Course Outline of Advanced Database

No.	Session	Topic/ Content
1	Session 1	**Introduction** Class 1: Summary of prior course, course outline; Keywords, definition and usage
2	Session 2	**Data Transaction** Class 1: Concept, Example, Transaction states and ACID properties, Concurrent transactions, Serialization
3	Session 3	**Database Concurrent Access & Concurrency Control** Class 1: Definition, Concurrent Access, Concurrency problems and solutions Class 2: Locks, locking protocols, Class 3: Deadlocks, classification, causes and prevention
4	Session 4	**Query Optimization** Class 1: Query processing flow, optimization necessity and optimization, Optimization, Equivalence Rules and examples, **Mathematical Implementation**
5	Session 5	**Database Normalization** Class 1: Normalization, Necessity, Recap of 1st, 2nd, 3rd Normal form; Class 2: BCNF, 4th & 5th Normal form,
6	Session 6	**Database Security** Class 1: Security overview, authentication, authorization, roles, Security policy, two main approaches Class 2: Security Techniques{**Mandatory Access Control, Discretionary Access Control**}
7	Session 7	**Distributed Database Concept** Class 1: Introduction, Difficulties, Advantages and Components, Homogeneous or Heterogeneous DDBs Class 2: Replication, Fragmentation and Distributed Database Concept Class 3: **Mathematical Implementation**
8	Session 8	**Deductive Database with ProLog** Class 1: Introduction, Logic Programming with Prolog. Query expression, Relationships, Differences, Optimization, Integrity, **ProLog Implementation**

9	Session 9	**Data Warehousing and Storage Process** Class 1: Introduction, Necessity, Differences between transactional system, DWH characteristics, Dimension of DWH Class 2: Model and Components, Steps to build DWH
10	Session 10	**Big Data, Hadoop and Data Analysis** Class 1: Definition, Basic Concepts, Implication, Hadoop Introduction Class 2: Map Reduce Algorithm.
11	Session 11	**Data Mining and Decision Making** Class 1: Facts, Dimension, A DWH preparation, Data extraction, Data Mining- what and why, Data mining algorithms, some useful terminologies Class 2: Association Rules and Classification {Decision Tree}
12	Session 12	**Database-as-a-Service** Class 1: Basic Concept of Cloud Database, different types DB services, Virtualization, Parallel Computing