1. Introduction to databases

Covered in:
- Lecture set 1
- Chapter 1 - Kroenke

Sub-topics:
  a. Database Management Systems benefits

2. Data Modeling with the Entity-Relationship Model

Covered in:
- Class 2
- Chapter 5 - Kroenke

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:
- Class 3
- Chapter 3, pages 69-74, 79-81 Kroenke

Sub-topics:
- Relation/Table
  - Attributes
- Integrity Constraints
- Keys
- Primary key
- Candidate key
- Surrogate key
- Foreign key
  - Referential integrity constraint

4. Transforming ER diagrams to Relational Model

Covered in:
- Class 3, 4
- Chapter 6 - Kroenke

Sub-topics:
- 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
- Transform relationships (foreign keys used here)
  - 1:1 relationships, 1:N relationships
    - identifying relationships
    - non-identifying relationships
  - N:M relationships
  - Supertype/subtype relationships
- Specify logic to enforce minimum cardinalities
5. **Normalization**

Covered in:
- Class 5, 6
- Chapter 3, pages 74-99 - Kroenke
- Chapter 4 - Kroenke

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 (not required for exam)
  - Fourth Normal Form

6. **SQL**

Covered in:
- Class 7, 8
- Chapter 7, pg 220-234 and Chapter 2 - Kroenke

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 keyword
- j. ORDER BY
- k. Aggregate operators: COUNT, MIN, MAX, AVG, SUM
- l. GROUP BY… HAVING
- m. Subqueries
- n. Joins (select from multiple tables)