Z511 Database Design

Course Information

- Time: Tuesdays 9:30 AM to 12:15 PM
- Room: Luddy Hall 0119
- Instructor: Kahyun Choi
    - Email: choika@iu.edu
    - Phone: (812) 855-2666
    - Office hours: Luddy Hall 2106 Mondays 3:30 PM to 4:30 PM

Learning Outcomes

- Have a specific understanding of the relational database model
- Model database requirements using ER diagrams
- Map an ER diagram into a relational schema
- Identify tables that are not normalized and convert them to 3NF
- Implement a relational database using SQL commands
- Write SQL queries to generate reports
- Use various database management systems including MySQL, Access, MongoDB, and Neo4j to design and implement databases

Requirements

- This course is designed for students with no prior knowledge of databases or SQL
- Basic computer skills

Textbook

- Jukic, Nenad, Susan Vrbsky, and Svetlozar Nestorov. *Database systems: Introduction to databases and data warehouses*. Prospect Press, 2016.

Optional Books and Resources

- Beaulieu, Alan. *Learning SQL: Master SQL Fundamentals*. "O'Reilly Media, Inc.", 2009.

Tools

- ERDPlus
- MySQL Workbench, installed in the Luddy 0119 and also available via IUAnyWare
- Access (available via IUAnyWare)
- phpMyAdmin
- MongoDB Atlas and MongoDB Compass (installed in the Luddy 0119)

Course Topics

- Week 01: Introduction to Databases & Course Overview
- Week 02: ER Modeling
- Week 03: Relational Database Modeling
- Week 04: Normalization
- Week 05: EER Modeling, Creating Access Tables, and User defined constraints
- Week 06: SQL (DDL), Date Types, and Referential Integrity
- Week 07: SQL (CRUD)
- Week 08: SQL (Grouping, Subquery, and Inner Join)
- Week 09: SQL (Subquery, Joins, and Index)
- Week 10: SQL (Case, Set, View, and Transaction)
- Week 11: No Class (ISMIR conference week)
- Week 12: NoSQL (MongoDB) I
- Week 13: NoSQL (MongoDB) II
- Week 14: No Class (Thanksgiving)
- Week 15: NoSQL (Neo4j)
- Week 16: Final Project Presentation

Assignments

- Assignment 1: Draw ER diagrams based on given requirements. (5%)
- Assignment 2: a) Draw relational schemas based on given ER diagrams b) Normalize toy databases. (5%)

- Assignment 3: a) Create databases from given ER diagrams and requirements b) Write SQL queries to answer given questions c) Implement various referential integrity constraints (5%)
- Assignment 4: SQL Problem set I (5%)
- Assignment 5: SQL Problem set II (5%)
- Assignment 6: MongoDB (5%)

Final Project

- Group Formation (due October 28)
    - Add your group information to the Final Project Group page.
- Proposal (10%, due Nov 12)
- Group Meetings (5%)
    - Data Sources (1.5%, due Nov 12)
    - Data Types (1.5%, due Nov 19)
    - SQL (2%, due Dec 3)
- Presentation (5%, Dec 10)
    - Slides are due Dec8
- Final project report (10%, Dec 15)

Lab Tasks

- Plenty of hands-on exercises in class
- 12 lab tasks (2.5% each, due at the end of class)

Grading Policy

- Lab Tasks (30%) + Assignments (30%) + Final Project (30%) + Participation (10%) = Total (100%)
- Please submit what you have even if it is incomplete.
- If you cannot deliver your work on the date it is due, it is your responsibility to discuss your situation with the instructor, preferably in advance.
- Some assignments will be discussed in class following the due date, late work will not be accepted for those assignments
- It is up to the instructor's discretion to assign zero, partial, or full credit for past-due work.

ADA Disability Compliance Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact IU Disability Services for Students.

Course Schedule

Week	**Date**	**Topic**	**Reference**	**Due**
Week 01	8/27	Introduction to Databases & Course Overview	Jukic Chapter 1	Lab Task
Week 02	9/3	ER Modeling	Jukic Chapter 2	Lab Task
Week 03	9/10	Relational Database Modeling	Jukic Chapter 3	Lab Task
Week 04	9/17	Normalization	Jukic Chapter 4	Lab Task Assignment 1
Week 05	9/24	EER Modeling, Creating Access Tables, and User defined constraints	Jukic Appendix A Access official tutorials	Lab Task
Week 06	10/1	SQL (DDL), Data Types, and Referential Integrity	Jukic Chapter 5, Jukic Chapter 6, MySQL Workbench, Manual, MySQL Manual	Lab Task Assignment 2

Week 07	10/8	SQL (CRUD & Where conditions)	Jukic Chapter 5	Lab Task
Week 08	10/15	SQL (Grouping, Subquery, and Inner Join)	Jukic Chapter 5	Lab Task Assignment 3
Week 09	10/22	SQL (Subquery, Joins, and Index)	Jukic Chapter 5	Lab Task
Week 10	10/29	SQL (Case, Set, View, and Transaction)	Jukic Chapter 5	Lab Task Assignment 4 Project Group
Week 11	11/5	No Class (ISMIR conference week)		
Week 12	11/12	NoSQL (MongoDB)	Jukic Appendix H&I, JSON tutorial, MongoDB tutorial	Lab Task Group Meeting Project Proposal
Week 13	11/19	NoSQL (MongoDB)	Jukic Appendix H&I, JSON tutorial, MongoDB tutorial	Lab Task Group Meeting Assignment 5
Week 14	11/26	No Class (Thanksgiving)		

Week 15	12/3	NoSQL (Neo4j)	Introduction to Neo4j Neo4j Developer Guides	Lab Task Group Meeting Assignment 6
Week 16	12/10	Project Presentation		Project Report