

# PRINCIPLES OF DATABASE SYSTEMS – CS5423

## *Syllabus*

### 1. GENERAL INFORMATION:

Instructor name:

Email:

Credit: 4 (3 lecture, 1 lab)

Prerequisite: None

### 2. COURSE INFORMATION:

- Course description:

To introduce concepts and types of Computer Database, examine theoretical and pragmatic ideas underlying relational databases such as: data models, data description languages, and query facilities including relational algebra and SQL, data normalization, methodologies of database design, techniques for database application development..., and discuss certain other aspects of database systems - recovery, concurrency, security, and integrity.

- Course objectives:

Upon completion of this course, the students should be able to outline an architecture for a database system, define and manipulate data by using relational algebra or SQL, and understands transactions process of database systems, explain the concept of functional dependency and database normalization and explain the role of database in an enterprise or organization.

### 3. BOOK AND MATERIALS:

- Required textbook:

Fundamentals of Database Systems (6<sup>th</sup> Ed.) by Ramez Elmasri and Shamkant B. Navathe, Addison-Wesley, 2011.

- Other materials:

- Database Design, Application Development & Administration, 3rd by Michael V.Mannino, 2007.
- Peter Rob, Carlos Coronel, Database Systems: Design, Implementation, and Management, 4th edition, Course Technology, 1999.
- D. Kroenke, Database Processing: Fundamentals, Design and Implementation, Prentice Hall Business Publishing, 1997.

- Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, 2nd ed., Benjamin/Cummings Publishing Co., 1994

#### 4. GRADING PROCEDURES:

Computer-based testing: .....	30%
Midterm Examinations: .....	20%
Final Examination: .....	50%

#### 5. COURSE OUTLINE:

Unit	Topics
<b>1</b>	<b>Introduction</b> Overview of Database Systems, Database Systems vs. File Systems, Various aspects of Database Systems, Terminology: model, schema, instance. Three levels of data abstraction, Database Languages, System Architecture of a Database System, Classification of DBMS.
<b>2</b>	<b>Data Modelling</b> Entity-Relationship(ER) Model, Entities and Entity types, Relationship and Relationship type, Constraints, Weak Entity Types, ER Diagrams. Semantic object model.
<b>3</b>	<b>Process of Database Design</b> Phase 1 : Requirement Analysis Phase 2: Conceptual Database Design Phase 3: Database Schema Design
<b>4</b>	<b>Database and Database Application Design</b> Database design using entity-relationship and semantic object models, database application design. Terminology in Relational Data Model, Integrity Constraints, Primitive Operations on Relations, Relational Algebra (RA), Relational Algebra Operations, Relational Completeness, Additional Operations on Relations.
<b>5</b>	<b>Database Implementation</b> Foundations of relational implementation. Structured Query Language (SQL): DML Features in SQL, DDL in SQL, Updates in SQL, Views in SQL, Embedded SQL, Query-by-Example (QBE). Concurrency, recovery and security issues.

<b>6</b>	<p><b>Functional Dependencies</b></p> <p>Amstrong's Inference Rules and Minimum Covers, Normal Forms: First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form</p>	
<b>7</b>	<p><b>Trends In Database</b></p> <p>Current Trends in Database Systems: Client-Server database systems, Open Database Connectivity (ODBC) standard, Knowledge-Based Systems, Object-Based Systems, data warehousing and data mining concepts, Web databases.</p>	

#### **6. COURSE REQUIREMENTS:**

- Programming Assignments: Exercises are in corresponding sections of the required book.
- Projects or Team Class Projects: Projects are given by the instructor after finishing a chapter.
- Class attendance/participation: Evaluated by checking in the Attendance Book
- Final Examination: Students are directly tested and automatically marked on computers.

#### **7. ACADEMIC INTEGRITY POLICIES:**

- Student may not use Vietnamese language in class, or will be reduced 2% final marks
- Be punctual to come and leave the class.
- Maximum cancellation time per semester is 6 hours per class.

#### **8. COMMENTS AND NOTES:**

- Preparation for Class: It is expected that the students read related chapter in textbook and lecture noted before each class. This will help to capture the topics presented and discussed during class hours.
- Use of Class Time: Class time will be used mainly for lectures and discussions. A small part of class hours is used for testing. House works will be discussed on individual basis.
- Class Attendance: Due to the broad range of topics discussed throughout the course and their inter-relationship, it is requested that the students should attend the class regularly.
- Assignment Requirement: Assignments of each session must be submitted by email before the next session begins.