



### IS 584 Database Management Systems

**Semester:** Fall 2016  
**Instructor:** Peiling Wang, Ph.D.  
**Time/Place:** Tuesday 5:05 – 7:50 p.m.  
Link to class: <https://tennessee.zoom.us/j/752418484>  
Or, go to <https://tennessee.zoom.us/join>; enter meeting ID: 752 418 484  
**Office/Hours:** COM 443; Tu 12:00 – 4:00 p.m.; also by appointment  
**Contact:** voice: (865) 974-3700; email: [peilingw@utk.edu](mailto:peilingw@utk.edu)

#### Catalog Description

Defining data needs, data structures, role of operating systems in data management, file organization, database management systems, logical data models, internal data models, database administration and evaluation. Design and implementation of applications using database management systems.

#### Goals/Objectives

- understand information needs in organizations and the database environment
- understand the database development process and technology
- master database terminology for effective communication
- be able to design data models using Entity-Relationship (ER) diagrams (conceptual design)
- be able to translate/map ER diagrams to relational models (logical design)
- be able to implement a prototype database application using a relational DBMS software package (physical database)
- be able to use Structured Query Language (SQL) to retrieve data (data access)
- understand issues pertinent to operational databases

#### Learner-centered Approach to Teaching/Learning

The shift to 21<sup>st</sup> century learning requires teachers to adopt a learner-centered approach to teaching. Built on the constructivist theory, I design the course that takes into consideration of students' diverse backgrounds and career goals, as well as the need for lifelong learning. Database is a challenging subject, which is loaded with difficult concepts and requires strong computer technological skills. It will not be a realistic expectation to master the subject in a 3-credit course. My expectation is that upon successful completion of the course, you will feel confident to pursue the subject further because of the solid foundation we build during the course regardless of your starting point. For the students with some database experiences, you are encouraged to move towards a higher level of competences.

I encourage you to set up your own learning objectives based on your career goals. I support and guide you to achieve your personalized learning outcomes. Critical success factors include critical thinking and perseverance. You will find practical use of the knowledge and skills learned in this course even if you are not seeking a database management career! Congratulations to you for taking this course to learn a challenging subject.

### **Innovating Teaching with Flipped Classroom**

I will adopt this approach in this course to place my students in the center of learning. The flipped classroom method has been successful when students are well prepared and actively participate in the hands-on activities during the class time. This approach is appropriate for the concepts and tasks such as drawing an ERD, testing SQL statements, analyzing different models for a well-defined design case. This approach should make online courses more effective by reducing one-way lecturing.

### **Course Materials**

Blackboard (<https://bblearn.utk.edu/>) is the official Web-based courseware to manage the course and facilitate communication between the instructor and the students. In the event that Blackboard is down, check with OIT at (865) 974-9900. For questions about Zoom, call (865) 974-3117. You may also call SIS support at (888) 378-9338 or (865) 974-7913.

### ***About the textbook (required):***

Choosing a suitable textbook to fulfill our learning objectives for this course is difficult because there are so many database textbooks and learners have diverse backgrounds and learning styles. A textbook that is easy to follow for one student may be hard for another student due to individual differences. Let's work together to make learning easier by sharing experiences along the process.

Jeffrey A. Hoffer, V. Ramesh, Heikki Topi. *Modern Database Management*, a successful textbook currently in its 12th edition (2015). Please note that we will use **11th edition** ©2013 (Published 07/16/2012) Prentice Hall, 624 pp.

paperback	ISBN-10: 0273779281; ISBN-13: 978-0273779285
hardcover	ISBN-10: 0132662256; ISBN-13: 978-0132662253

Online resources provided by the first author:

[http://wps.prenhall.com/bp\\_hoffer\\_mdm\\_11/230/58943/15089539.cw/index.html](http://wps.prenhall.com/bp_hoffer_mdm_11/230/58943/15089539.cw/index.html)

We will **study and master** the following Chapters with a focus on Bolded chapters.

