CS464/564: Introduction to Database Management  
Spring 2019

Instructor:  
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Office: Farris Engineering Center 2040. Phone: 277-3052  
Office hours: TBD, by email, and by appointment.

Teaching Assistant:  
Md Parvez Mollah (email: parvez@unm.edu)  
Office Hours: TBD  
where?

Class meets:  
Lectures: Tuesday and Thursday 4:30 - 5:45 pm,  
Dane Smith Hall 141 (room will be changed)

1 Course Description

Many applications need to handle a significant amount of data or complex data. This need started  
in the early sixties (1960s!) and is even more prevalent today. Computer Science has responded  
to this need by developing a sub-discipline called Databases. Business applications were the first  
to demand features and services from commercial database management systems (DBMS). In the  
early nineties a broader set of applications discovered the usefulness of using a DBMS. Growing  
needs of the business community and more complex semantics and data volumes handled by diverse  
users have made the discipline evolve into different directions.

This course is an introduction to Database Systems at the senior level. It provides a broad  
description of the Database discipline. It starts by talking about data semantics, data models,  
and the notion of specifying the data required by an application through a database schema. The  
course presents the Entity-Relationship (ER) model to structure the semantics of the data from  
a specific domain. It then covers how to implement databases by describing how to translate an  
ER model into a relational schema. Once structured in a database, these data can be queried by  
high-level interrogation languages, of which SQL has been the most widely spread. The software  
to manage a database has become as complex as an operating system. The DBMS provides many  
valuable services to the administrators and users of the database.

According to the UNM catalog, this course provides an: “Introduction to database management  
systems. Emphasis is on the relational data model. Topics covered include query languages,  
relational design theory, file structures and query optimization. Students will implement a database  
application using a nonprocedural query language interfaced with a host programming language.  
Prerequisite: 561.”
The class covers a wide range of introductory topics including but not limited to:

- Basic concepts: data, users, database, applications, the database approach. Data models, database architecture, data independence.
- The Entity-Relationship Model and some of its extensions.
- The Relational Model: relations, normalization theory, relational algebra, relational calculus.
- Database applications. The SQL query language.
- Database Management Systems (DBMS): underlying models and services
- Approaches to: Query optimization, Concurrency control and recovery.
- Most recent dbms paradigms.
- Relationship between Databases and Artificial Intelligence.

Because of the wide range of topics that will be covered, students will be expected to read ahead in the textbook (cited below), so that the class can move along at the necessary pace. In the last section of this document there is a tentative calendar with a distribution of the topics on the lecture days. The calendar is not final and it is subject to changes along the semester.

At the end of the term, the student should be able to:

- Understand and apply the database approach to different situations.
- List and describe the services provided by a Database Management System (DBMS).
- Use the acquired foundational background in database topics, to reason about and discuss/understand the information requirements of users that can be satisfied with a database.
- Demonstrate experience in modeling data using the ER model.
- Demonstrate experience in translating an ER schema into a relational schema.
- Demonstrate experience in writing queries in SQL.
- Enumerate and describe the different DBMS paradigms that coexist today.

2 Textbook

3 Evaluations

Grades will be determined through the following types of evaluations.

**Exams (35%)**: Midterm exam (15%): Thursday, March 7th (Week 8)
Final Exam (20%): May 7, 5:30 to 7:30 pm (cs464 students only)
Students registered for CS564
will have a final project instead of the final exam

**Projects (50%)**: approximately 3

**Assignments (15%)**: weekly of biweekly exercises (approximately 6)

**Grading**: The final grade will be calculated by weighing each exam and assignment score obtained by the student, according to the percentages described above. This numeric final grade (in a scale of 100) is converted into a letter final grade (A+,A,A-,B+,B, etc.). Since the conversion process (from number to letter) is left to the instructor to decide, the student should not compute their letter grade according to their own or other faculty’s conversion table. In particular, in this class we use the average and standard deviation to determine the range for each of the 4 letter grades.

4 UNM learn platform

For all announcements and submissions of assignments we will use UNM learn available with your Net ID at learn.unm.edu. When you register for this class your UNM id is automatically included in the course platform list and this will allow you access to all the course materials. There will be no other formal website for this class. Students should be up to date with the announcements and material published in this platform. All projects and assignments will be submitted through Learn. Communication with the instructor and the teaching assistant will be done via email, if the email is individual. But if the question or comment pertains to the whole group of students in the class, it should be done through the discussion board in Learn.

5 Course and UNM Policies

This section contains the most important policies students are expected to comply with.

5.1 Specific Course Policies

1. Communication with instructor and TA will always be respectful. The instructor requires that you use the email address soraya@cs.unm.edu and to get a timely response add CS464 or CS564 to the subject line, accordingly.
2. Assignments will be handed out and collected using UNM Learn; assignments should only be submitted through learn, not email or other means. If you are unable to submit assignments on Learn due to technical difficulties, please email me the submission on time and we will coordinate later submission through Learn once the technical difficulties are resolved.

3. Students are responsible for turning in assignments on time. Unexcused late assignments will only be accepted by prior arrangement with the instructor before the due date/time, with significant penalties determined by this instructor. Late assignments will be accepted without penalty only in the case of documented extraordinary circumstances that make prior arrangement impossible. If you know that you will be unable to make a turn-in date due to circumstances outside of your control (e.g. illness, death in the family, etc.), please make arrangements with me either in person, by email, or by phone as soon as possible for an extension.

4. No make-up or extra credit assignments or tests will be given. In general, the dates of the exams and the due dates for assignments will be announced well in advance. If you must miss a midterm, your final exam grade will count for that midterm grade as well.

