22C:244 – Advanced Database Systems
Fall 2002

Instructor:	**Dr. Ramon Lawrence**
Class Schedule:	2:30 – 3:45 p.m. Tuesday/Thursday
Location:	114 MacLean Hall
Office Hours:	201L MacLean Hall - 1:00 – 2:30 Tuesday/Thursday or by appointment
Phone:	335-0561
E-mail:	ramon-lawrence@uiowa.edu (preferred contact method)
Course URL:	http://www.cs.uiowa.edu/~rlawrenc/teaching/244/

Course Description

Expands on 22C:144 to cover advanced database implementation and design topics including file organizations, storage management, database system architectures, query optimization, transaction management, recovery, and concurrency control. Additional topics including distributed databases, mobile databases, and integration may also be covered. A major component of the course is a database implementation project using current database languages and systems.

Prerequisite

- 21:124/22C:144 Database Management Systems is recommended but not required

Marking and Evaluation

Homework Assignments		**10 %**
Midterm Exam		**20 %**
Final Exam		**40 %**
Programming Project		**30 %**
Proposal	5 %	
Presentation	5 %	
Final Program	20 %	

This course will use +/- grading. No late projects will be accepted.

Textbooks and Reference Material

- A. Silberschatz, H.F. Korth and S. Sudarshan, *Database Systems Concepts*, McGraw-Hill, 3rd edition, 1997, ISBN: 0-07-044756-X or 4th edition, 2001, ISBN: 0-07-228363-7.
- R. Elmasri and S. Navathe, *Fundamentals of Database Systems (3rd edition)*, Addison-Wesley, 2000, ISBN: 0-8053-1755-4.
- The textbooks are **optional**, although it is recommended you acquire one for reference.

Expectations

- I expect students to attend **all** classes and prepare before attending class. This includes reading relevant sections of the textbook (if available) and reviewing notes from previous lectures.
- I expect all students to learn the material in the course and undertake sufficient effort to produce advanced projects associated with a class of this level.
- I want all students to enjoy attending class and feel free to participate according to their own personalities. The discussions are typically informal, so you may raise your hand to participate in a conversation or simply speak out at appropriate moments.
- **I want all students to pass the course, receive a good grade, and feel the course was beneficial.**

Students with Disabilities

I would like to hear from anyone who has a disability which may require some modification of seating, testing, or other class requirements so that appropriate arrangements can be made. Please see me after class or during my office hours.

Grievances and Complaints Procedures

If you have any grievance or complaint about course direction, your treatment during class, your assigned marks, or any other problem, please first talk to your professor about the situation. I am very approachable and will work hard to ensure the course is enjoyable for you.
If there is a situation that cannot be resolved in this manner, please contact the Chair of the Department of Computer Science, Professor Jim Cremer, at 14D MacLean Hall, 335-0736.

Academic Dishonesty

A student must submit original work of his or her own construction. Academic dishonesty in the form of copying assignments, projects, or exams from other students or sources is not permitted. If you have any questions about what constitutes academic dishonesty, please contact your professor or consult the printed policy in the *Schedule of Courses* and the *CLAS Bulletin*.

Course Outline

The course is structured as a lecture. However, this timeline is not absolute. The professor is not bound to the topics, timelines, and outline provided as they serve only as a general reference.

Date	Topics Covered and Description
August 27 (T)	**First day of classes. Introduction to course, discuss syllabus, motivation**
August 29 (Th)	Storage issues I: disk technology, RAID, buffering
September 3 (T)	Storage issues II: record types (fixed vs. variable), organization, and placement
September 5 (Th)	Storage issues III: file operations (retrieval and update), hashing
September 10 (T)	Indexing I: motivation, definition, and applications
September 12 (Th)	Indexing II: B and B+-Trees
September 17 (T)	Indexing III: indexing multimedia, spatial, and temporal data
September 19 (Th)	Query processing I: basic steps, translating SQL to relational algebra, query plans
September 24 (T)	Query processing II: algorithms for implementing the select operation **Project Proposals due**
September 26 (Th)	Query processing III: algorithms for implementing the join operation
October 1 (T)	Query processing IV: cost-based query optimization
October 3 (Th)	Query processing V: heuristic query optimization
October 8 (T)	Transaction processing I: overview, transaction states, ACID properties, schedules
October 10 (Th)	Transaction processing II: serializable and recoverable schedules
October 15 (T)	**Mid-Term Exam**
October 17 (Th)	Transaction processing III: view serializability
October 22 (T)	Concurrency control I: overview, locks, two-phase locking (2PL)
October 24 (Th)	Concurrency control II: multi-granularity locking, deadlock and starvation, timestamps and validation protocols
October 29 (T)	**No class.**
October 31 (Th)	**No class.**
November 5 (T)	Recovery: database recovery techniques, checkpoints
November 7 (Th)	Database security: SQL security, data encryption
November 12 (T)	Introduction to Distributed and Multidatabases
November 14 (Th)	Introduction to Mobile Databases
November 19 (T)	Introduction to Data Warehouses
November 21 (Th)	Emerging database application areas: bioinformatics, simulations, medical
November 26 (T)	**No classes for Thanksgiving.**
November 28 (Th)	**No classes for Thanksgiving.**
December 3 (T)	Project presentations.
December 5 (Th)	Project presentations.
December 10 (T)	Project presentations.
December 12 (Th)	**Final programming project due. Review for final exam.**
December 17 (T)	**Final Exam. Tuesday, December 17th 7:30 a.m.**