

The University of Illinois at Chicago

College of Business Administration

Information and Decision Sciences Dept.

IDS521: Advanced Database Systems

A Mixed-Mode Course: about 2/3 meetings in class, 1/3 meetings on-line

Fall 2006: 1800 to 2030, Tuesdays, BH208, Call#: 14091

Prof. Aris M. Ouksel, UH2411, <mailto:aris@uic.edu>, <http://www.uic.edu/~aris>,

Office Hours: 1600 to 1800 on Tuesdays or by appointments or through Blackboard CourseInfo

Course description: Management of large, complex databases involves technical skills and background needed by information systems professionals as well as tactical and strategic issues faced by information technology managers. This course provides conceptual knowledge, practical skills, and policy background for prospective information systems professionals and information technology managers. The course reviews some material from a prerequisite courses in databases and then covers conceptual and product material about database integrity, index structures, query optimization, transaction management, data warehouses, object databases, and distributed databases.

Textbooks: The conceptual material for the course comes from the second edition of Michel Mannino's textbook, *Database Design, Application Development, and Administration*, Third Edition, McGraw Hill 2007. IDS521 reviews selected chapters from Parts 1, 2, 3, and uses mainly selected chapters from Parts 4, 5, 6 and 7. These latter chapters provide a conceptual understanding of database administration, physical database design, stored procedures and triggers, query optimization, transaction management, data warehouses, distributed databases, and object-relational databases. In addition, additional class materials will be distributed through Blackboard covering issues not addressed in the book such as XML. The third edition chapters provide extensive coverage of Oracle 10g and SQL 2003 to augment the conceptual material.

Oracle 10g material: You can purchase a trade book about Oracle (9i or 10g) or use the online material available at the Oracle Technology Network (<http://www.oracle.com/technology>). I recommend online documentation although you may prefer to purchase a book. Note that you must register to use the Oracle site, but registration is free. In the Oracle 10g documentation main page, select View Library to see a list of the major documentation books. The list of frequently used Oracle 10g books can be directly found at http://otn.oracle.com/pls/db10g/portal.portal_demo3?selected=1. Of particular interest are the following books:

- Administrator's Guide
- Application Developer's Guide - Fundamentals
- Application Developer's Guide – Object Relational Features (use the search button)
- Concepts
- Data Warehousing Guide (use the search button)
- Performance Tuning Guide
- PL/SQL User's Guide and Reference
- SQL Reference

Other Material: In addition to the textbook and Oracle material, other material for the course

is available in the course website. For the benchmark material, you can download selected chapters from the Benchmark Handbook (<http://www.benchmarkresources.com/handbook/>) used in the second half of the course without any cost.

References:

1. A. Silberschatz, H. F. Korth, and S. Sudarshan, ‘Database System Concepts’ McGrawHill, Fifth Edition, 2006
2. R. Elmasri and S.B. Navathe “Fundamentals of Database Systems”, Addison Wesley, Fifth Edition, 2000H.
3. R. Sunderraman, "ORACLE9i Programming: A Primer", Addison Wesley, 2004
4. C. J. Date, "An Introduction to Database Systems", Addison Wesley, Seventh Edition, 2000

You are expected to bring your textbook to class, particularly during problem sessions.

Goals: This course is designed to review with graduate students the fundamentals, design, and implementation of database processing, to introduce advanced database design theory and methodology, object-oriented and extended relational database technology, system implementation techniques, advanced database concepts and emerging applications.

Expectations: You should expect to learn about the following issues: (not necessarily in the order given)

- Data Modeling, Logical Database Design and the Relational Model
- Introduction to file structures and indexing.
- SQL: Interactive, static and dynamic embedded, JDBC, ODBC)
- Object-Oriented and Extended Relational Database Technology
- Database Design Theory and Methodology
- System Implementation Techniques (Query Optimization, Transaction Processing concepts, Concurrency Control and Recovery Techniques, Security, etc...)
- XML and Web Data; Legacy Systems
- Client/Server Databases (ASP, CGI, ...), Middleware, Multi-tiered Architectures
- Data Warehousing
- Web Services and Business Intelligence

Prerequisites: IDS410 or meet the instructor to discuss the content of IDS505 or IDS510 if taken previously. Note that a strong programming background is required (programming is already a prerequisite to IDS410). Students who do not have the prerequisites will be dropped at any time during the semester (No exception).

Study Groups: The students will work in teams of exactly 4 students (if more than 20 students in class) and no less than 3 students (if less than 20 students). **Groups must be formed by THE END OF THE SECOND WEEK (see schedule). Failure to do so will result in your being assigned randomly to a group with no recourse. NOTE: You will not be able to change groups during the semester, except in “very” extraordinary circumstances (dislike of partners or failure to arrange schedules are not a strong reason: use Blackboard to arrange virtual meetings). It is therefore incumbent upon you to select your teammates carefully. Please do spend some time with your classmates starting at the first class to find compatible teammates.** At the end of the semester, each member of a team will also be asked to evaluate the participation of their partners

in the project, and submit a report through e-mail to the instructor. A number of points (which may result in one or two letter downgrade) will be subtracted from the overall assignment and/or project grade for those students who were deemed insufficiently active by their partners. The study groups will work together on the course material, the assignments, and the project.

