

Database Management Systems

(COP 5725)

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Database Systems Research & Development Center

Course Syllabus¹ – Fall 2011

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1. Note that this syllabus has a “dynamic” character. That is, it can (and will be) updated and extended at any time without prior notice. Hence, from time to time you should check the syllabus.

1 General Information

Credits:	3
Prerequisites:	Data structures and algorithms; web programming skills (e.g., PHP) needed (if you do not have them, you must obtain them in self-study)
Instructor:	Dr. Markus Schneider
Lecture times:	Tuesdays: 1:55 pm – 2:45 pm (7th period), Thursdays: 1:55 pm – 2:45 pm, 3:00 pm – 3:50 pm (7th & 8th period)
Location:	NEB 100
Office hours:	Tuesdays: 12:30 pm - 1:30 pm, Thursdays: 12:30 pm - 1:30 pm, or by appointment
Office:	CSE Building, room E450
Course web site:	http://www.cise.ufl.edu/~mschneid/Teaching/COP5725_Fall2011/COP5725_Fall2011.html
Phone:	(352) 505-1584
Email:	mschneid@cise.ufl.edu

2 Course Objectives

This lecture provides students with the essential concepts, principles, and techniques of modern database systems from a user perspective. This means that the lecture focuses on the functionalities that are offered by database systems and not on the methods to implement them. Specifically, the course teaches students the ability to develop a solution to a real-world data management problem that requires the application of the theories and practices developed in class.

From a theoretical point of view, this course covers the essential principles for the design, analysis, and use of computerized database systems. The design and techniques of conceptual modeling, database modeling, database system architecture, and user/program interfaces are presented in a unified way. Specifically, topics covered during the course of the semester include:

- file systems versus a database management system
- conceptual database design and modeling based on the Entity Relationship (ER) model
- the relational data model
- transforming an ER design into a relational database schema
- relational algebra
- SQL query language
- relational database design theory including functional dependencies and normalization
- database application programming
- object-relational database systems
- SQL 3 standard

From a practical point of view, students learn to deal with a commercial database system (Oracle). They learn how to apply theoretically understood concepts in a professional database environment. For example, they practice how to formulate ad hoc queries or how to write application programs in a database context. They also learn the complete process from devising a conceptual database design up to its transformation into the database schema of a concrete database management system.

By providing a balanced view of theory and practice, the material covered should allow the student to understand and use practical database systems. The student is provided with a basic understanding of the issues and problems involved in database system development, a knowledge of currently practical techniques for satisfying the needs of a database system, and an indication of the current research approaches that are likely to provide a basis for tomorrow's systems.

3 Course Information

3.1 Textbooks and Readings

A *required* textbook will be used this semester to augment the material presented in lectures:

R. Elmasri & S. B. Navathe. *Fundamentals of Database Systems*. Addison Wesley, 6th edition, 2010, ISBN 978-0-136-08620-8

The course web page will mention a list of additional, *recommended* but *optional* textbooks.

The material covered in the lectures should be considered as the main definition of the scope of the course. Readings in the required textbook are important to supplement lecture material. Assignments and exams will be based on the topics presented in the lecture and may involve issues addressed in the readings.

3.2 Staff

Instructor:

Dr. Markus Schneider

Office: CSE Building, Room E450

Tel.: (352) 505-1584

E-mail: mschneid@cise.ufl.edu

Teaching Assistants:

Please take the names, the offices, the telephone numbers, the office hours, and the email addresses of the teaching assistants from the course website.

4 Course Assessment

Student assessment will be based on *exams*, *homework*, and a *software project*.

4.1 Exams

There will be three exams, the first one roughly after one third of the semester, the second one roughly after two third of the semester, and the third exam at the end of the semester. All three exams will be in class with closed notes and closed books. The goal of writing three exams instead of two exams is to give the students a better insight into their performance in the class and, if necessary, the chance to improve it. Failure to take an exam will lead to 0 points in that exam. The exam schedule will be announced on the course web site. There will be *no* explicit final exam.

