UNIVERSITY OF CANBERRA

Discrete Mathematics

Unit code and version	6698.5
Unit offering option	207208
Study level	Level 1 - Undergraduate Introductory Unit
Credit points	3
Faculty	Faculty of Science and Technology
Discipline	Academic Program Area - Technology
Unit offering details	Semester 2, 2022 , ON-CAMPUS , UC - Canberra, Bruce
Unit convener name and contact details	Unit Convenor and Lecturer Dr Judith Ascione Email:judith.ascione@canberra.edu.au Office: 6C43 Phone: 6201 2044 I will be available in Maths and Stats Help (MaSH) inRoom 6B32 of the Student Resource Centre.The timetable will be posted on Canvas. The Unit Moderator is Dr Sumaira Qureshi
Administrative contact details	Student Central Building 1, Level B Email:Student.Centre@canberra.edu.au Phone: 1300 301 727

Academic content

Unit description

This unit investigates topics from discrete mathematics in the broad areas of Logic and Proof, Sets, Functions and Relations, Graphs and Trees, and Recursion. The treatment of these topics will cover both practical and theoretical aspects and will usually include at least one important application in Information Technology.

Learning outcomes

1. understand and manipulate the language and notation of symbolic logic;

2. understand and create proofs of numeric and algebraic propositions;
3. understand and use the language and notation of sets, relations and functions, graphs and trees.
4. analyse and create simple automata.
5. understand the concept of recursion and solve problems using this concept.

Graduate attributes

1. UC graduates are professional
    - communicate effectively
    - display initiative and drive, and use their organisation skills to plan and manage their workload
    - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
3. UC graduates are lifelong learners
    - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
    - evaluate and adopt new technology
    - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

This unit is concerned with the mathematics that underlies numerous aspects of modern computing including logic circuits, algorithm correctness, databases, run-time analysis, and automata. The unit emphasises the rigorous understanding of the mathematical tools that have proven to be of crucial importance for these applications. Students successfully completing this unit will be able to use these tools, and understand mathematical arguments including proof.

Skills development

As students of the University of Canberra, you will develop your critical thinking skills, your ability to solve complex problems, your ability to work with others, your confidence to learn independently, your written communication skills, your spoken communication skills and a number of work-related knowledge and skills.

Accreditation

Assumed knowledge: High school mathematics to year 12 (ACT Mathematics Applications major, NSW Mathematics major, or equivalent).

ACS Accreditation

This unit is part of courses accredited by the Australian Computer Society (ACS)

Skills Framework for the Information Age (SFIA) v8

This unit aligns with the following SFIA professional skills:

- Data science DATS
- Numerical analysis NUAN

SFIA skills are defined by levels of responsibility, based on autonomy, influence, complexity, business skills, and knowledge. Although this unit may cover knowledge and skills at higher levels, it is expected that graduates of undergraduate degrees will be capable of operating at Level 2 overall.

Seoul Accord

The UC generic attributes address graduate attributes 1, 6, 7, 9, and 10 of the Seoul Accord. The remaining graduate attributes that are covered in this unit are:

2. Knowledge for Solving Computing Problems

3. Problem Analysis

4. Design/Development of Solutions

5. Modern Tool Usage

EA Accreditation

This unit is part of courses accredited by Engineers Australia (EA)

This unit assesses and exposes students to the following Professional Engineer Stage 1 Competencies:

1.2 Conceptual understanding – Indicators Assessed: a

Timetable of activities

Week	Topic (Sections in Epp, 4th and 5th editions)	Tutorial	Assessment		
1	Speaking Mathematically (1.1 - 1.3)	No tutorials this week	-		
2	The Logic of Compound Statements (2.1 - 2.3)	Speaking mathematically	Online test 1: Algebra revision		
3	Digirtal logic circuits (2.4) The Logic of Quantified Statements (3.1 - 3.2)	Logic	Online test 2: Speaking mathematically and logic		
4	Elementary Number Theory and Methods of Proof (4.1 - 4.5 in the 4th edition but 4.1 - 4.6 in the 5th edition)	Digital logic circuits and the logic of quantifiers	Online test 3: Digital logic circuits and the logic of quantifiers		
5	Sequences, Mathematical Induction and Recursion (5.1 - 5.2, 5.6 - 5.7)	Elementary number theory and the method of proof	Online test 4: Elementary number theory and the method of proof		
6	Set Theory (6.1 - 6.3)	Sequences, mathematical induction and recursion	Online test 5: Sequences and mathemetical induction and recursion		

7	Relations (8.1 - 8.3)	Set theory	-
8	No lecture	Class-free period	-
9	Relations (8.5 you can read 8.4 for interest if you like) Counting and probablity (9.1 - 9.5, 9.8)	Relations from 8.1 - 8.3	Online test 6: Set theory
10	Counting and Probability (9.1 - 9.5, 9.8) continued Graphs and trees (10.1 - 10.2)	Relations 8.5 and counting and probablity	Online test 7: Relations
11	Graphs and Trees continued (10.5, 10.7 in the 4th edition but 10.4 and 10.6 in the 5th edition)	Counting and probability	Online test 8: Counting and probability
12	Regular Expressions and Finite-State Automata (12.1 - 12.2)	Graphs and trees	Online test 9: Graphs and trees.
13	Revision or Catch -up	Regular expressions and automata	Online test 10: Regular expressions and automata

Unit resources

Required texts

Required text: Susannah S. Epp, Discrete Mathematics with Applications, 4th edition, or 5th edition Brooks/Cole Cengage Learning, 2011.

The electronic version is available from the publisher's website. Paper copies can be bought from many text-book suppliers. You can also find it in the Library.

Materials and equipment

You will need a scientific calculator for the tutorial questions and tests. The Casio fx-82AU PLUS II is recommended. This can be bought from Officeworks or other similar shops for around $30.

Unit website

Each unit you are enrolled in has an online teaching site in the learning management system UCLearn. You access UCLearn through MyUC.

Pattern of attendance and other requirements:

- You should attend or watch the two hours of lectures each week.
- You should attend one of the two-hour tutorials each week.
- Before eachtutorial, you should work through the material for the week including the activities on Canvas, and review the tutorial questions.
- After each tutorial, you should complete any remaining tutorial questions.
- Do the weekly online test

Assessment

Assessment item details

Online test 1

Due date

Week 2

Weighting

10%

Assessment details

Online test 1 will cover algebra revision. See the Canvas site for more details. This will be a Canvas test and will open at 6 am on Monday 8th Audust and close at 11:59 pm on Sunday 14th August. You will have 60 minutes in which to complete the test sometime in the window it is open.

Addresses learning outcomes

- 1. understand and manipulate the language and notation of symbolic logic;

Related graduate attributes

1. UC graduates are professional
    - communicate effectively
    - display initiative and drive, and use their organisation skills to plan and manage their workload
    - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
3. UC graduates are lifelong learners
    - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
    - evaluate and adopt new technology
    - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

Online test 2

Due date

Week 3

Weighting

10%

Assessment details

Online test 2 will cover speaking mathematically and logic. This will be a Canvas test and will open at 6 am on Monday 15th August and close at 11:59 pm on Sunday 21st August. You will have 60 minutes in which to complete the test sometime in the window it is open.

Addresses learning outcomes

- 1. understand and manipulate the language and notation of symbolic logic;

Related graduate attributes

1. UC graduates are professional
    - communicate effectively
    - display initiative and drive, and use their organisation skills to plan and manage their workload
    - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
3. UC graduates are lifelong learners
    - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
    - evaluate and adopt new technology
    - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

Online test 3

Due date

Week 4

Weighting

10%

Assessment details

Online test 3 will cover digital logic circuits and the logic of quantifiers. This will be a Canvas test and will open at 6 am on Monday 22nd August and close at 11:59 pm on Sunday 28th August. You will have 70 minutes in which to complete the test sometime in the window it is open.

