Instructor: Antonio Miranda
Hill 363
Phone 57477
email: antonio.miranda@cs.rutgers.edu
Office hours: Tuesdays 10am-11am, Fridays 11am-12pm

Course Goals: This course will consider various languages for representing and accessing the different kinds of information, methodologies for using them, *theoretical principles* underlying them, and some fundamental algorithms. However, in contrast to standard database courses, we will be very skimpy on implementation aspects of DBMS, such as data storage, and transaction processing, which are covered in 198:437.

Text: *Database Management Systems* by R. Ramakrishnan and M. Gehrke, 3rd edition, McGraw-Hill.

Students are responsible for knowing all the material (a lot) that will be covered in class and is NOT in the book.

Other useful books:

- *A First Course in Databases* by J. Ullman and J. Widom
- *Database Systems: concepts, languages, and architectures* by P. Atzeni, S. Ceri, S. Praboschi, R. Torlone
- *Fundamentals of Database Systems* by R. Elmasri and S. Navathe

Class Policy:

- Attendance. Attendance is required. The instructor assumes that all students have knowledge of every announcement made during class time as well as all material covered in class.
- Exams. The exams will include material from:
  - lectures
  - homeworks
  - project
  - class participation

  The only acceptable reason for not attending an exam is a major (documented) medical emergency. NO make-ups will be given in any other case.

  A list of specific topics will be posted before each exam, to help you prepare.

- Class participation. During most lectures and recitations you will be given a short list of exercises to be completed by working in teams (of at most 3 students each). These exercises will be counted as *class participation*. There is NO make-up for class participation but the lowest one will be dropped.
- Homeworks. Homeworks will be posted on Sakai. Late homeworks (less than 3 days) will still be accepted but with a 30% penalty even if they are 1 minute late. After 3 days late homeworks will **NOT** be accepted. Partially completed homeworks will receive partial credit.
- Project. The programming project will be graded principally on functionality. In order to pass the course, a working programming project must be completed and handed in. Individual contributions to the project will be measured and taken into account, the instructor may request an oral examination to further evaluate a student's understanding of the material involved and the way in which the program works. The only communication between teams should concern very general topics such as how to log in, how to install software and the like. Reusing software written by others or for other courses/projects is prohibited, unless approved by the instructor.
- Regrading. To report possible grading errors, attach a page describing the alleged error to the corresponding exam, homework, or project and submit it to the instructor or TA no later than one week after the date when the test, homework or project was returned graded. An answer to a grade appeal may not be available until the end of the semester, so make copies of the materials given back for review. One week after the exam, homework or project was returned graded to the class, the grade becomes permanent and cannot be changed. The grade of the final exam becomes permanent one week after it is posted on Sakai.
- Grading.

Homeworks	20%
Programming Project	25%
2 Midterm exams	30%
Final exam	15%
Class participation	10%

The grade assigned as final grade cannot be changed, even by doing additional work. In order to be fair to all students, any option to improve grades (if any) will be given to every student, NOT just to one particular student.

Course Outline:

Lecture	Book Chapters	**Topics**
1	1.1-1.8	Database Management Systems
2	2.1-2.2	Conceptual Modeling
3	2.3-2.4.2	Entity Relationship Diagram basics
4	2.4.3-2.4.5	Weak entities, classes, aggregation
5	2.5	n-ary relationships and reification
6	3.1-3.2	Relational Model
7	3.2-3.4	Integrity constraints
8	3.5.1-3.5.4	From E/R to Relations
9	3.5.5-3.5.6	Translating weak and class entities
10	3.5.7-3.5.8	Merge rule
11		Midterm exam 1
12	5.1-5.3	SQL basics
13	5.3-5.4	Set operations and subqueries
14	5.5	Aggregate operators
15	5.6	Joins and advanced queries
16	5.7-5.9	Constraints, assertions, and triggers
17		Advanced SQL examples
18	4.1-4.2	Relational Algebra
19		Queries in Relational Algebra
20		Midterm exam 2
21	19.1-19.2	Functional dependencies
22	19.3-19.4	Closures and keys
23	19.4-19.5	Lossless decompositions and Normal forms
24	19.6	BCNF and 3NF decomposition
25	16.1-16.3	Transactions and ACID properties
26	16.4-16.6	Locks and isolation levels in SQL
27	24.1-24.3	Deductive databases (datalog)
28	27.6-27.8	Introduction to XML

Adjustments to this schedule, as well as to the order of the topics will be made as necessary.

Important Dates:

Exam 1	February 26, 2020
Exam 2	April 6, 2020
Final	TBD