

# Exam 1 Study Guide CSE30246 - Database Concepts

## ER Diagrams

Entity Sets

Relationships

Attributes

Weak Entity Sets and Referential Integrity

Hierarchical Entity Sets

Understand how to draw an ER Diagram, including relationship cardinality

## Relational Model

Relation

Schema

Instance

Type

Tuple

SQL to create table and drop table

Keys (SQL)

nulls

defaults

Difference between ER Diagram and Relational Model

How to translate between ER Diagram and a Relational Model

- Combining relations

- Translating Weak Entity Sets

- Translating Hierarchies – three choices: OO, ER

## Relational Design

Normal Forms – 1NF through BCNF

How do we know we have a good design?

How do the different normal forms address the criteria for good design?

What is a functional dependency?

How are they related to keys and superkeys?

Use Armstrongs Axioms to define the closure of FD sets

Use Armstrongs Axioms to define the closure on a set of Attributes.

Reason about the keys and superkeys from attribute closure.

Understand which relations are in 2NF, 3NF and BCNF, decompose bad relations if necessary.

## Relational Algebra

Understand the different relational algebra operators:  $\sigma$ ,  $\pi$ ,  $\rho$  ...

Understand the different joins – Cartesian product, natural, equi, theta...

Evaluate the relationship between Set Union, Intersect, Difference vs Bag Union, Intersect, Difference

Write expressions and trees with relational algebra to answer queries

## Relational Calculus

Understand Constants, Predicates, Boolean operations, Exists and For All qualifiers

How does Relational Calculus relate to Relational Algebra? How is it different?

How does Relational Calculus relate to SQL? How is it different?

Write expressions with relational calculus to answer queries

## SQL

Know SQL syntax – MySQL shortcuts are allowed on the test (limit X, join Y on a=b...)

SELECT  
FROM  
WHERE  
GROUP BY  
HAVING  
ORDER BY  
LIMIT

Understand subqueries – in, any, all, exists

Table joins

Differences between subquery IN and join

null value logic

duplicate elimination

Aggregation and Aggregation operators

Write expressions in SQL to answer queries

INSERT, UPDATE, DELETE

Understand when and how to write these expressions to perform operations (and dangers)

Views – what are they, how do they work?

Constraints –

Primary key, Foreign key, check, assertion

Foreign key default actions, cascade, set null

When are foreign key actions triggered – what happens under different actions.

Understand why triggers are necessary in lieu of checks and global assertions