INST 733 - Database Design
Spring 2014 - Tentative Syllabus

Instructor:	Vedat G. Diker	**Class meeting time and place:**
Office:	SG-III, Room 5131	Tuesday evenings *(1/28/2013 - 5/13/2013)*
Phone:	(301) 738-6241	6:00 PM to 8:45 PM
E-mail:	v d i k e r @umd.edu	in SG-III, Room 4203 *(Shady Grove campus)*
Office Hours:	By appointment	

Catalog Description:
Principles of user-oriented database design. Requirements analysis. Data modeling. Data integrity and security and multi-user databases. Implementing an information system using a database management system (DBMS).

Extended Description:
This course focuses on approaches to and methods for designing relational databases. After almost half a century of development, and challenges from various competing paradigms, relational databases remain to be the industry standard for data persistence. A high-quality relational database can help leverage an organization's data and information assets for better fulfillment of its mission. On the other hand, a poor, problem-ridden database can complicate even the simplest data-driven functions within the organization. There are various factors that determine the quality of a relational database. An indispensible prerequisite for establishing a high-quality database is a robust design. This course covers principles and methods for logical and physical database design, as well as SQL, a language for maintaining relational databases and managing data held in relational databases.

Goals:
After completing this course the student will be able to:
- understand and define fundamental concepts in relational databases,
- develop a logical database design,
- develop entity-relationship diagrams,
- normalize relational databases,
- develop a physical database based on a logical design,
- perform CRUD (create, read, update, delete) operations on relational databases

Elements of the Course:
Active Participation: The course will involve in-class discussions, as well as in-class exercises. The students are expected to come to class prepared, and participate actively. Please inform the instructor in advance if you will not be able to participate in a class meeting.

In-Class/At-Home Assignments: Student will do hands-on work in the classroom, and some of these exercises will be collected via ELMS (Canvas) to be graded. Students can work on the in-class assignments individually or in consultation with one or more other students; **however, each student will be expected to develop and submit a unique, separate artifact to be graded**, if an exercise is graded. Some in-class assignments may have at-home components, which will also be submitted via ELMS.

Project: Student will work as pairs on developing a logical design for a database and subsequently implementing the design in a physical database. Furthermore, student pairs will populate their databases with sample data and run CRUD operations on their databases. The following stages of the project will be graded as separate elements:
- Proposal
- Logical design (including an E-R diagram, and normalization as necessary),
- Physical design (including data type choices and queries for building the physical database),
- Sample data and CRUD operations.
- Project diary and report (Students will keep a log/diary of their activities on the database, including the challenges faced and how they were solved. A final report will summarize the overall project. The log/diary will be included in the report as a section of an appendix.

The database and the report will be of professional quality, in the sense that they could be used as the basis for an actual relational database in an actual organization. Details about the expectations for the project and submission deadlines will be given on the course website on ELMS.

Grading:

In-Class/At-Home Assignments	40%
Project - Proposal	5%
Project - Logical Design	15%
Project - Physical Design	10%
Project - Sample Data and CRUD	15%
Project - Project Diary and Report	15%
Active Participation and Attendance	Although this component will not be added as extra points to your grade, excessive absence (missing more than three sessions with explanation, or more than one session without explanation,) non-participation, disruptive behavior in class, or other unwanted behavior may affect your grade negatively.

Texts:

Required: **SQL: Visual QuickStart Guide (3rd Edition)** Chris Fehily
Peachpit Press. ISBN: 0321553578 / 978-0321553577
(An electronic version might be available for purchase/download.)

Other: A number of other readings from different sources will be made available to students. Students are expected to read the material by the deadlines, and before coverage in the class.

Classroom Computer Use:

There will be a good amount of hands-on work in the course. It is highly recommended that you bring a portable computer with you to every class meeting. You may not be able to get the best learning experience from this course without a computer in class. The computer can run on any of the commonly-used operating systems, such as Windows, MacOS or Linux. It must have wireless Internet capability. For the best learning experience, students must refrain from using their computers for activities that are not related to the course, during class time.

Required Software:

We will use the freely-available MySQL Database Server and MySQL Workbench to work on exercises and to build our project databases. Please install the software on your computer at your

earliest convenience. You can download them through the links below; you will need both. If you need help with installation and configuration, contact the instructor as soon as possible.
- MySQL Server: http://dev.mysql.com/downloads/mysql/ (see the options under the "Select Platform" drop-down for the correct operating system.)
- My SQL Workbench: http://dev.mysql.com/downloads/tools/workbench/ (see the options under the "Select Platform" drop-down for the correct operating system.)

Policy on Academic Misconduct
Cases of academic misconduct will be referred to the Office of Student Conduct irrespective of scope and circumstances, as required by university rules and regulations. It is crucial to understand that the instructors do not have a choice of following other courses of actions in handling these cases. There are severe consequences of academic misconduct, some of which are permanent and reflected on the student's transcript. For details about procedures governing such referrals and possible consequences for the student please visit http://osc.umd.edu/OSC/Default.aspx.

