**CS8803 Databases and Information Security**

[This course is a expanded version of CS4400 Introduction to Database Systems]

**COURSE CONTENT:**

We introduce the fundamental concepts necessary for the design and use of modern database systems. We examine the concepts in the order that we encounter them in the actual database design process. We start with the problem of conceptually representing data that is to be stored in a database. From there, we see how the data in a conceptual data model can be converted to a database specific model (e.g., the relational data model). We also discuss various forms for relations that possess good properties. We see how to use the relational database language SQL to define the relations and to write SQL statements to insert, delete, retrieve and update the data. We also examine some of the fundamental storage structures that are used in relational database systems. We end the course with a discussion of some advanced topics in the database management area.

**PROJECT:**

You will design and implement a database application using the MySQL relational database system through PHP. The Project can be done in groups of 3-4 students.  We will follow a typical database design methodology for this project. The project will consist of 3 phases (deliverables) as well as a final demonstration.

**Information Security Masters Students:**

Substantial additional project requirements for InfoSec MS students will concentrate on Information Security related topics, including:

* Privacy
* Access control
* SQL injection

**RULES FOR PROJECT COLLABORATION:**

Students within each project group are strongly encouraged to split each phase of the project into smaller tasks and collaborate closely with each other to accomplish that phase.  No collaboration of any kind whatsoever is allowed between students in different project groups.  Any violation of this policy will be reported to the Dean of Students without exception.

**Required Text:**  *Fundamentals of Database Systems*, 6th edition, Elmasri & Navathe, Addison-Wesley, 2010.

**Resources on T-Square:**

* **Lecture Notes**
* **Database Design Methodology Notes**
* **MySQL, PHP Notes**
* **Sample Quizzes**
* **Class Project**

**Prerequisite(s):**  Basic programming skills, e.g. C, Java, Python, …

**Grading:**

Quiz 1-4: 15% each.

Project (PhaseI 10%, PhaseII 15%, PhaseIII 15% (optional)

Final Exam 15% (only for students not doing project PhaseIII)

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| **Topic** | **Chapters**  **5th Edition** | **Chapters**  **6th Edition** |
| Basic concepts - data independence, 3 level database architecture, database system components | 1, 2 | 1, 2 |
| Conceptual database level - Entity-Relationship Model | 3, 4 | 7, 8 |
| DBMS Design Methodology (Part I): Analysis and Specification | notes | notes |
| Relational Data Model: Introduction, Algebra and Calculus | 5, 6 | 3, 6 |
| SQL Query Language | 8 | 4, 5 |
| Mapping from ER Model to Relational Model | 7 | 9 |
| Relational database design - Normal Forms, Functional Dependencies | 10, 11 | 15, 16 |
| Oracle JDBC and JAVA | notes | notes |
| DBMS Design Methodology (Part II): Design and Implementation | notes | notes |
| Internal database level - storage structures | 13, 14 | 17, 18 |
| Data mining and data warehousing | 28, 29 | 28, 29 |

**IMPORTANT DATES:**

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| **Quiz #** | **Topics** | **Date** |
| 1 | DB Concepts & ER/EER  Model | TBD |
| 2 | Relations, Algebra & Calculus | TBD |
| 3 | QBE, SQL and ER to Relational Mapping | TBD |
| 4 | Normalization and Physical Design | TBD |

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| **Project** | **Due Date** |
| Phase 1 | TBD |
| Phase 2 | TBD |
| Phase 3 | TBD |