Revision and discussion	Module exam 3
			Final exam

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

No changes from previous offering

Unit information based on version 2024.03 of the Handbook