

**City University of Hong Kong  
Course Syllabus**

offered by College/School/Department of Mathematics  
with effect from Semester A 2021 / 22

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**Part I Course Overview**

<b>Course Title:</b>	<b>Discrete Mathematics</b>
<b>Course Code:</b>	<b>MA2185</b>
<b>Course Duration:</b>	<b>1 semester</b>
<b>Credit Units:</b>	<b>3 CUs</b>
<b>Level:</b>	<b>B2</b>
<b>Proposed Area:</b> <i>(for GE courses only)</i>	<input type="checkbox"/> Arts and Humanities <input type="checkbox"/> Study of Societies, Social and Business Organisations <input type="checkbox"/> Science and Technology
<b>Medium of Instruction:</b>	<b>English</b>
<b>Medium of Assessment:</b>	<b>English</b>
<b>Prerequisites:</b> <i>(Course Code and Title)</i>	<b>Nil</b>
<b>Precursors:</b> <i>(Course Code and Title)</i>	<b>Nil</b>
<b>Equivalent Courses:</b> <i>(Course Code and Title)</i>	<b>Nil</b>
<b>Exclusive Courses:</b> <i>(Course Code and Title)</i>	<b>MA2144 Discrete Mathematics MA2504 Discrete Mathematics MA2509 Discrete Mathematics</b>

## Part II Course Details

### 1. Abstract

(A 150-word description about the course)

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.

### 2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs <sup>#</sup>	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	explain at high levels concepts from discrete mathematics.		✓		
2.	implement basic operations in discrete mathematics.			✓	
3.	use formal mathematical reasoning techniques and basic counting techniques.			✓	
4.	develop mathematical models through relations, combinatorics, graph theory, and apply mathematical methods to a range of problems in computer sciences.		✓	✓	
5.	the combination of CILOs 1-4		✓	✓	
		100%			

\* If weighting is assigned to CILOs, they should add up to 100%.

# Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

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 self-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.

### 3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.					Hours/week (if applicable)
		1	2	3	4	5	
Lectures	Learning through <b>teaching</b> is primarily based on lectures.	✓	✓	✓	✓	✓	40 hours in total
Tutorials	Learning through <b>tutorials</b> is primarily based on interactive		✓				4 hours

	problem solving allowing instant feedback.							
				✓				4 hours
		✓						1 hour
					✓			3 hours
Assignments	Learning through <b>take-home assignments</b> helps students understand basic mathematical concepts and techniques of discrete mathematics, and apply mathematical methods to some problems in computer sciences.	✓	✓	✓	✓	✓		after-class
Online applications	Learning through <b>online examples for applications</b> helps students apply discrete mathematics to some problems in computer sciences.				✓			after-class
Math Help Centre	Learning activities in <b>Math Help Centre</b> provides students extra help.		✓	✓	✓			after-class

#### 4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

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 Tasks/Activities	CILO No.					Weighting*	Remarks
	1	2	3	4	5		
Continuous Assessment: _____%							
Test		✓	✓			30%	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.
Hand-in assignments	✓	✓	✓	✓			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.
Formative assignments	take-home				✓	0%	The assignments provide students chances to demonstrate their achievements on discrete mathematics learned in this course.	
Examination: <u>70</u> % (duration: 2 hrs, if applicable)								Examination questions are designed to see how far students have achieved their intended learning outcomes. Questions will primarily be skills and understanding based to assess the student's versatility in discrete mathematics.
							100%	

\* The weightings should add up to 100%.

## 5. Assessment Rubrics

*(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)*

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Test	ABILITY to SOLVE in DETAIL and with ACCURACY the posed QUESTIONS	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hand-in assignments	ABILITY to SOLVE in DETAIL and with ACCURACY the posed QUESTIONS	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Formative take-home assignments	ABILITY to SOLVE in DETAIL and with ACCURACY the posed QUESTIONS	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Examination	ABILITY to SOLVE in DETAIL and with ACCURACY the posed QUESTIONS	High	Significant	Moderate	Basic	Not even reaching marginal levels

**Part III Other Information** (more details can be provided separately in the teaching plan)

**1. Keyword Syllabus**

*(An indication of the key topics of the course.)*

- 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.

**2. Reading List**

**2.1 Compulsory Readings**

*(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)*

1.	Discrete Mathematics for Computer Science, by Kenneth P Bogart, Clifford Stein, and L. Drysdale (Key College Publishing, 2005)
2.	
3.	
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**2.2 Additional Readings**

*(Additional references for students to learn to expand their knowledge about the subject.)*

1.	<a href="http://www6.cityu.edu.hk/ma/ug/serv/ma2185.htm">http://www6.cityu.edu.hk/ma/ug/serv/ma2185.htm</a>
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