# EECS 495 – INTRODUCTION TO DATABASE SYSTEMS

**Fall 2015**


**INSTRUCTOR:** *Peter Scheuermann*
**OFFICE:** Tech L452
**OFFICE HOURS:** Mon, Wed: 3:00 - 4:00 pm; Thurs: 2:00 - 3:00 pm
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**INSTRUCTOR-2 (TA):** *Mas-ud Hussain*
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**OFFICE HOURS:** Tuesday: 5:00 – 6:00 pm
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**TEXTBOOKS:** R. Ramakrishman and J. Gehrke, "Database Management Systems," Third Edition, McGraw-Hill, 2003

C. Jensen, T. Pedersen and C. Thomson "Multidimensional Databases and Data Warehousing, Morgan and Claypool, 2010 (download for free)

**REFERENCES** A. Silberschatz, H. Korth and S. Sudarshan ,"Database System Concepts," Sixth Edition, McGraw-Hill, 2010.

M. Golfarelli and S. Rizzi, "Data Warehouse Design: Modern Principles and Methodologies by McGraw-Hill, May 20009

**COURSE GOALS:** This course will cover the principles of database systems from the view of application developers. For relational databases, we will emphasize a logical design approach that starts with an Entity-Relationship specification of the data requirements and then give rules for deriving a schema in the relational model. We will discuss how to develop database-backend applications by embedding SQL in host languages. We will also study the basic principles of data warehousing (DW): the Dimensional Fact Model (DFM) and the logical models for representing multidimensional data structures.

Students will get hands-on experience through programming projects in MySQL and the Microsoft SQL Server.

**GRADING (Curved):**

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| Home-works: | 15% |
| Programming. Assignments | 40% |
| Midterm Exam: | 20% |
| Final Exam: | 25% |

**Tentative Course Outline (subject to change)**

1. Database Architecture Framework

2. Modeling the Real World
   The Entity Relationship Model

3. The Relational Model
   Relational Schemas and Keys
   Transformation of an E-R schema into a Relational Schema

4. Relational Query Languages
   Relational Algebra
   SQL Programming
   Triggers and Active Databases

5. Using SQL in Applications
   Embedded SQL and stored procedures

6. Relational Database Design
   Functional and Multivalued Dependencies
   Normal Forms
   Normalization through Decomposition

7. Tree Structured Indexing
   Primary and Secondary Indices
   B+-tree and hashing Indexing

8. Query Processing
   External Sort
   Join Algorithms: Nested joins, Merge join, Hash Join

9. Conceptual Modeling of Data Warehouses
   The DFM: facts, measures dimensions and cubes

Events and Aggregation: additive, non-additive, aggregations with hierarchies

10 Logical Modeling of Data Warehouses

ROLAP versus MOLAP

Star schemas and snowflake schemas

**NOTE: You must get a combined grade of at least 40 in the exams in order to pass the class**.