

**Cleveland State University**  
**Department of Electrical Engineering and Computer Science**

**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 concept and use of modern database systems. It studies database design process, conceptual modeling of data, converting conceptual data representations to a relational database scheme, 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 some of the fundamental file system for physical data storages and index structures. The course also introduces database programming with stored procedure, functions, and triggers. The course extends to modern database processing - client server database programming with Embedded SQL, Dynamic SQL, and JDBC/ODBC. It advances to build a web service applications using database and PHP. Finally the course advances with introduction of Semistructured Database concept with XML and Data Warehouse concept.

**Textbook:**

"Fundamentals of Database Systems". Elmasri / Navathe. Ed.  
Addison/Wesley Pub Co. 6th Edition or higher, (2011)

**References:**

Online Documentation of Microsoft SQL Server (2012 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, index structures, 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 to build web service applications with database and PHP.

**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. Understand file system and index structures of relational database system
4. Build database programming with stored procedure, functions, and

- triggers
5. Build modern database applications in distributed database systems by writing client server database programming with Embedded SQL, Dynamic SQL, and JDBC/ODBC
  6. Build web service applications with database and PHP

**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:**

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|---|---|
| 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. The Relational Algebra and Relational Calculus               | 4 |
| 6. Database Programming: Stored Procedure, Function, Trigger    | 4 |
| 7. Embedded SQL, Dynamic SQL, ODBC/JDBC                         | 4 |
| 8. Disk Storage, Basic File Structures, and Hashing             | 4 |
| 9. Primary and Secondary Index, Multi-level Index               | 4 |
| 10. Web Programming with ODBC and PHP                           | 4 |

Total

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45

**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 to retrieve/report complicated data
6. Write Triggers to implement database constraints or complex business rules
7. Build a web based service using MySQL and PHP

Total equivalent lecture hours

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20

**Computer Usage:**

Microsoft SQL Server (2012 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.