- **Course material:** This is a mixed-mode course, which means in this particular case about 2/3 of the class will be conducted as usual, i.e., face-to-face classroom meetings, and 1/3 on-line. Each student will be studying the course material assigned for a given week either online or presented in class, first on their own, and then in communication with their group members either face-to-face if it is convenient, or through the discussion forum, which will be available through CourseInfo. During this process, the students are encouraged to ask questions from each other to enhance the comprehension of the material. In the event the members of each group are unable to answer these questions, **each group** must collectively formulate these questions as precisely as possible and post them in the discussion board for all the students to see. All students are welcome to answer these questions. The TA and I (the instructor) will be monitoring the discussion board twice a week, and will respond only to unanswered questions, and will monitor participation. **NOTE: The questions must be well-written, formulated thoroughly and precisely, and must not be repeated (the students must consult the whole thread of already posed questions). General questions and questions that do not conform to the above criteria will not be answered. NOTE: 4 TESTS QUIZ WILL BE GIVEN DURING THE SEMESTER AND WILL INCLUDE COVERAGE OF THE MATERIAL ASSIGNED FOR ONLINE SESSIONS.**

- **Assignments:** The same approach as for the course material applies, except that questions are now only shared within groups and not between groups. Again, I or the TA will monitor each group to answer questions when necessary. The questions posed must still satisfy the criteria enunciated above, **AND PARTICIPATION WILL BE EVALUATED.**

- **Project:** The same approach as for assignments applies.

Office Hour and Online Time Periods: Office hours will be from 4pm to 6pm every Tuesday. Additionally, during the online class periods, I will also be in my office to have either face-to-face meetings (if convenient for students) or to answer online questions. For those students who prefer face-to-face meetings, but cannot meet with me during office hours because of work schedule constraints, I will be able to meet you immediately after the class period, or make appointments.

Grading: Assignments are graded on a 100 pts basis. The points will be distributed as follows:

TESTS	Percentage of total	Dates
Test I	10	09/19
Test II	10	10/10
Test III	15	11/07
Test IV	10	11/21

(Note: the problems for the tests will be very similar to those at the end of the textbook's chapters covered.. There are several problems whose solutions are available on the web site. Some of these problems will be discussed in class; others are your responsibility)

PROJECT **Begins** **Ends**

. Phase I Report	10	9/12	10/07
. Phase II Report	10	10/08	11/04
. Phase III Report	05	11/05	12/01
• Presentation	10	11/28	11/28

Students will be required to hand in their reports before midnight on the due date through Course Info Digital Box following the schedule given above. **Late reports will not be accepted and a grade 0 will be assigned for each late report. It is your responsibility to make sure that your assignment is properly uploaded. Submissions by email to the instructor or the TA will not be accepted.** A separate document will provide the details about the specific project, the assumptions, the requirements, and the expectations on each of the reports. The presentations will affect the individual grade of phase III. Each member of a group will also be asked to evaluate the participation of their partners in the project, and submit a report through e-mail to the instructor at the end of the semester.

It is your responsibility to practice and learn SQL/PSM and Javascript. If a TA is assigned, communication with the TA will be done through CourseInfo at times designated by the TA and at specific weekly office hours. You are encouraged to use the discussion forum available in CourseInfo for questions. The TA will broadcast info about this later. I (instructor) will answer questions about the design, and not programming questions.

I will be proposing a list of projects, from which each group must select one on first-come-first-serve basis. Alternatively, groups may suggest their own project. This is particularly encouraged if the project can be done externally at an enterprise where the students are currently working.

ASSIGNMENTS

The assignments for this class are intensive and very time-consuming. In fact, each of the assignment is a akin to a project. It is therefore important that you start early your work on the assignments.

LATE ASSIGNMENTS WILL NOT BE ACCEPTED. NO EXCUSES WILL BE ACCEPTABLE.

. Assignment I	10	09/12	09/30
. Assignment II	10	09/30	10/14
. Assignment III	10	10/14	11/04
. Assignment IV	10	11/04	11/25

Additional practice problems are also assigned. Consult the assignment directory in IDS521 courseinfo for the practice problems according to the same schedule as above. Note these problems are not graded.

Advanced Students: This class is made of two groups of students: those who have limited knowledge of databases and/or programming; and those who have taken databases in the past

and/or who have had extensive experience in database. It is important that you spend enough time finding the right group for yourself.

Grading Policy: Students who wish to appeal a grade must do so **within one week** after the evaluation is returned. There will be **NO** exception. The final grades will be awarded using a curve. However, I will exercise my judgment as to the cut points. In particular, no “A” will be given below a total of 85pts, no “B” below 70pts, no “C” below 55 pts, and no “D” below 40pts.

Attendance: You are responsible for any material covered in the lectures and reading material. Because class participation is an important part of your learning experience, attendance is strongly suggested. Attendance is required for all the tests.

Makeups: No makeup exam will be given unless the student provides a good, verifiable reason for being unable to attend the exam. Note that I will be very intransigent in this matter and will make sure that the reason provided is indeed verified.

