UNSW Course Outline

ZPEM2313 Discrete Mathematics with Applications - 2024

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General Course Information

Course Code : ZPEM2313
Year : 2024
Term : Semester 2
Teaching Period : Z2
Is a multi-term course? : No
Faculty : UNSW Canberra
Academic Unit : UC Science
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : UNSW Canberra at ADFA
Campus : UNSW Canberra
Study Level : Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Discrete Mathematics is a rapidly growing area of mathematics with many current and emerging applications. It is the study of mathematical structures that are discrete; in contrast with calculus which deals with continuous change.

The importance of Discrete Mathematics today lies in its numerous practical and relevant applications. It plays an essential role in modelling the natural world (e.g., the genome) and the technological world (e.g., the Internet), and in designing efficient solutions such as Internet routing protocols. It is commonly used in cryptography, computer security, electronic banking, algorithms, theory of computing, telecommunications, web search engines, to mention a few.

Emphasis will be placed on developing techniques and uses in applications. Modelling of processes and phenomena which occur in economics and the physical, environmental and life sciences will be used as a vehicle throughout. Topics to be covered include: combinatorics and counting, proof by induction and recurrence relations, graph theory and networks, matrix arithmetic and Markov chains, logic and finite set theory.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Understand that mathematics is a set of statements deduced logically from axioms and definitions; understand the importance of a proof
CLO2 : Demonstrate an understanding of set definitions and operations
CLO3 : Use and convert between the different representations of a function: including tables, algebraic expressions and arrow diagrams
CLO4 : Describe a Markov Chain and the idea of a transition matrix representing probabilities of moving from state to state.
CLO5 : Learn about the mathematics used when studying networks and so gain an introduction to graph theory plus some ideas in topology

Course Learning Outcomes	Assessment Item
CLO1 : Understand that mathematics is a set of statements deduced logically from axioms and definitions; understand the importance of a proof	• Quiz 1 • Test 1 • Final exam
CLO2 : Demonstrate an understanding of set definitions and operations	• Quiz 1 • Test 1 • Final exam
CLO3 : Use and convert between the different representations of a function: including tables, algebraic expressions and arrow diagrams	• Test 1 • Final exam
CLO4 : Describe a Markov Chain and the idea of a transition matrix representing probabilities of moving from state to state.	• In class activity • Final exam
CLO5 : Learn about the mathematics used when studying networks and so gain an introduction to graph theory plus some ideas in topology	• Quiz 2 • Test 2 • Final exam

Learning and Teaching Technologies

Moodle - Learning Management System

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Quiz 1 Assessment Format: Individual	11%	Start Date: 13/08/2024 03:10 PM Due Date: 13/08/2024 04:00 PM
Test 1 Assessment Format: Individual	14%	Start Date: 23/08/2024 10:00 AM Due Date: 23/08/2024 11:50 AM
Quiz 2 Assessment Format: Individual	11%	Start Date: 04/10/2024 03:10 PM Due Date: 04/10/2024 04:00 PM
Test 2 Assessment Format: Individual	14%	Start Date: 18/10/2024 10:00 AM Due Date: 18/10/2024 11:50 AM
In class activity Assessment Format: Individual	10%	Start Date: ad hoc Due Date: Not Applicable
Final exam Assessment Format: Individual	40%	Start Date: During exam period Due Date: During exam period

Assessment Details

Quiz 1

Assessment Overview

Covering material on propositional maths and set theory.

Course Learning Outcomes

- CLO1 : Understand that mathematics is a set of statements deduced logically from axioms and definitions; understand the importance of a proof
- CLO2 : Demonstrate an understanding of set definitions and operations

Assessment Length

50 min

Assessment information

Friday Timetable will operate. Quiz held during tutorial.

Assignment submission Turnitin type

Not Applicable

Test 1

Assessment Overview

Covering material on propositional maths and set theory.

Course Learning Outcomes

- CLO1 : Understand that mathematics is a set of statements deduced logically from axioms and definitions; understand the importance of a proof
- CLO2 : Demonstrate an understanding of set definitions and operations
- CLO3 : Use and convert between the different representations of a function: including tables, algebraic expressions and arrow diagrams

Assessment Length

110 min

Assignment submission Turnitin type

Not Applicable

Quiz 2

Assessment Overview

Material covered is graphs and networks.