Addresses learning outcomes

- 1. understand and manipulate the language and notation of symbolic logic;

Related graduate attributes

1. UC graduates are professional
    - communicate effectively
    - display initiative and drive, and use their organisation skills to plan and manage their workload
    - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems

3. UC graduates are lifelong learners
    - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
    - evaluate and adopt new technology
    - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

Online test 4

Due date

Week 5

Weighting

10%

Assessment details

Online test 4 will cover elemnetary number theory and methods of proof. This will be a Canvas test and will open at 6 am on Monday 29th March and close at 11:59 pm on Aunday 4th September. You will have 60 minutes in which to complete the test sometime in the window it is open.

Addresses learning outcomes

- 2. understand and create proofs of numeric and algebraic propositions;

Related graduate attributes

1. UC graduates are professional
    - communicate effectively
    - display initiative and drive, and use their organisation skills to plan and manage their workload
    - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
3. UC graduates are lifelong learners
    - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
    - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development
    - evaluate and adopt new technology

Online test 5

Due date

Week 6

Weighting

10%

Assessment details

Online test 5 will cover sequences, mathematical induction and recursion. This will be a Canvas test and will open at 6 am on Monday 5th September and close at 11:59 pm on Sunday 11th September. You will have 90 minutes in which to complete the test sometime in the window it is open.

Addresses learning outcomes

- 2. understand and create proofs of numeric and algebraic propositions;
- 5. understand the concept of recursion and solve problems using this concept.

Related graduate attributes

1. UC graduates are professional
    - communicate effectively
    - display initiative and drive, and use their organisation skills to plan and manage their workload
    - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
3. UC graduates are lifelong learners
    - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
    - evaluate and adopt new technology
    - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

Online test 6

Due date

Week 9

Weighting

10%

Assessment details

Online test 6 will cover set theory. This will be a Canvas test and will open at 6 am on Monday 26th September and close at 11:59 pm on Monday 3rd October You will have 70 minutes in which to complete the test sometime in the window it is open. This test is open for one extra day because Monday October 3rd is a public holiday. The period of grace for late submissions will still close on Sunday 9th October.

Addresses learning outcomes

- 3. understand and use the language and notation of sets, relations and functions, graphs and trees.

Related graduate attributes

1. UC graduates are professional
    - communicate effectively
    - display initiative and drive, and use their organisation skills to plan and manage their workload
    - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
3. UC graduates are lifelong learners
    - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
    - evaluate and adopt new technology
    - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

Online test 7

Due date

Week 10

Weighting

10%

Assessment details

Online test 7 will cover relations. This will be a Canvas test and will open at 6 am on Monday 3rd October and close at 11:59 pm on Sunday 9th October. You will have 90 minutes in which to complete the test sometime in the window it is open.

Addresses learning outcomes

- 3. understand and use the language and notation of sets, relations and functions, graphs and trees.

Related graduate attributes

1. UC graduates are professional
    - communicate effectively
    - display initiative and drive, and use their organisation skills to plan and manage their workload
    - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
3. UC graduates are lifelong learners
    - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
    - evaluate and adopt new technology
    - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

Online test 8

Due date

Week 11

Weighting

10%

Assessment details

Online test 8 will cover counting and probability. This will be a Canvas test and will open at 6 am on Monday 10th October and close at 11:59 pm on Sunday 16th October. You will have 70 minutes in which to complete the test sometime in the window it is open.

Addresses learning outcomes

- 3. understand and use the language and notation of sets, relations and functions, graphs and trees.