University of Maryland Code of Academic Integrity:
"The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism." For more information, please visit http://shc.umd.edu/SHC/Default.aspx and http://www.president.umd.edu/policies/iii100a.html.

Special needs
Students with disabilities should inform the instructor of their needs at the beginning of the semester. Please also contact the Disability Support Services (301-314-7682 or http://www.counseling.umd.edu/DSS/). DSS will make arrangements with the student and the instructor to determine and implement appropriate academic accommodations. Students encountering psychological problems that hamper their course work are referred to the Counseling Center (301-314-7651 or http://www.counseling.umd.edu/) for expert help.

Tentative Course Plan (Subject to possible change during semester**):**

	Date	**Topics**	**Readings (to be done before class)**
1	Jan. 28	Introduction; Course logistics; software installation Project ideas	---
2	Feb. 4	Relational database fundamentals	[DMDLD] - Ch. 1 [RDDCE] - Ch. 4 [SQLRT] - Ch.s 1, 2, 3
3	Feb. 11	Introduction to MySQL Server; Introduction to MySQL Workbench; Introduction to SQL	[BDBD] - Ch. 10 [MDBM] - Ch. 6 [SQLVQS] - Ch.s 2, 3
4	Feb. 18	Entity- relationship diagrams	[DMDLD] - Ch. 2 [RDDCE] - Ch. 5 [SQLCE] - Ch. 1
5	Feb. 25	Normalization	[BDBD] Ch.s 8, 9 [DMDLD] - Ch. 6 [RDDCE] - Ch. 6
6	Mar. 4	Read (*R**) operations via SQL	*[SQLVQS] - Ch.s 4, 5, 6, 7, 8, 9*
7	Mar. 11	In-class work on Project	---
-	Mar. 18	SPRING BREAK - NO CLASS	---
8	Mar. 25	Physical design principles; Data types; Indexes	[FDBMS] - Ch. 8 [MDBM] - Ch. 5 [PDBD] - Ch. 1
9	Apr. 1	Physical design practice; Physical design via MySQL Workbench; Reverse and Forward Engineering	[MDBM] - Ch. 7 *[SQLVQS] - Ch. 11*
10	Apr. 8	Create, Update, Delete (C*UD) operations via SQL	[SQLCE] - Ch. 2 *[SQLVQS] - Ch. 10*
11	Apr. 15	Views; Stored procedures; Triggers	[PDBD] - Ch. 2 [SQLVQS] - Ch.s 12, 13
12	Apr. 22	In-class work on Project	---
13	Apr. 29	In-class work on Project	---
14	May 6	Contemporary non-relational approaches; “Polyglot persistence”	[NSQLD] Preface, Ch. 13 [PNSQL] - Ch. 1
15	May 13	TBD	TBD

Chapters in *italics* will not be available on course reserves due to fair-use limitations.

Book Codes:

BDBD: Beginning Database Design - 2nd Edition [2012]
(Clare Churcher) (Apress - ISBN: 978-1-4302-4209-3 / 978-1-4302-4210-9)

DMDLD: Database Modeling and Design: Logical Design - 5th Edition [2011]
(T. Teorey, S. Lightstone, T. Nadeau, H.V. Jagadish) (Morgan K. - ISBN: 978-0-12-382020-4)

FDBMS: Fundamentals of Database Management Systems - 2nd Edition [2012]
(Mark L. Gillenson) (Wiley - ISBN: 978-0-470-62470-8)

MDBM: Modern Database Management - 10th Edition [2011]
(Jeffrey A. Hoffer, V. Ramesh, Heikki Topi) (Prentice Hall - ISBN: 0-13-608839-2)

NSQLD: NoSQL Distilled [2013]
(Pramod J. Sadalage, Martin Fowler) (Addison Wesley - ISBN: 978-0-321-82662-6)

PDBD: Physical Database Design [2007]
(Sam Lightstone, Toby Teorey, Tom Nadeau) (Morgan Kaufmann - ISBN: 978-0-12-369389-1)

PNSQL: Professional NoSQL [2011]
(Shashank Tiwari) (Wrox - ISBN: 978-0-470-94224-6)

RDDCE: Relational Database Design and Implementation: Clearly Explained - 3rd Ed. [2009]
(Jan L. Harrington) (Morgan Kaufmann - ISBN: 978-0-12-374730-3)

SQLCE: SQL Clearly Explained - 3rd Edition [2010]
(Jan L. Harrington) (Morgan Kaufmann - ISBN: 978-0-12-375697-8)

SQLRT: SQL and Relational Theory - 2nd Edition [2012]
(C.J. Date) (O'Reilly Media - ISBN: 978-1-449-31640-2)

SQLVQS: SQL Visual QuickStart Guide - 3rd Edition [2008]
(Chris Fehily) (Peachpit - ISBN: 978-0-321-55357-7)