All three exams will be based on the contents of the lecture *and* the corresponding readings. The reading sections can also contain material not covered by the lecture. The exams will contain two different kinds of exercises. The first kind includes *practical exercises* like formulating queries or designing a conceptual schema. The second kind incorporates *knowledge exercises* and checks your knowledge of important database notions and concepts. These concepts and notions are sometimes required to be formulated in mathematical notation and *not* in your own words. An example is to explain what a *relation* is with respect to a given relation schema $R(A_1, \dots, A_n)$. The expected answer is *not* “A relation is a table consisting of rows and columns, etc.” but “A relation r with respect to a relation schema $R(A_1, \dots, A_n)$ is defined as $r(R) = \text{dom}(A_1) \times \dots \times \text{dom}(A_n)$ where $\text{dom}(A_i)$ denotes the domain of attribute A_i .” This is much more precise, unambiguous, and shorter.

4.2 Homework

The homework consists of five assignments. These assignments, which accompany the different lectures, will take you through the steps that are involved in building “real-world” database applications. All assignments must be solved by each student *individually*. Working in groups is *not* allowed. The assignments consist of written parts as well as parts dealing with the database system Oracle. Failure to submit an assignment will lead to 0 points in that assignment.

4.3 Software Project

In parallel to the lectures and homework, student groups will implement a larger, joint piece of database software. This effort involves web-based database programming and is designed to give the student some real “hands-on” experience with a full-fledged database management system. We will use Oracle or other database systems, high-level programming languages like Java or C++ as well as script languages like Javascript or PHP. Specifically, students will design a relational database, load and query the database, and create a web-based database application program. Students who are not familiar with programming languages and script languages will have to learn such a language on their own in order to be able to implement the web-based project part.

At the demonstration day, which will be near the end of the semester, the student groups have to present their software system. Students have to arrange an appointment with the instructor. Demonstrations will last 30 minutes and will be conducted in the CISE computer labs (room 114).

4.4 Oracle

We will be using an *Oracle* database server. *Oracle* clients (called *SQL Plus*) for connecting to the server are available on UNIX workstations, Linux workstations, and PCs in the CISE computer labs. Information about the Oracle database system installation in our department can be found at <http://www.cise.ufl.edu/help/database/oracle.shtml>. In order to be able to connect to the Oracle server, you need to have a current CISE account as well as an Oracle account (they are two different accounts with different passwords). Please refer to <http://www.cise.ufl.edu/help/database/oracle.shtml#register> for information on how to obtain a new Oracle account or how to renew your existing Oracle account. You can also access these web sites from our course web site.

4.5 Class Participation

The instructor highly recommends a regular class attendance. The instructor would also like to point out that he highly advocates punctuality for the lectures.

4.6 Late Policy

All homework must be turned in at the beginning of the lecture on the day it is due. A student must in person put the homework submission on the desk of the classroom before the beginning of the lecture. Homework turned in after the deadline but less than 24 hours late will be accepted but penalized 15%; homework turned in more than 24 hours but less than 48 hours late will be penalized 30%. No homework will be accepted more than 48 hours late. Homework may *not* be submitted electronically. This late policy will be strictly enforced.

In some cases, it can happen that the late policy rule is invalidated. The reason is that shortly before an exam we aim to post the homework solutions immediately after the homework submissions in order to enable you to use the homework solutions as a preparation for this exam. However, we cannot post the solutions if we have not received your submissions.

4.7 Grading

During the semester the student can only earn *points* and *not* grades. At the end of the semester the weighted sum of all points is mapped to a grade. The weighting is as follows:

Exam		Project		Homework	
Exam 1	15%	Project Deliverable 1	4%	Homework 1	6%
Exam 2	15%	Project Deliverable 2	4%	Homework 2	6%
Exam 3	15%	Project Deliverable 3	1%	Homework 3	6%
		Project Software	16%	Homework 4	6%
				Homework 5	6%

The maximum number of points that can be achieved in an exam, a project deliverable, the project software, and a homework assignment is 100 points.

