

MA2185: DISCRETE MATHEMATICS

Effective Term

Semester A 2024/25

Part I Course Overview

Course Title

Discrete Mathematics

Subject Code

MA - Mathematics

Course Number

2185

Academic Unit

Mathematics (MA)

College/School

College of Science (SI)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

MA2144 Discrete Mathematics
MA2504 Discrete Mathematics
MA2509 Discrete Mathematics

Part II Course Details

Abstract

This course aims to introduce basic ideas of discrete mathematics such as formal mathematical reasoning techniques, basic counting techniques and their applications, number theory and graph theory for computer science students. The objective is intended for students to understand the basic theory and some applications of discrete mathematics. The course gives students training in the ability to think quantitatively and analyse problems critically.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 app.)		DEC-A2	DEC-A3
1	explain at high levels concepts from discrete mathematics.		x		
2	implement basic operations in discrete mathematics.			x	
3	use formal mathematical reasoning techniques and basic counting techniques.			x	
4	develop mathematical models through relations, combinatorics, graph theory, and apply mathematical methods to a range of problems in computer sciences.		x	x	
5	the combination of CILOs 1-4		x	x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Learning through teaching is primarily based on lectures.	1, 2, 3, 4, 5	40 hours in total
2	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	2	4 hours
3	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	3	4 hours

4	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	1	1 hour
5	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	4	3 hours
6	Assignments	Learning through take-home assignments helps students understand basic mathematical concepts and techniques of discrete mathematics, and apply mathematical methods to some problems in computer sciences.	1, 2, 3, 4, 5	after-class
7	Online applications	Learning through online examples for applications helps students apply discrete mathematics to some problems in computer sciences.	4	after-class
8	Math Help Centre	Learning activities in Math Help Centre provides students extra help.	2, 3, 4	after-class

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quizzes/Test/Midterm	2, 3	15	Questions are designed for the first part of the course to see how well the students have learned the basic concepts, techniques and some applications of discrete mathematics.
2	Hand-in assignments	1, 2, 3, 4	15	These are skills based assessment to see whether the students are familiar with the basic concepts, techniques of discrete mathematics and some applications in computer sciences.

3	Formative take-home assignments	5	0	The assignments provide students chances to demonstrate their achievements on discrete mathematics learned in this course.
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Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

2

Additional Information for ATs

30% Coursework

70% Examination (Duration: 2 hours, at the end of the semester)

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)**Assessment Task**

1. Quizzes/Test/Midterm

Criterion

ABILITY to SOLVE in DETAIL and with ACCURACY the posed QUESTIONS

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

2. Hand-in assignments

Criterion

ABILITY to SOLVE in DETAIL and with ACCURACY the posed QUESTIONS

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

3. Formative take-home assignments

Criterion

ABILITY to SOLVE in DETAIL and with ACCURACY the posed QUESTIONS

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

4. Examination

Criterion

ABILITY to SOLVE in DETAIL and with ACCURACY the posed QUESTIONS

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

- Basic Concepts: Logic. Proof and mathematical reasoning. Recurrence relation. Sets and relations and functions. Cartesian product.
- Counting and Probability: Counting techniques. Permutations and combinations. Probability, random variables, expectation, and variance.
- Number Theory: Introduction to crypto, modulus operation, and finite group. Inverse and GCD.
- Graph Theory: Graph definition and properties. Euler and Hamiltonian circuits. Graph coloring. Planarity.

Reading List

Compulsory Readings

Title	
1	Discrete Mathematics for Computer Science, by Kenneth P Bogart, Clifford Stein, and L. Drysdale (Key College Publishing, 2005)

Additional Readings

Title	
1	https://www.cityu.edu.hk/ma/programmes/undergraduate/non-BSCM-students/topics-recommended-readings-servicing-courses#heading14