School of Information and Physical Sciences

MATH1510: Discrete Mathematics

Callaghan
Semester 2 - 2023

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

COURSE OUTLINE

OVERVIEW

Course Description

Discrete mathematics is the study of mathematical structures that are discrete, separated or distinct; in contrast with calculus which deals with continuous change. It is an important area of pure and applied mathematics, as well as providing the mathematical basis for the understanding of computers and modern computation. Discrete Mathematics is important in the sciences, where it has increasing application in many areas, an exemplar of which is the understanding of DNA sequences in molecular biology. The Discrete Mathematics course introduces first year students to the basic concepts of discrete mathematics, covering topics such as sets, logic, enumeration methods, probability, recurrence relations, induction and graph theory. The course provides important background for students pursuing a BMath degree. It covers much of the mathematics essential for students majoring in Computer Science or Software Engineering, and is a compulsory course in those degree programs.

Assumed Knowledge

HSC Advanced Mathematics (Bands 5 or 6), or equivalent.

Contact Hours

Callaghan
Lecture
Face to Face On Campus
4 hour(s) per Week for Full Term

Workshop
Face to Face On Campus
2 hour(s) per Week for 11 Weeks

Unit Weighting

10

Workload

Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

CONTACTS

Course Coordinator

Callaghan
A/Pr Jeffrey Hogan
Jeff.Hogan@newcastle.edu.au
(02) 4921 7235
Consultation: see Canvas

Teaching Staff

Other teaching staff will be advised on the course Canvas site.

School Office

School of Information and Physical Sciences
SR233, Social Sciences Building
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+61 2 4921 5513
9am-5pm (Mon-Fri)

SYLLABUS

Course Content

- Elementary set theory
- Relations and functions
- Graph theory
- Modular arithmetic
- Logic and proofs
- Enumeration techniques
- Elementary probability theory
- Recurrence relations

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Read, interpret and write some basic mathematical notation

2. Recognise and/or construct examples of mathematical objects introduced during the course, such as sets and functions

3. Identify and use several mathematical models, (e.g. propositional logic, trees) including some of those underlying computing and information technology

4. Recognise valid, logical, mathematical arguments and construct valid arguments/proofs

5. Simplify complex mathematical scenarios using logical thinking and problem-solving skills.

Course Materials

Students enrolled in the course can login to the course Canvas site to access the materials used to support this course. Students should visit the Canvas site on a regular basis for announcements, lecture notes, and assignments.

Recommended Text:

Richard Johnsonbaugh, Discrete Mathematics, Prentice Hall. (7th or 8th edition)

COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL of the following compulsory requirements:

Contact Hour Requirements:

- Workshop There is a compulsory attendance requirement in this course. Students must attend a minimum of 80% of workshops to meet course requirements. Attendance records will be kept and maintained via myUON.

SCHEDULE

Week	Week Begins	Topic	Learning Activity	Assessment Due
1	17 Jul	Logic and Proofs	Lecture	
2	24 Jul	Proofs and Sets	Lecture and workshop	Workshop Quiz 1
3	31 Jul	Sets and Relations	Lecture and workshop	Workshop Quiz 2
4	7 Aug	Relations and Graphs and Trees	Lecture and workshop	Workshop Quiz 3
5	14 Aug	Graphs and Trees	Lecture and workshop	Workshop Quiz 4 Assignment 1
6	21 Aug	Graphs and Trees	Lecture and workshop	Workshop Quiz 5
7	28 Aug	Review and Algorithms and Recurrence Relations I	Lecture and workshop	Workshop Quiz 6
8	4 Sep	Algorithms and Recurrence Relations I (ctd)	Lecture and test in workshop	Mid Semester Test in workshop
9	11 Sep	Algorithms and Recurrence Relations II	Lecture and workshop	Workshop Quiz 7
10	18 Sep	Counting and Probability I	Lecture and Workshop	Workshop Quiz 8 Assignment 2
Mid Term Break				
Mid Term Break				
11	9 Oct	Counting and Probability II	Lecture and workshop	Workshop Quiz 9
12	16 Oct	Counting and Probability III	Lecture and workshop	Workshop Quiz 10
13	23 Oct	Review	Review in tuesday lecture. No workshop.	
Examination Period				
Examination Period				

ASSESSMENTS

This course has 4 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Workshop quizzes (x10)	Workshops of weeks 2-7, 9-12	Individual	30%	1, 2, 3, 4, 5
2	Formal examination	Formal examination period	Individual	30%	1, 2, 3, 4, 5
3	Written Assignments	11:59pm Friday, weeks 5 and 10	Group	10%	1, 2, 3, 4, 5
4	Midsemester test	Workshops, week 8	Individual	30%	1, 2, 3, 4, 5

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 – Workshop Quizzes

Assessment Type In Term Test
Description Ten written in-class quizzes, done in workshops, worth 3% each.
Weighting 30%
Due Date In workshops, weeks 2-7 and 9-12
Submission Method In class
Assessment Criteria Mathematical correctness and clarity of arguments
Return Method In class
Feedback Provided In class

Assessment 2 - Formal examination

Assessment Type Formal Examination
Description A formal examination covering the entire course. Non-programmable, non-graphing calculators and a double-sided A4 sized resource sheet are allowed.
Weighting 30%
Due Date Formal examination period
Submission Method Online
Assessment Criteria Mathematical correctness and clarity of arguments
Return Method Not returned
Feedback Provided No

Assessment 3 - Written Assignments

Assessment Type Written Assignment
Description Two written assignments, worth 5% each
Weighting 10%
Due Date Week 5 (Assignment 1) and Week 10 (Assignment 2), both at 11:59pm on Friday.
Submission Method Online
Assessment Criteria As described on Canvas
Return Method Online
Feedback Provided Online

Assessment 4 – Midsemester test

Assessment Type In Term Test
Description An in-class test covering material from the first half of the course. Non-programmable, non-graphing calculators and a double-sided A4 sized resource sheet are allowed.
Weighting 30%
Due Date Week 8, in workshop
Submission Method In class
Assessment Criteria Mathematical correctness and clarity of arguments
Return Method In class
Feedback Provided In class

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods

Communication methods used in this course include:

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure. In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule.

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35

Adverse Circumstances

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:
https://policies.newcastle.edu.au/document/view-current.php?id=236

Important Policy Information

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at
https://www.newcastle.edu.au/current-students/no-room-for/policies-and-procedures
that support a safe and respectful environment at the University.

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.