

Macao Polytechnic University
Faculty of Applied Sciences
Bachelor of Science in Computing

Module Outline

Academic Year 2022 / 2023 Semester 2

Learning Module	Discrete Mathematics		Class Code	MATH121
Pre-requisite(s)	MATH111 Essential Computer Mathematics			
Medium of Instruction	English		Credit	3
Lecture Hours	45 hrs	Lab/Practice Hours	0 hrs	Total Hours 45 hrs
Instructor	Dr. Liam Lei		E-mail	liamli@mpu.edu.mo
Office	Rm.N46B, Wui Chi Building., Main Campus		Telephone	8599-6808

Description

This learning module introduces students to the fundamental concepts of discrete mathematics. The course provides a foundation for the development of many computer related concepts and more advanced mathematical concepts found in computer science. Topics include sets and logic, combinatorial mathematics, relations and functions, groups, and graphs

Learning Outcomes

After completing the module, students will be able to:

1. Describe sets using the descriptive property method; (SM2p)
2. Analyze a logical proposition; (SM2p)
3. Apply some powerful mathematical tools, viz. Principle of Inclusion and Exclusion, Principle of Mathematical Induction, Multiplication Principle for Counting, and the Pigeonhole Principle in solving some mathematical problems; (SM2p, EA3p)
4. Explain the abstract concept of relations, especially that of equivalence relations; (SM2p)
5. Explain the abstract concept of algebraic systems, especially that of groups; (SM2p)
6. Formulate and solve mathematics-related problems arising from the computer learning modules.(SM2p, SM3p)

Content

1. Sets (9 hours)
 - 1.1. Basic Concepts of Sets
 - 1.2. Operations of Sets
 - 1.3. Properties of Set Operations
 - 1.4. Principle of Inclusion and Exclusion
2. Simple Mathematical Logic (7 hours)
 - 2.1. Propositions
 - 2.2. Logical Operations
 - 2.3. Quantified Propositions
 - 2.4. Mathematical Induction
3. Counting (8 hours)
 - 3.1. Basic Counting Principles
 - 3.2. Permutations
 - 3.3. Permutations with Repetition
 - 3.4. Combinations
 - 3.5. Pigeonhole Principle
4. Relations and Functions (10 hours)
 - 4.1. Cartesian Products and Partitions
 - 4.2. Relations
 - 4.3. Graphical Representation of Relations
 - 4.4. Equivalence Relations
 - 4.5. Functions
 - 4.6. Injections and Surjections
5. Groups (11 hours)
 - 5.1. Binary Operations
 - 5.2. Closed Algebraic Systems
 - 5.3. Semigroups
 - 5.4. Monoids
 - 5.5. Groups and Subgroups

Teaching Method

Lectures, and tutorials.

Attendance

Attendance requirements are governed by the “Academic Regulations Governing Bachelor’s Degree Programmes” of Macao Polytechnic University. Students who do not meet the attendance requirements for the module will not be permitted to sit the final or re-sit examination and shall be awarded an ‘F’ grade.

Assessment

This learning module is graded on a 100 point scale, with 100 being the highest possible score and 50 being the passing score.

Item	Description	AHEP3 LO	Percentage
1. Assignments/Classwork	Home-/Classroom-based exercises	SM2p, SM3p, EA3p	10%
2. Tests	Knowledge assessment	SM2p, SM3p, EA3p	40%
3. Examination	3-hour written examination	SM2p, SM3p, EA3p	50%
Total Percentage:			100%

Students with an overall score of less than 35 in the coursework must take the re-sit examination even if the overall score for the module is 50 or above.

Students with a score of less than 35 in the final examination must take the re-sit examination even if the overall score for the module is 50 or above.

Students with an overall final grade of less than 35 are NOT allowed to take the re-sit examination.

Teaching Material(s)

Textbook(s)

1. Kolman, B., Busby, R. C., and Ross, S. C. (2008). *Discrete Mathematical Structures* (6th ed.). New York: Prentice Hall.

Reference

Reference book(s)

1. Rosen, K. H. (1998). *Discrete Mathematics and Its Applications*. Singapore: McGraw-Hill.