ECSE209L: Discrete Mathematical Structures

Course Type:	Core

L	T	P	Credits
3	1	0	4

Pre-requisites: NA

Course Learning Outcomes:

CLO1: Learn logical notation to illustrate sets, relations, functions, and integers.

CLO2: Identify induction hypotheses and prove elementary properties of modular arithmetic.

CLO3: Apply graph theory models of data structures to solve problems of connectivity and constraint satisfaction.

Module 1 (Contact hours: 11)

Introduction to Propositional Logic, Proposition, Logical Operators, Tautology, Contradiction Logical Equivalence, Tautological Implication, Methods of Proof. Introduction to Sets, Some Standard Sets, Subset and Proper, Power Set, Venn Diagrams, Operations on Sets, Some Other Classes of Sets. Definition of Function, Types of Functions, Sum and Product of Functions, Functions Used in Computer Science, Definition of Relation.

Module 2 (Contact hours: 11)

Relation vs Function, Different Types of Relations, Pictorial or Graphical Representation of Relations, Matrix Representation of Relations. Closure of relations, Representation of Integers, GCD, residue classes, linear congruence. Euclidean theorem, Chinese remainder theorem, inclusion-exclusion principle. Binomial coefficients, permutation and combination.

Module 3 (Contact hours: 10)

Pigeonhole principle, Definition of semi-group, monoid and group. Types of groups. Addition and Multiplication modulo m, definition of ring and field. Definition of ring and field contd., introduction to partially ordered set, concept and properties of lattices.

Module 4 (Contact hours: 10)

Introduction to graph, Homomorphism and Isomorphism, Euler graph, Hamiltonian circuit, travelling salesman problem, definition of trees, spanning trees, Kruskal and Prims algorithm. Chromatic number, clique and matching.

Suggested Textbooks:

1) *Bisht, R.K. and Dhami, H.S., Discrete Mathematics, (1st Edition), Oxford University Press, 2015. ISBN- 9780199452798.*
2) *O'Donnell, J., Hall, C. and Page, R., Discrete Mathematics Using a Computer (2nd Edition), Springer - International, 2006. ISBN- 978-1846282416.*

References:

1) *Biggs, N.L., Discrete mathematics, (2nd Edition), Oxford University Press, 2002. ISBN- 978-0198507178.*
2) https://www.coursera.org/learn/discrete-mathematics

Evaluation Components:

Components of Course Evaluation	Percentage
Mid Term Examination	20
End Term Examination	40
Assignment	10
Quiz	20
Continuous Evaluation	10