

Kotebe Metropolitan University
College of Natural and Computational Sciences
Department of Mathematics

Course Syllabus

Program: B. Sc

Enrolment: Extension

Course title: Discrete
Mathematics and Combinatorics

Target group: Computer
Science students

Course Code: Math2051

Course Credit point : 5ECTS

Course Category: Supportive

Academic Year: 2019

Year / Semester: II/II

Prerequisites: None

Co-requisite(s): None

Instructor's Name: Fufa Beyene

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Course Description: This course covers basic set theories, number theories, counting principles and graph theory.

Intended Learning Outcomes:

On completion of the course, successful students will be able to:

- Understand the basic ideas of set theories, number theories and relation and functions.
- Understand the basic properties of Algorithms.
- Apply PMI and recursion definition.
- Understand the basic counting principles, pigeonhole principle, generating permutations.
- Determine different types of graphs and graph isomorphism.
- Know tree and their properties

Course contents

Chapter-1: Basic Structures

- 1.1. Sets & types of sets
- 1.2. Set operations and identities
- 1.3. Sizes of sets
- 1.4. Functions
- 1.5. Sequences and Summation

Chapter-2: Algorithms, Integers and Matrices

- 2.1. Integers and Modular Arithmetic
- 2.2. Primes and GCD
- 2.3. Algorithms
- 2.4. Growth of Functions
- 2.5. Matrices and matrix algorithm

Chapter-3: Relation, Induction and Recursion

- 3.1. Relations and their properties
- 3.2. Equivalence relations
- 3.3. Mathematical Induction
- 3.4. Recursion and Recurrence relations

Chapter-5: Graphs

- 5.1. Introduction to Graphs and its type
- 5.2. Representing Graphs and graph Isomorphism
- 5.3. Connectivity
- 5.4. Euler and Hamilton paths
- 5.5. Shortest Path Problems

Chapter-6: Trees

- 6.1. Introduction to Trees
- 6.2. Application of Trees
- 6.3. Tree Traversal
- 6.4. Spanning Trees
- 6.5. Minimum Spanning Trees

Teaching-learning Method

The course will be delivered through different ways of instructional methods including lectures, discussion, group work, assignments, and presentation of individual and group work and problem solving methods.

Course policy:

- Class attendance of at least 85% is required to sit for the final examination.
- A student has to take all continuous assessments and final exam.

Respect all rules and regulations of the university

Assessments:

- Assignments= 30%.
 - Tests = 30%
 - Quizzes=10%
 - Final Exam= 40%
- Total=100%

Text book: Kenneth H. Rosen, *Discrete mathematics and its Applications*, 7th edition, 2007

References:

- Richard Brauldi, *Introductory Combinatorics*, 5th edition.
- Axler, Ribert, *Combinatorics and Graph theory*, 2nd edition. G. Goodoire, M. Pormenlter, *Discrete Mathematics with Graph theory*, 2nd edition.