Cleveland State University
Department of Electrical and Computer Engineering

CIS 430/530: Database System and Processing

Catalog Description: CIS 430/530 Database System and Processing (3-0-3)
Pre-requisite: CIS 506 or CIS 265
The course introduces design and use of modern database systems. It studies database design process, conceptual modeling of data, implementation of conceptual data representations to a relational database, use of the relational database query language SQL to create database and to write SQL statements for insert, delete, update and retrieve data. The course also introduces database programming with stored procedure, functions, and triggers. The course also introduces some of the fundamentals of client-server architecture of database systems and Transaction concept in distributed multiuser systems. The course extends to modern database processing - client server database programming with Embedded SQL, Dynamic SQL, and JDBC/ODBC. It introduces building web service applications using a database server and PHP. If a time permitted, the course may advance with a physical database file system and non-relational database systems.

Textbook:
ISBN-10: 0133970779

References:
Online Documentation of Microsoft SQL Server (2014 or higher) or Oracle Database 11g

Coordinator: Dr. Sunnie S. Chung, Electrical Engineering and Computer Science.

Course Objectives: To study modern relational database concepts for design and use of the database systems. To study modeling of data, converting conceptual data representations to a relational database scheme, and use of the relational database language SQL to create database and to write SQL statements for insert, delete, update and retrieve data. To study file system and database programming with stored procedure, functions, and triggers. To study to build modern database applications in distributed database systems - client server database programming with Embedded SQL, Dynamic SQL, and JDBC/ODBC. Finally to study transaction concept in distributed multiuser database systems.

Expected Outcomes: Upon completion of this course, students should be able to:
1. Design and model conceptual data representations to a relational database scheme
2. Use of the relational database language SQL to create database and to
write SQL statements for insert, delete, update and retrieve data
3. Study database programming with stored procedure, functions, and triggers
4. Study to build modern database applications in distributed database systems by writing client server database programming with Embedded SQL, Dynamic SQL, and JDBC/ODBC
5. Study to build web service applications with a database server and PHP
6. Study Transaction concept in a distributed multiuser database system

**Fulfillment of CS Program Objectives and Outcomes:**
**Objectives:**
1. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
4. An ability to apply design and development principles in the construction of software systems of varying complexity

**Outcomes:**
(b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
(c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
(i) An ability to use current techniques, skills, and tools necessary for computing practice.
(k) An ability to apply design and development principles in the construction of software systems of varying complexity.

**Contribution of Course to Meeting the Professional Component:**
Math & Basic Science: 0 credit;
Engineering Topics: 3 credits;
General Education: 0 credit

**Prerequisites by Topic:** Data Structures and Algorithms (Topics covered in CIS265)

**Major Course Topics:**

1. Overview on Modern Database System Concepts and Architecture 3
2. Data Modeling Using the Entity-Relationship 4
3. SQL: Schema Definition, Constraints, Queries, and Views 8
4. Complex SQL 6
5. Use of View 3
6. The Relational Algebra and Relational Calculus 4
7. Database Programming: Stored Procedure, Function, Trigger 8
8. Embedded SQL, Dynamic SQL, ODBC/JDBC  4

9. Transaction Concept in a distributed multi-user system  4

10. Web Service Application with PHP and a SQL server  4

Total  48

**Major Lab Topics:**

1. Introduction of Database Server and Client
2. ER- Modeling, Database Design
3. Transform to a Database Schema
4. Build a Database to Run SQLs over the Database
5. Write Complex SQLs and View to retrieve/report complex data
6. Write Triggers to implement database constraints or complex business rules
7. Write Stored Procedures/Functions to implement modern database applications
8. Write a Web Service application using PHP and a database server

Total equivalent lecture hours  20

**Computer Usage:** Microsoft SQL Server (2014 or higher) or Oracle Database 11g will be used for the computer labs and Mysql and PHP will be used for the computer lab to build a web service application.