5. Requests for regrades of assignments must be made within two weeks from when the assignment is returned. Assignments will not be regraded after that point.

6. Assignments and tests for which a regrade is sought will be regraded in their entirety. Therefore the new grade could be lower or higher than the original grade (before regrading).

7. This course falls under all UNM policies for last day to drop courses, as described at http://www.unm.edu/studentinfo.html and in the UNM Course Catalog. Please see the UNM academic calendar for course dates, the last day to drop courses without penalty, and for financial disenrollment dates.

8. Any requests to drop the class or change grade mode (e.g. audit, CR/NC) with instructor permission must be made on or before the last regular class/lab meeting. Such request made after this date will not be approved except in the case of documented, extraordinary circumstances.

5.2 Academic Honesty

The university policy on academic honesty is contained in the Pathfinder; you should review this policy if you are unfamiliar with it. Any academic dishonesty will result in an automatic F for the entire semester and will be referred to the UNM Dean of Students for further disciplinary action as they deem appropriate. There will be no second chances or extra warnings.

As a general rule, any work you hand in for this class must be your own original work. Do not, under any circumstances, share source code, writings, or assignments with your classmates without my explicit prior approval. Students can, however, verbally discuss assigned readings, written and lab assignments, and programming assignments outside of class, or using online mechanisms
(email, Piazza, etc) that are the general equivalent of verbal communication. For example, feel free
to describe verbally over email generally how you attacked a particular problem in a programming
assignment.

Any conversation or sharing of information that moves beyond simple verbal discussion and
begins discussing or sharing specifics of source code or mathematical operations, however, is poten-
tially a violation of academic honesty requirements. If you are unsure about whether or not you
can share a particular piece of information, please consult with Prof. Abad-Mota prior to sharing
it.

As examples, the following, are clearly not acceptable and will be considered cheating: copying
another person’s code; co-developing code with someone else; mailing your code to another person;
using the Internet (e.g. StackOverflow) to find a solution to the problem; making your files readable
so another person can copy them; reading another person’s files; using another person’s listing
(taken from the trash, for example); having another person write a portion of your code for you.

5.3 Copyright issues

All materials in this course fall under copyright laws and should not be downloaded, distributed,
or used by students for any purpose outside this course.

5.4 Title IX

Our classroom and our university should always be spaces of mutual respect, kindness, and support,
without fear of discrimination, harassment, or violence. Should you ever need assistance or have
concerns about incidents that violate this principle, please access the resources available to you
on campus, especially the LoboRESPECT Advocacy Center and the support services listed on its
website (http://loborespect.unm.edu/). Please note that, because UNM faculty, TAs, and GAs
are considered ”responsible employees” by the Department of Education, any disclosure of gender
discrimination (including sexual harassment, sexual misconduct, and sexual violence) made to a
faculty member, TA, or GA must be reported by that faculty member, TA, or GA to the university’s
Title IX coordinator. For more information on the campus policy regarding sexual misconduct,
please see: https://policy.unm.edu/university-policies/2000/2740.html.

5.5 ADA

In accordance with University Policy 2310 and the Americans with Disabilities Act (ADA), aca-
demic accommodations may be made for any student who notifies the instructor of the need for an
accommodation. It is imperative that you take the initiative to bring such needs to the instructor’s
attention, as I am not legally permitted to inquire. Students who may require assistance in emer-
gency evacuations should contact the instructor as to the most appropriate procedures to follow.
Contact Accessibility Resource Center at 277-3506 for additional information.
5.6 Citizenship and/or Immigration Status

All students are welcome in this class regardless of citizenship, residency, or immigration status. Your professor will respect your privacy if you choose to disclose your status. As for all students in the class, family emergency-related absences are normally excused with reasonable notice to the professor. UNM as an institution has made a core commitment to the success of all our students, including members of our undocumented community. The Administration's welcome is found on our website: http://undocumented.unm.edu/.
### Tentative Calendar for Spring 2019

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<th>Week</th>
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<th>Thursday</th>
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<tr>
<td>1</td>
<td>January</td>
<td><strong>15</strong> Introduction &amp; Basic Concepts #1&lt;br&gt;The Database Approach</td>
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<td>2</td>
<td>February</td>
<td><strong>22</strong> ER Model (2) #3</td>
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<td><strong>29</strong> Extended-ER Model (2) #5</td>
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<td><strong>5</strong> The Relational Model (2) #7</td>
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<td><strong>12</strong> Translation EER-Relational #9</td>
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<td><strong>19</strong> Relational Algebra(2) #11</td>
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<td><strong>26</strong> SQL(2) #13</td>
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<td>8</td>
<td>March</td>
<td><strong>5</strong> Relational Calculus #15</td>
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<td><strong>12</strong> Spring</td>
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<td><strong>19</strong> SQL(4) #16</td>
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<td><strong>26</strong> Normalization Theory (2) #18</td>
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<td>11</td>
<td>April</td>
<td><strong>2</strong> Normalization Theory (4) #20</td>
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<td><strong>9</strong> DBMS(2). Physical Design #22</td>
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<td><strong>16</strong> Transactions. Concurrency Control and Recovery (1) #24</td>
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<td><strong>23</strong> Most recent DBMS paradigms(1) #26</td>
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<td>April/May</td>
<td><strong>30</strong> Most recent DBMS paradigms(1) #28</td>
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<td>16</td>
<td>May</td>
<td><strong>7</strong> Final Exam: 5:30-7:30pm</td>
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