Course Learning Outcomes

- CLO5 : Learn about the mathematics used when studying networks and so gain an introduction to graph theory plus some ideas in topology

Assessment Length

50 min

Assignment submission Turnitin type

Not Applicable

Test 2

Assessment Overview

Material covered is graphs and networks.

Course Learning Outcomes

- CLO5 : Learn about the mathematics used when studying networks and so gain an introduction to graph theory plus some ideas in topology

Assessment Length

110 min

Assignment submission Turnitin type

Not Applicable

In class activity

Assessment Overview

Read and report on a branch of mathematics where discrete maths is applicable.

Course Learning Outcomes

- CLO4 : Describe a Markov Chain and the idea of a transition matrix representing probabilities of moving from state to state.

Assessment Length

10-15 min: several

Assessment information

There will be several in-class activities.

Assignment submission Turnitin type

Not Applicable

Final exam

Assessment Overview

Cover the entire course material.

Course Learning Outcomes

- CLO1 : Understand that mathematics is a set of statements deduced logically from axioms and definitions; understand the importance of a proof
- CLO2 : Demonstrate an understanding of set definitions and operations
- CLO3 : Use and convert between the different representations of a function: including tables, algebraic expressions and arrow diagrams
- CLO4 : Describe a Markov Chain and the idea of a transition matrix representing probabilities of moving from state to state.
- CLO5 : Learn about the mathematics used when studying networks and so gain an introduction to graph theory plus some ideas in topology

Assessment Length

3 hours

Assignment submission Turnitin type

Not Applicable

General Assessment Information

USE OF GENERATIVE AI: NO ASSISTANCE (This is most relevant for invigilated exams) It is prohibited to use any software or service to search for or generate information or answers. If its use is detected, it will be regarded as serious academic misconduct and subject to the standard penalties, which may include 00FL, suspension and exclusion.

Grading Basis

Standard

Requirements to pass course

A mark of greater than 50%.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 15 July - 19 July	Lecture	Mathematical language
Week 2 : 22 July - 26 July	Lecture	Proofs about numbers
Week 3 : 29 July - 2 August	Lecture	Proof by Induction
Week 4 : 5 August - 9 August	Lecture	Set theory 1
Week 5 : 12 August - 16 August	Lecture	Set theory 2
Week 6 : 19 August - 23 August	Lecture	Functions and relations 1
Week 7 : 9 September - 13 September	Lecture	Functions and relations 2
Week 8 : 16 September - 20 September	Lecture	Graphs and trees 1
Week 9 : 23 September - 27 September	Lecture	Graphs and trees 2
Week 10 : 30 September - 4 October	Lecture	Graphs and trees 3
Week 11 : 7 October - 11 October	Lecture	Special topics 1
Week 12 : 14 October - 18 October	Lecture	Special topics 2
Week 13 : 21 October - 25 October	Lecture	Revision

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Resources

Recommended Resources

Kenneth H. Rosen, Discrete Mathematics and its Application, 8th Edition, McGraw Hill (Publishers), 2019.

Course Evaluation and Development

Your feedback matters!

The course is taught in the so-called 'flipped-mode' where students are encouraged to take responsibility for their own learning. This approach is unique within the School of Science especially within the physical sciences.

Previous students told us:

Based on last year's students' feedback the flipped-mode of instruction was viewed positively. Some students welcomed the 'independence' this learning style provided them with. Others observed that 'self-directed learning' helped them by allowing 'flexibility in achieving course outlines', that it was suited to each student's individual circumstances.

We have responded to this feedback by:

The 'flipped-mode' of instruction will continue to be the bedrock to achieving the learning outcomes. To maintain interest and currency some topics will be replaced with those that are of interest to students.

There is no 'ideal' textbook but central to the 'flipped-mode' of instruction is access to a good textbook. The current textbook (see course outline) is one of the best on the market, it provides quality examples and exercises with more detailed solutions.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Zlatko Jovanoski		Room 132B, School of Science (Building 26)	+61 2 5114 5043	I am usually available for consultation during normal working hours. Please phone or email to make an appointment.	No	Yes
	Zlatko Jovanoski					No	No