Related graduate attributes

1. UC graduates are professional
    - communicate effectively
    - display initiative and drive, and use their organisation skills to plan and manage their workload
    - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
3. UC graduates are lifelong learners
    - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas

- evaluate and adopt new technology
- reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

Online test 9

Due date

Week 12

Weighting

10%

Assessment details

Online test 9 will cover graphs and trees. This will be a Canvas test and will open at 6 am on Monday 17th October and close at 11:59 pm on Sunday 23rd October. You will have 100 minutes in which to complete the test sometime in the window it is open.

Addresses learning outcomes

- 3. understand and use the language and notation of sets, relations and functions, graphs and trees.

Related graduate attributes

1. UC graduates are professional
    - communicate effectively
    - display initiative and drive, and use their organisation skills to plan and manage their workload
    - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
3. UC graduates are lifelong learners
    - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
    - evaluate and adopt new technology
    - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

Online test 10

Due date

Week 13

Weighting

10%

Assessment details

Online test 10 will cover regular expressions and automata. This will be a Canvas test and will open at 6 am on Monday 24th October and close at 11:59 pm on Sunday 30th October. You will have 90 minutes in which to complete the test sometime in the window it is open.

Addresses learning outcomes

- 4. analyse and create simple automata.

Related graduate attributes

1. UC graduates are professional
    - communicate effectively
    - display initiative and drive, and use their organisation skills to plan and manage their workload
    - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
3. UC graduates are lifelong learners
    - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
    - evaluate and adopt new technology
    - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

Submission of assessment items

Extensions

Students can apply for an extension to the submission due date for an assessment item due to extenuating, evidenced circumstances (specific details are found in the Assessment Procedures). An extension must be applied for before the due date. Documentary evidence (e.g. medical certificate) will be expected for an extension to be granted, however this will not guarantee that the application will be successful. The Unit Convener or relevant Program Director/Course Convener will decide whether to grant an extension and the length of the extension.

An Assignment Extension form is available from the Student Forms page.

Late submissions

The following late submission period and penalty is applicable to any teaching period commencing after 1 April 2024.

To support the provision of timely feedback to students within the unit, late penalties will apply for summative assessments where late submission is permitted. Late submissions without an approved extension or reasonable adjustment will result in a penalty of a mark reduction of 10% of the maximum available marks for the assessment item per day (or part thereof) up to and including three calendar days. If a student submits more than three calendar days late without an approved extension or reasonable adjustment, the student will be allocated a mark of zero for that assessment, with no feedback provided.

Approval of extensions based on extenuating circumstances will be dependent upon the production of supporting documentation and at the discretion of the unit convener.

For teaching periods commencing prior to 1 April 2024, a late penalty of 5 % of the maximum available marks for the assessment item per day (or part thereof) was applied up to and including seven calendar days. An assignment submitted over 7 days late will not be accepted.

Special assessment requirements

In order to pass the unit each quiz must be attempted and a non-zero mark attained. The quiz marks will be averaged for a combined total. This combined total must be 50% or above to pass. However, if you get 0 on at least one test your grade will be NX, no matter what your overall average is. If you do not attempt at least one test your grade will be NC, no matter what your overall average is. The grade will be determined using the following table.

Supplementary assessment

Refer to the Assessment Policy and Assessment Procedures

Academic integrity

Students have a responsibility to uphold University standards on ethical scholarship. Good scholarship involves building on the work of others and use of others' work must be acknowledged with proper attribution made. Cheating, plagiarism, and falsification of data are dishonest

practices that contravene academic values. Refer to the University's Student Charter for more information.

To enhance understanding of academic integrity, all students are expected to complete the Academic Integrity Module (AIM) at least once during their course of study. You can access this module within UCLearn (Canvas) through the 'Academic Integrity and Avoiding Plagiarism' link in the Study Help site.

Use of Text-Matching Software

The University of Canberra uses text-matching software to help students and staff reduce plagiarism and improve understanding of academic integrity. The software matches submitted text in student assignments against material from various sources: the internet, published books and journals, and previously submitted student texts.

