# MA2144: DISCRETE MATHEMATICS

**Effective Term**
Semester A 2025/26

## Part I Course Overview

**Course Title**
Discrete Mathematics

**Subject Code**
MA - Mathematics
**Course Number**
2144

**Academic Unit**
Mathematics (MA)

**College/School**
College of Science (SI)

**Course Duration**
One Semester

**Credit Units**
4

**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**
MA2504 Discrete Mathematics
MA2509 Discrete Mathematics
MA2185 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 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 app.) | DEC-A1 | 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, and functions, 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 ("-" for nil entry) | Allow Use of GenAI? |
|---|---|---|---|---|---|
| 1 | Test | 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. | No |

| | | | | | |
|---|---|---|---|---|---|
| 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. | Yes |
| 3 | Formative take-home assignments | 1, 2, 3, 4 | 0 | The assignments provide students chances to demonstrate their achievements on discrete mathematics learned in this course. | Yes |

**Continuous Assessment (%)**

30

**Examination (%)**

70

**Examination Duration (Hours)**

2

**Minimum Examination Passing Requirement (%)**

30

**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. Test

**Criterion**

ABILITY to SOLVE in DETAIL and withACCURACY 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

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**Assessment Task**
2. Hand-in assignments

**Criterion**
ABILITY to SOLVE in DETAIL and withACCURACY 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

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**Assessment Task**
3. Formative take-home assignments

**Criterion**
ABILITY to SOLVE in DETAIL and withACCURACY 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

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**Assessment Task**
4. Examination

**Criterion**
ABILITY to SOLVE in DETAIL and withACCURACY 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

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# Part III Other Information

**Keyword Syllabus**
Mathematical logic. Methods of mathematical proof. Predicate calculus. Sets and relations. Cartesian product. Functions. Permutations and combinations. Inclusion-exclusion principle. Recurrence relations. Complexity analysis of algorithms.

**Reading List**

**Compulsory Readings**

| | Title |
|---|---|
| 1 | https://www.cityu.edu.hk/ma/programmes/undergraduate/non-BSCM-students/topics-recommended-readings-servicing-courses#heading8 |

**Additional Readings**

| | Title |
|---|---|
| 1 | Nil |