Incomplete grades: Incomplete grades will be given only if a student has completed most of the course work, e.g., 80%, and has a good, verifiable reason for not completing the remainder. Students who miss large parts of a course for good reason and must make up a great deal of the course should drop and start over.

Two-week drop rule: All courses in the College of Business Administration are subject to the “two week drop” rule. After two weeks a student may drop a course only by petition, and such petitions are approved only in extenuating circumstances. This applies to all students, even if they are enrolled in LAS or any other college.

Academic dishonesty: The following activities will be considered academic dishonesty:

- Copying the work of current and past IDS521 students
- Working collaboratively on individual assignments or across groups except to provide debugging or assistance with the underlying concepts.
- Posting assignment solutions (total or partial) in threaded discussions or email messages.
- Using material from other sources (websites, books, articles ...) without crediting the source.

Tentative list of topics and schedule (for planning purposes only): Material covered follows the presentation in the book. Note that there may changes in the schedule. Depending on the level of comprehension of concepts, some topics may require additional presentation time. As a result some of the later topics may be truncated or omitted. Students are responsible for material actually covered in class.

- The material presented in class is in large measure from the book. However, the emphasis as well as the sequence of this material will at times differ significantly from the book. Because of that, I urge you all to attend all classes and expect you to take notes in class. Office hours are not meant for individual lectures for your missed class. Should you miss the class, it is your responsibility to obtain materials from a fellow student.
- Note that the list of topics is tentative. There may be changes during the semester. Should this be the case, the specific changes will be announced through CourseInfo.
- All project and relevant course material will be posted through CourseInfo. Announcements of changes in the program will also be broadcast through CourseInfo. I urge all students to log in regularly.
- Groups can take advantage of the facilities provided by CourseInfo to establish communication between the members.

Week	Dates	Materials Covered	Readings	Location
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1.	08/29	Course presentation, Organization and Review : Introduction to Databases and Data Development Relational Data Model	Txt: 1,2.1 to 2.3, 3, SQL(16), CO(21)C	BH208
2.	09/05	Query Formulation with SQL, Entity Relationship Model Problem Session, (NB: DISCUSSION OF TEAM FORMATION. THE LIST OF GROUP MEMBERS MUST BE E-MAILED AT THE END OF THE TWO-WEEK REGISTRATION WEEK TO THE TA)	Txt: 4,5,6	BH208
3.	09/12	Relational Database Design, Advanced SQL Project Out. ASS#1 out	Txt: 6,7	Online
4.	09/19	TEST # 1 (1,2,3,4,5,6) Relational Database Design, Advanced SQL Problem Session to be continued online, Oracle accounts.	Txt: 7,9	BH208
5.	09/26 09/30	Application Development with views Stored Procedures and Triggers Problem Session to be continued online ASS#1 due, ASS#2 out.	Txt: 10, 11.1, 11.2,11.3, SQL(16),CO(21) PL/SQL(1,4)	BH208
6.	10/03 10/07	Relational Design, Advanced SQL, App. Dev. With views, Stored Procedures and Triggers PHASE I Report due.	Txt: 7,9,10,11	Online
7.	10/10 10/14	TEST #2 (7, 9,10,11) Data Warehouse Overview, Relational Data Representation, GROUP BY extensions, Materialized Views and Query Rewriting Problem Session ASS#2 due, ASS#3, out	Txt: 16, DW	BH208
8.	10/17 10/19	Data Warehouse, Data Warehouse Refresh, Object-Oriented Database, Object-Oriented Features in Oracle and SQL: 1999, Temporal Databases??? Problem Session, Final day to select topics for presentation	Txt: 16,18 ADGO (2)	BH208
9.	10/24	Physical Data Organization, File Structures	Txt: 8.1, 8.2 ADM(14), CO(2)	Online
10.	10/31 11/04	Index Matching, Bitmap Indexes, Query Optimization ASS#3 due, ASS#4 out PHASE II Report due	Txt: 8.3, 8.4 CO(5), PTG(12,14,16) ADM(15)	BH208
11.	11/07	TEST#3 (8,11,16,18) Transaction Processing Problem session	Txt: 15 CO(4,13,15) PTG(17),ADM(32)	BH208
12.	11/14	XML	Material Provided	Online
13.	11/21 11/25	XML , Client-Server Processing, Parallel Processing, Distributed Databases ASS#4 due	Txt: 17 up to 17.6.1	BH208
14.	11/21	TEST#4: (8,15,17) Discussion of Presentations:		BH208
15.	11/28	Presentations: Best Projects will be selected for presentation to the IDS dept (a bonus as high as 5 points may be added to the overall grade)	Txt: 26, 27, ADM(31)	BH208
16.	12/05	PHASE III Report due.	Finals Week	Online

ADGF: Application Developer's Guide—Fundamentals, ADM: Administration Guide, ADGO: Application Developer's Guide – Object Relational Features, CO: Concepts, DW: Data Warehousing Guide, PL/SQL: PL/SQL User's Guide and Reference, PTG: Database Performance Tuning Guide.