*Part I:* The Context of Database Management

Chapter 1: The Database Environment and Development Process

*Part II:* Database Analysis

**Chapter 2: Modeling Data in the Organization**

Chapter 3: The Enhanced E-R Model

*Part III: Database Design***Chapter 4: Logical Database Design and the Relational Model**

Chapter 5: Physical Database Design and Performance

*Part IV: Implementation***Chapter 6: Introduction to SQL****Chapter 7: Advanced SQL****About DBMS (software)**

To complete labs and projects, you need to use Microsoft Access 2010 or later. If you are already fluent in Access, you can try SQL server. UT students can download Office365 for free:

- PC users: your free copy of Office365 includes Access. Download Office365 at <https://help.utk.edu/kb/index2.php?func=show&e=2269>. You will need to log-in with your UT NetID and password.
- Mac users: your free copy of Office365 does **not** include Access, so you will need to:
  - a. first, run MS Windows virtually on your Mac. To run Windows virtually on your Mac, download Oracle VirtualBox software for free at [http://download.cnet.com/VirtualBox/3000-2094\\_4-145711.html](http://download.cnet.com/VirtualBox/3000-2094_4-145711.html), or at <https://www.virtualbox.org/wiki/Downloads>;
  - b. next, download a free copy of “Windows 10 for Education” to install on your Mac, using Bootcamp or Parallels, at <https://oit.utk.edu/hardware-software/Pages/Kivuto-WebStore.aspx> and click on the “Login to Kivuto WebStore” button. To download Parallels, go to [www.parallels.com](http://www.parallels.com).
  - c. finally, install the free copy of Office365 for Windows that includes Microsoft Access.
- For mobile devices, please visit <https://help.utk.edu/kb/index2.php?func=show&e=2275>.

For the project assignment, you may use any relational DBMS database packages (e.g., MySQL, SQL Server, etc.) if you reach expert level for ACCESS, but you will be responsible for obtaining the package of your choice. SQL Server Express is free for downloading (mentioned in Lynda tutorial). Discuss your options with the instructor to assess feasibility.

Reference manuals or how-to books for DBMS can accelerate the learning process. Although online help is useful for experienced users, a good introductory book may help beginners jump start. By a *good* book, I mean that the text is written at the level compatible with the learner’s background and learning style. Some learners prefer a quick, concise guide and others appreciate detailed explanations with illustrations. I personally keep several references on my bookshelf and frequently read several of them to master difficult concepts. I recommend you to visit local bookstores to check the books out before you buy one.

**Assignments and Evaluation**

You need a graphics tool and ACCESS database management system (DBMS) to complete assignments. All assignments must be uploaded to Blackboard. Please be reminded that your work-in-progress file in Blackboard is invisible to me until you **submit** it. Given that Blackboard allows multiple submissions at different times, if you intend to replace a previously

submitted assignment, indicate so in your comment so I will delete the previous submissions. Some assignments may not accept multiple submissions at different times. In this case, contact me so that I can reset it for you so that you can **submit** again. Please keep a copy of your assignments in case of file corruption during the transmission or in case Blackboard crashes.

### **1. Class Attendance Participation (10%)**

Prepared attendance is important for this course given the nature of the subject. Students are expected to have read the material before the class and contribute to discussion and other activities.

If you must *miss* a class for whatever reason, you are still responsible for the material covered. The UTK School of Information Sciences (SIS) does not recommend that students attend online classes while driving or riding in motorized vehicles. Collaborate client for smart phone or tablet may not support functions such as AppShare. Classes are recorded and can be replayed to make up the missed class. See the Texting While Driving Law (TCA 55-8-199).

Conferences with the instructor: you are strongly encouraged to meet with the instructor in person or online. Many students found such meetings helpful, especially during their projects and labs.

You are required to hold at least *one* meeting with the instructor no later than last day of class: for campus students, meet face to face; for DE students, use interactive methods such as Skype or Zoom. Please contact me early in the semester to schedule the meeting.

### **2. Course Journals (15%) – Start now**

Becoming a reflective learner is very important for career success in IT! Write structured journal entries for important incidents during your learning: 1) your “Aha!” moments; 2) a know-how you figured out that can be used later or shared with others; 3) a debugging episode—what was your strategy to tackle the problem; 4) a lesson learned from a mistake—if you would do the task again, what might you do? Throughout of the semester, you will write about these significant learning experiences and reflect on your growth. Be succinct!

### **3. Exercises (20%)**

The exercises aim to review concepts and reinforce understanding. The exercise questions are to be answered online in Blackboard where you can receive instant feedback. These are implemented using the “test” function of Blackboard so that you will receive the system feedback instantly. If you missed a question, you can analyze if you have not mastered the concept or if the question is vague. You should redo these exercises two times by the due dates; the highest score of each exercise will be counted. When you redo an exercise, you will have to answer all the questions again because the system cannot be set up for showing only the questions with incorrect answers. Late assignments will lose *one point* a day.

### **4. Labs (25%)**

Learning-by-doing! Labs are important hands-on practices to develop IT skills. These labs are designed for practicing basic DBMS skills: implementing data structure and using SQL.

