Topics:

1. Graphs:
   * Definition, Vertices, Edges, Degree, and Sub-graphs
   * Paths in graphs
   * Simple paths and cycles
   * Directed and undirected graphs
   * Directed acyclic graphs
2. Graph representations
   * Adjacency matrix (sparse and dense matrix)
   * Linked list
3. Graphs Algorithms
   * Graphs traversal: Breadth-First Search(BFS) vs. Depth-First Search(DFS)
   * Topological Sort
4. Minimum Spanning Tree (MST)
   * Spanning tree and the weight of a spanning tree in a weighted graph
   * Prim’s Algorithm
   * Kruskal’s Algorithm
5. (single-source) Shortest Path
   * Dijkstra’s Algorithm
   * Bellman-Ford Algorithm
6. Hashing
   * Concept (hash table, hash function, collisions, load factor, …)
   * Operations: find, insert, delete
   * Collision resolution
     1. Open hashing – (separate) chaining (using linked list)
     2. Close hashing – open addressing
        1. Linear probing
        2. Quadratic probing
        3. Double hashing
   * Re-hashing
7. Relational Databases
   * Concept (relation, relational data model, tables, (primary/foreign) keys)
   * SQL
     1. DDL like create a table
     2. DML like select, insert, update and delete
     3. Null value, aggregate functions (sum, min, max, avg, count)
   * (inner) Join operation