Student responsibility

Learner engagement

Lecture attendance or listening, 2 hours per week for 12 weeks	24 hours
Working through lecture material 4 hours per week for 12 weeks	48 hours
Tutorial preparation approx 2.5 hours per week for 11 weeks	27 hours
Tutorial attendance 1 hour for 11 weeks	11 hours
Online-test preparation	27 hours
Online-test sitting	13 hours
Total	150 hours

Inclusion and engagement

It is strongly recommended that students who need assistance in undertaking the unit because of disability or an ongoing health condition register with the Inclusion and Engagement Office as soon as possible so that reasonable adjustment arrangements can be made.

Participation requirements

It is expected that you will attend or listen to lectures and attend one tutorial each week.

Withdrawal

If you are planning to withdraw please discuss with your Unit Convener. UC College students must also seek advice from the College.

Required IT skills

All students are assumed to be able to:

- Read and print documents on the unit website – mostly in Adobe PDF format.
- Communicate using e-mail.
- Use their own scientific calculator.

This unit may involve online meetings in real time using the Virtual Room in your UCLearn teaching site. The Virtual Room allows you to communicate in real time with your lecturer and other students. To participate verbally, rather than just typing, you will need a microphone. For best audio quality we recommend a microphone and speaker headset. For more information and to test your computer, go to the Virtual Room in your UCLearn site and 'Join Course Room'. This will trigger a tutorial to help familiarise you with the functionality of the virtual room.

In-unit costs

The e-book version of the textbook should be available for around $85. If you decide to buy the hardcover version, it will be significantly more

expensive. The calculator should be available for around $30.

Work integrated learning

Not applicable

Additional information

Communication with class: It is assumed that all students will regularly (at least weekly) open the unit's website and read any announcements there. It is also assumed that all students will regularly (at least weekly) read e-mail received at their UC student accounts. Announcements made at lectures or circulated by e-mail to UC student accounts will be deemed to have been made to the whole class.

Student feedback

All students enrolled in this unit will have opportunities to provide anonymous feedback on the unit through the InterFace Student Experience Questionnaire (ISEQ). The request for your feedback will be posted on your InterFace page at least twice during a teaching period. InterFace can be accessed through MyUC.

Changes to unit based on student feedback

Based on the feedback it is my plan to put more material on the website to aid in student understanding.

Authority of this unit outline

This unit outline must be read in conjunction with the University of Canberra's Policies and Procedures, including the Assessment Policy and associated Procedure. The Assessment Policy and Assessment Procedure include information on matters such as plagiarism, grade descriptors, moderation, feedback, and deferred exams.

Any change to the information contained in the Academic content and Assessment sections of this document, will only be made by the Unit Convener if the written agreement of the Program Director and a majority of students has been obtained; and if written advice of the change is then provided on the teaching site in UCLearn. If this is not possible, written advice of the change must be then forwarded to each student enrolled in the unit at their registered term address. Any individual student who believes themselves to be disadvantaged by a change is encouraged to discuss the matter with the Unit Convener.

Authority Text

Main

> Exception – Potential changes to a unit's learning activities and assessment items (Approved Academic Board 2020)
>
> In the event of Australian Government and/or ACT Government directive, such as those requiring physical distancing and restrictions on movement because of a pandemic, learning activities and/or assessment items in some units may change. These changes will not be updated in the published Unit Outline but will be communicated to students via the unit's UCLearn (Canvas) teaching site. The new learning activities and/or assessment items will continue to meet the unit's learning outcomes, as described in the Unit Outline.
>
> New learning activities and/or assessment items will be available on the unit's UCLearn (Canvas) teaching site. Please contact the Unit Convener with any questions.

TEQSA Provider ID: PRV12003 (Australian University)

UC acknowledges the Ngunnawal people, traditional custodians of the lands where Bruce campus is situated. We wish to acknowledge and respect their continuing culture and the contribution they make to the life of Canberra and the region. We also acknowledge all other First Nations Peoples on whose lands we gather.