1. Introduction to databases

Covered in:
- Lecture set 1
- Chapter 1

Sub-topics:
  a. Database Management Systems benefits

2. Data Modeling with the Entity-Relationship Model

Covered in:
- Set 2, 3
- Chapter 5

Sub-topics:
  a. Entities
     - Identifiers /Composite identifiers
     - Attributes
     - Strong entities
     - Weak entities
     - Id-dependent entities
  b. Relationships
     - Has-A relationships
       Maximum and minimum cardinality
       Identifying/non-identifying relationships
     - Is-A relationships (supertype/subtype)
       Inclusive/Exclusive
3. The Relational Model

Covered in:
- Set 4
- Chapter 3, pages 69-74, 79-81

Sub-topics:
a. Relation/Table
   • Attributes
b. Integrity Constraints
c. Keys
d. Primary key
e. Candidate key
f. Surrogate key
g. Foreign key
   • Referential integrity constraint

4. Transforming ER diagrams to Relational Model

Covered in:
- Set 5
- Chapter 6

Sub-topics:

a. Transform entities
   • Specify primary key
   • Specify candidate (alternate keys)
   • Specify properties for each column
     1. data type
     2. null/not null
     3. default values
     4. other constraints
b. Transform relationships (foreign keys used here)
   • 1:1 relationships, 1:N relationships
     - identifying relationships
     - non-identifying relationships
   • N:M relationships
   • Supertype/subtype relationships
c. Specify logic to enforce minimum cardinalities
5. SQL

Covered in:
- Set 6, 7
- Chapter 7, pg 220-234 and Chapter 2

Sub-topics:
- a. CREATE
- b. DROP
- c. ALTER
- d. INSERT
- e. DELETE
- f. UPDATE
- g. SELECT…FROM… WHERE… framework
- h. Conceptual evaluation of queries
- i. DISTINCT keywork
- j. ORDER BY
- k. Aggregate operators: COUNT, MIN, MAX, AVG, SUM
- l. GROUP BY… HAVING
- m. Subqueries
- n. Join

6. Normalization

Covered in:
- Set 8
- Chapter 3, pages 74-99
- Chapter 4

Sub-topics:
- a. Purpose
- b. Insert /delete/update anomalies
- c. Functional dependencies
  - Definition of key based on functional dependencies
- d. Normal forms
  - First normal form
  - Boyce-Codd Normal Form
  - Decomposition into relations that are in Boyce-Codd Normal Form
- e. Multivalued dependencies
  - Fourth Normal Form