The student's performance p will be calculated according to the following formula:

$$p = 15 \cdot \sum_{i=1}^3 ex_i^r / ex_i + 4 \cdot \sum_{i=1}^2 pd_i^r / pd_i + 1 \cdot pd_3^r / pd_3 + 16 \cdot (ps^r / ps) + 6 \cdot \sum_{i=1}^5 hw_i^r / hw_i$$

where the variables have the following meaning:

- p student's performance in percent
- ex_i maximum number of points for exam i (usually 100 points)
- ex_i^r received number of points for exam i
- pd_i maximum number of points for project deliverable i (usually 100 points)
- pd_i^r received number of points for project deliverable i
- ps maximum number of points for the project software (usually 100 points)
- ps^r received number of points for the project software
- hw_i maximum number of points for homework i (usually 100 points)
- hw_i^r received number of points for homework i

Point assessments (gradings) will be changed only when an assessment error has been made; *negotiation is impossible*. If a student thinks an error has been made, the student should let the instructor or the TAs know about their doubt. The entire exam or assignment will then be reevaluated. *A student must submit an item for reevaluation within 5 days from when the evaluation of that item was completed or posted.* Based on the student's performance, the following grading policy will be applied:

Student's Performance in %	Grade
>94-100	A
>88-94	A-
>82-88	B+
>76-82	B
>70-76	B-
>64-70	C+
>58-64	C
>52-58	C-
>46-52	D+
>40-46	D
>34-40	D-
0-34	E

A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C-average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: <http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html>.

5 Other Important Issues

5.1 Academic Honesty

Students are required to respect the ethical standards for academic honesty established by the Office for Student Judicial Affairs. The University of Florida student body voted in Fall 1995 to approve the following *Student Honor Code*:

We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

Work submitted must be produced individually by each student, except for tasks explicitly assigned to a group by the instructor. All work submitted individually in the form of exams, homework, presentations, reports, software projects, etc., is subject to the following implicitly or explicitly **required** pledge:

On my honor, I have neither given nor received unauthorized aid in doing this assignment.

Violations of academic honesty and integrity in this course will not be tolerated. The instructor will deal strictly with any violations. Since ethical behavior in science and engineering is equal in importance to specific knowledge, the instructor will assign a non-passing letter grade to students who violate academic honesty standards, regardless of the violator's grade performance in exams, homework, quizzes, and other assignments. Official sanctions issued by the Office of Student Judicial Affairs **will become permanently noted in the student's official transcript**.

The instructor's advice to the student is: immerse yourself in the class, learn the material, do your tasks (homework, presentation, report, implementation, etc.) yourself. The benefit and enjoyment you will receive as a result of hard work will be much more valuable than any penalty you might receive as a result of cheating.

5.2 Class Rules

For this class several rules hold which should be observed by the student:

1. If a student should have a problem that could have a negative influence on the student's class performance like sickness or project group conflicts, the student should talk to the instructor on time before it is too late in order to find a solution.
2. The instructor attaches great importance to punctuality. Hence, each student should come in time to the class.

3. Class-relevant announcements are made exclusively in the class. If a student is unable to attend a class, s/he should ask a fellow student or pass the instructor's office during the office hours regarding announcements in the previous class.
4. The homework assignments have to be performed individually. Teamwork is not allowed. The time period for working on a homework assignment is fixed. There are only exceptions from this rule, if they can be documented by some kind of official paper.
5. On the first page of a homework, a student should put his/her course number "OP 5725", name, and email address. If a student needs more than one sheet of paper, all sheets should be stapled in the left upper corner. The readability of the homework assignments is inevitable.

5.3 Students with Disabilities

Students requesting classroom accommodation must first register with the Dean of Students Office at the beginning of the semester. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation.

5.4 Where to Get Class-Related Information

The latest class-related information is given at the beginning of each class when announcements are made. Some information related to this class will be provided on the course web site. This especially relates to the slides of the different lectures. The home page for the course is located at

http://www.cise.ufl.edu/~mschneid/Teaching/CIS4301_Spring2011/CIS4301_Spring2011.html

5.5 Final Advice

The students who get the most out of this class will be the ones who put in the most effort. If you want to do well, come to all the lectures, read the assigned sections of the textbook before coming to class, and start early on your homework and software project. If you are having difficulty, you owe it to yourself to get help. The instructor and the teaching assistants sincerely want all of you to do well. If you work hard and master the material presented in this class, you will learn some powerful, fundamental concepts of database management systems as well as application development skills, which are very marketable in today's high-tech industry. The instructor will try his best to make the course as interesting and stimulating as possible and an enriching experience for you.

Markus Schneider