

Course Title MS 8123 - Discrete Mathematics

Course Status: Core; Credit Rating: 6; Total hour spent: 60

Course Aim:

The aim of this Course is to provide an introductory view in mathematics required for Courses related to Computer Science and ICT. The Course will equip students (abstract) discrete structures that are backbones of Computer Science.

Expected Learning Outcomes:

At the end of the course the student should be able to:

- i. Demonstrate understanding of basic concepts sets, relating laws, operations and cardinality
- ii. Demonstrate understanding of Number Systems, Sets and their Operation.
- iii. Evaluate the Truth Tables
- iv. Demonstrate understanding of counting techniques
- v. Demonstrate understanding of one-to-one, Onto, Inverse and composite functions
- vi. Demonstrate skills in perform mathematical proofs.
- vii. Employ methods related to these concepts in a variety of applications developing Algorithms, flowcharts
- viii. Apply logical thinking to problem-solving in context

Course Content:

Number Systems

Sets: Operation on Sets, Cardinality of the Sets, Laws of Algebra.

Logic: Propositional Logic, Logical equivalence, Predicates & Quantifiers, Logical reasoning. Membership, Statements, Logical Connectives, Truth Table, Laws of Algebra on Proposition, Arguments.

Finite State Automata, Numerical Analysis and Optimization. Mathematical Proofs and Polynomials, Sequences and Series.

Functions: One-to-one, Onto, Inverse, Composition, Graphs.

Counting: Basic rules, Pigeon Hall principle, Permutations and Combinations, Pascal's triangle and Binomial expansion.

Graphs: Directed, Undirected graphs. Algorithm, Meaning of algorithm, flowchart and Numerical Methods., Flowchart symbols, Linear Interpolation, Bisection Methods.

Assessment Method: Continuous Assessment - 40%; Semester Examination - 60%

Reading List

1. Rosen, Kenneth, (2018), "Discrete Mathematics and Its Applications" ,8th Ed., McGraw-Hill Higher Education
2. Kenneth Rosen, (2012 "Discrete Mathematics and Its Applications", 7th Edition, McGraw Hill Publishing Co.
3. Chartrand, Gary et al, (2011), "Discrete Mathematics",1st Ed., Waveland Pr Inc
4. Levin, Oscar, (2016), "Discrete Mathematics: An Open Introduction",2nd Ed., CreateSpace Independent Publishing Platform
5. Lewis, Harry et al, (2019)," Essential Discrete Mathematics for Computer Science", Princeton University Press