Lesson Plan
Course Title: Applied Graph Theory and Algorithms
Course code: CSC4066
Instructor: Dr. Hasin A Ahmed

Class No.	*Topics to be covered*
1-5	Algorithms for single source SP problem, Characterization and presence of SP, SP tree, Ford's labeling method and its correctness, Labeling and Scanning method – efficient, scanning orders.
5-10	Topological order for a cyclic networks, Shortest-first search for non-negative network (Dijkstra), BFS search for several networks and its analysis, All-pair shortest path problem - Floyd's algorithm and its analysis.
11-20	Basic concepts, Max flow-min cut Theorem, Ford and Fulkerson's augmenting path method, The Edmonds-Karp algorithm to solve the maximum flow problem, Integrality theorem - Maximum capacit, augmentation and its analysis - Augmentation by blocking flows - Dinic's algorithm-analysis of number of blocking steps for general and unit networks.
21-26	Basic concepts. Bipartite matching and network flows. Hall's marriage theorem. Non-bipartite matching-basic concepts, Edmonds- Blossom shrinking algorithm and its analysis.
27-38	Review of basic results about planarity, Kuratowski's theorem, Polynomial algorithm for testing of planarity and applications, Graph Isomorphism and its importance. Backtracking algorithm for general graphs, Isomorphism problem and its complexity. Isomorphism complete problems, polynomial, time algorithm for planar graph isomorphism, problem, Group theoretic methods and graph, isomorphism problem
39-45	Map and vertex coloring problem. 6,5 and 4-colour theorems for planar graphs, coloring graphs on compact surfaces, chromatic number.
46-50	Modeling physical networks, component equations, Kirchoff's laws, dual networks. Fundamental cycle and cutest equations, Matrix form of the network equations, state equations