However, much of the advanced database skills can only be built by exploring the software to develop adequate mental models and through trouble-shooting. MS Access has a good visual interface and provides error messages. It is suitable for learning using a trial and error approach. It also can support real-world projects of individual researchers or small organizations.

### **5. Project (30%)**

Students must complete a hands-on project either as an *individual* project or as *teamwork*. In real-world settings, a database is mostly designed, developed, and maintained by a team. A good team will make learning-about and learning-by-doing much easier and fun with the support of teammates. However, the online learning mode makes collaboration of database projects difficult. I will accept individual projects.

You may select one of the suggested types below, based on your learning objectives and your background. You may also propose a different database project derived from a need in the real world. Please discuss your project with the instructor.

*Type I. Database implementation.* Based on a given ERD-design and requirements, implement a physical database. You may use Access, SQL Server Express, MySQL, or any DBMS, whichever fits your learning objective. I will provide you with an ER design. [The focus of this type is query development to retrieve data – frontend.]

*Type II. Database design and prototyping.* Select a scenario or a real-world environment to do needs' analysis, conceptual design, and a prototype. I will help you along the process. [The focus of this type is data structure and integrity -- backend.]

*Type III. Web access to database.* Students with prior database knowledge and Web programming experiences may design a Web interface to handle data input, query, and output. I will provide you the back-end database. [The focus of this type is to use Web tools to retrieve data from a server based database – front end. For this type, the students must be an expert in database structure, query, and communication.]

Each project is evaluated based on the criteria for the type. The three types will not be cross-compared; each type is worth 30% towards final grade. Each project team will receive the same points unless issues arise.

### **Note on Evaluation and Grading**

The University of Tennessee grading system for graduate level courses are as follows. However, grades, as a quantitative assessment of course performance, do not always reflect a student's real competences.

A: superior performance

B+: better than satisfactory performance

C+: less than satisfactory performance

B: satisfactory performance

C: performance well below the

standard expected of graduate students

D: clearly unsatisfactory performance and cannot be used to satisfy degree requirements

F: extremely unsatisfactory performance and cannot be used to satisfy degree requirements

### **Academic Integrity**

“The responsibility for learning is an individual matter. Study, preparation and presentation should involve at all times the student’s own work, unless it has been clearly specified that work is to be a team effort. Academic honesty requires that all work presented be the student’s own work, not only on tests, but in themes, papers, homework, and class presentation. ...” (*Hilltopics Student Handbook*, The University of Tennessee, Knoxville, <http://hilltopics.utk.edu/>).

### **Disability Statement**

“Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Disability Services (ODS) at 865-974-6087 in 100 Dunford Hall to document his or her eligibility for services. ODS will work with students and faculty to coordinate reasonable accommodations for students with documented disabilities.”

### **Diversity Statement**

The College of Communication and Information (CCI) recognizes and values diversity. Exposing students to diverse people, ideas and cultures increases opportunities for intellectual inquiry, encourages critical thinking, and enhances communication and information competence. When all viewpoints are heard, thoughtfully considered, and respectfully responded to, everyone benefits. Diversity and fairness unite us with the wider professional and global community. (Approved by CCI Faculty, September 17, 2010; CCI’s full Diversity Statement at <http://www.cci.utk.edu/diversity-statement>).

### **Policy on Emergency or Inclement Weather**

If the university is officially closed, classes will be canceled. Visit UTK online to check on campus status. You can also check the UT Knoxville campus number 865-974-1000. I may arrange to extend sessions after the missed session or schedule a makeup session. Any type of arrangements will be discussed with you in advance and announced in class or via e-mail.

**Schedule** (Subject to change due to unforeseen circumstances)

<b>August</b>	
23 (Tuesday)	Welcome and Introduction; Tips for learning databases Bblearn: folder Schedule for readings and materials; folder Assignments for exercises and labs
30	Database Environment and SDLC Chapter 1 or watch the video in Bblearn
<b>September</b>	
6	Conceptual Design: ER Model (Entities) Chapter 2 or Video
13	Conceptual Design: ER Model (Relationships) Chapter 2
20	Advanced ERD Chapter 3 or Video
27	Logical Mapping: ERD to Relational Model Chapter 4 (skip Normalization)
<b>October</b>	
4	Normalization & Review (Q&A) Chapter 4 Introduction to Normalization ...
11	Learning Goals: Database Competence Levels Project discussion
18	Wang at ASIST conference
25	Physical Database Design & Prototyping Chapter 5 & DBMS video
<b>November</b>	
1	Introducing to SQL
8	Basic SQL Chapter 6 & online resources
15	Advanced SQL Chapter 7 & online resources
22	Advanced topic: NoSQL databases Lynda video
29	Project showcase