



Course Descriptor Math 211, Principles of Mathematics

Proposed Academic Year	2021-2022	Last Reviewed Academic Year	2020-2021
Course Code	MATH 211	Course Title	Principles of Mathematics
Credit hours	3 CR	Level of study	Under Graduate
College / Centre	CAHS	Department	BSD
Co-requisites		Pre-requisites	

1. COURSE OUTLINE

Logic: axioms and theorems, negations, quantifiers. Algebra of sets: union, intersection, symmetric difference, difference, complement. Functions: domain and range, different classes of functions including 1-1, and onto, the graph of a function. Relations on sets: equivalence relations and equivalence classes, partial order relation, total order relation. The cardinality of sets: finite sets, countable sets, uncountable sets.

2. AIMS

This course aims to prepare the students for advanced courses in mathematics, by acquainting the mathematical logic and mathematical, concept of sets, relations, functions, countable and uncountable sets. To understand the concept of finite, infinite, countable, and uncountable sets. To understand the concept of cardinal numbers. To explore the arithmetic of cardinal numbers.

3. LEARNING OUTCOMES, TEACHING, LEARNING and ASSESSMENT METHODS

Learning Outcomes (Definitive)	Teaching and Learning methods (Indicative)	Assessment (Indicative)
Upon successful completion of this course, students will be able to:		
1. Apply truth tables and the logical structure of proofs and work symbolically with connectives and quantifiers to produce logically valid, correct and clear arguments.	Lectures and solving problems	Quizzes, Midterm, Assignment
2. Formulate short proofs using Mathematical induction.	Lectures and solving problems	Quizzes, Midterm, Assignment
3. Formulate short proofs using the following methods: direct proof, indirect proof, proof by contradiction, and case analysis.	Lectures and solving problems	Quizzes, Midterm, Assignment
4. Apply the different properties of injection, surjection, bijection, compositions, and inverse functions.	Lectures and solving problems	Quizzes, Midterm, Assignment
5. Understand the concepts of finite, infinite, Countable and uncountable sets.	Lectures and solving problems	Quizzes, Midterm, Assignment
6. Understand the concept of Cardinal numbers and apply the operation of Cardinal numbers.	Lectures and solving problems	Quizzes, Midterm, Assignment



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4. ASSESSMENT WEIGHTING

Assessment	Percentage of final mark (%)
Quiz 1	10%
Quiz 2	10%
Midterm	20%
Participation	10%
Assignment	10%
Final	40%
TOTAL	100%

5. ACHIEVING A PASS

Students will achieve 3 credit hours for this course by passing **ALL** of the course assessments [*alternatively, list the compulsory pass assessments**] and achieving a **minimum overall score of 50%**

NB *Ensure that ALL learning outcomes are taken into account

6. COURSE CONTENT (Indicative)

Mathematical Logic: Mathematical Logic: Statements and Their Connectives. Tautology. Implication and Equivalence. Contradiction. Deductive Reasoning Predicates and quantifiers. Types of mathematical Proofs

Sets and Families: Sets and subsets. Union. Intersection. Complement. Specification of Sets. Index Families of Sets.

Relations: Cartesian Product of Two Sets. Relation and their properties. Partitions and Equivalence relations. Partial order relation. Total order relation

Functions: Images and Inverse Images of Sets. Injective, surjective, bijective, and inverse functions. Composition Functions.

Countable and Uncountable Sets: Finite and infinite sets. Equipotent of sets. Countable sets. Uncountable sets. Denumerable sets. Main theorems and examples. The concepts of cardinal numbers. Arithmetic of cardinal numbers.

TOTAL HOURS

45

Plus **RECOMMENDED INDEPENDENT STUDY HOURS**

TOTAL COURSE HOURS

7. RECOMMENDED REFERENCES

Core text/s:

A book of Set Theory, Charles C. Pinter, DOVER PUBLICATIONS, INC. Mineola, New York, ISBN-13: 978-0-486-79549-2