Instructor

Bruce A. Ernst

Phone: 646-4282
Email: bernst@nmsu.edu
Office Location: Computer Center Building, Room 143 D
Office Hours: Monday 10 AM – 1 PM
Tuesday 8 – 10 AM, 2 – 5 PM
Wednesday 8 AM – 1 PM
Thursday 8 AM – 1 PM, 2 – 5 PM
Check my calendar for availability within these hours. You are welcome to come by at any time, but it is best to call first to verify that I am available. My calendar is subject to database emergencies and impromptu meetings. Also, I recommend that you add half an hour to any busy times, in case a meeting runs long.

Course

Description

This course teaches database concepts with a focus on relational databases. This course covers concepts about building, managing, and using databases and includes extensive coverage of SQL (structured query language), the standard language of relational databases. The coverage of SQL will include DDL (data definition language), used to construct a database; DML (data manipulation language), used for basic and advanced queries; and embedded SQL, used in procedural programming languages. This course will also introduce database management concepts that deal with managing users and physical storage (DCL = data control language). Transaction processing, data warehouses and mining, and current topics will be covered. IS 350/540 with a grade of "C" or better is a prerequisite for this course.

Objectives

The student who completes this course should know:

1. The features of database management systems, such as Oracle and Microsoft SQL Server.
2. Relational database concepts, such as 1st, 2nd, and 3rd normal form, and referential integrity.
3. SQL, the standard language of relational databases; including variations in Oracle, and, if time permits, SQL Server.
4. Query formulation. How to read a data model and design a query.
5. How embedded SQL is used in a procedural language (PL/SQL) for data processing. An introduction to PL/SQL will be covered.
6. Basic DBA activities to manage a relational database, such as managing physical storage, creating databases, managing user accounts.
7. How online transaction processing enforces the properties of ACID (Atomicity, Consistency, Isolation, Durability).
8. The purpose of data warehouses and data mining.
9. Professional codes of ethics and ethical issues related to data.

Materials and Content

Text  
*Database: Design, Application Development, & Administration*, M. V. Mannino, McGraw-Hill Irwin. The most current edition is the 5th, but the 4th edition is also acceptable. The textbook uses two databases for which scripts will be available through Canvas. One database is the basis for chapter examples and the other is used for end-of-chapter problems.

If you buy an older edition, the sequence of a few chapters will be somewhat different but the content and examples remain pretty much the same. A copy of the text book is in the BC lab and available for use while you’re in the lab.  
(This book was paid for by a donation from one of our graduates.)

Canvas LMS  
http://learn.nmsu.edu
Assignment exercises will be assigned as individual work unless otherwise specified by the instructor. Students are expected to submit their own work. This is a senior-level course and most of you have worked together in previous classes so feel free to talk about assignment problems and help each other figure out solutions but don't copy/paste someone else's work and present it as your own. Submission of someone else's work as one's own will result in a zero for that assignment. See the section on scholastic dishonesty for further penalties.

The exercises provide hands-on practice that is essential to learning the material. Several databases besides the ones provided by the textbook will be used throughout the course. Many of the in-class and homework exercises will mirror examples given in the textbook or the problems listed at the end of the chapter but the exercises will often use different databases than those presented in the textbook. It is recommended that you type all the chapter examples to practice the SQL commands. One of the benefits of this textbook is that Mannino provides example SQL and example output. Typing the examples will help you understand how the SQL commands work. The only way to master this material is to practice writing SQL.

Individual exercises assigned to be done outside of class will be accepted late but there will be a 10% penalty for the first day late and 10% more for each day after that. Note: An assignment due at the beginning of class will have a 5% penalty if it is turned in at any time later that same day. Exercises assigned to be completed in class will not be accepted late.

**Topic Outline**

- **DBMS Tools**
  - **DBMS Overview.** The material we cover in this section provides an overview of the relational databases and the database management systems used to build and operate relational databases. In this module you will ...
    - get an overview of DBMSs.
    - review key concepts in the relational data model.
    - learn relational operators
    - learn DDL - a subset of SQL used to define and modify tables.

- **SQL Basics.** This section covers a lot of DML (data manipulation language) statements/commands in SQL. Once tables have been created and populated with data, the commands you learn here and the ones covered in the Advanced SQL module are the ones you'll use routinely to retrieve and modify data. Besides the textbook databases you'll work with many others. These are shown in the Data Models Module. In this module you will ...
    - Get an overview of SQL.
    - Retrieve data with the SELECT statement.
    - Set conditions for filtering data using the WHERE clause.
    - Retrieve data from multiple tables in one command.
    - Aggregate data to show groupings, totals, averages, etc.
    - Learn how to use the same table twice or more in a query by using table aliases.
    - Learn the traditional set operators.
    - View videos of SQL examples.

- **Normalization.** You already know a lot about data model concepts and terminology. In this section you'll learn some additional terms and concepts about normalizing the data. In this module you will ...
    - Learn about modification anomalies - unexpected and unintended results when data is modified. These anomalies can occur when the data is not normalized.
    - Learn the normal forms up to Boyce-Codd normal form.
    - Learn about denormalization -- situations where you may purposely denormalize data.

- **Advanced SQL.** Here you continue to extend your knowledge of SQL by learning about one-sided outer joins, subqueries and a few other aspects of using SQL. You will ...
    - Learn how to use one-sided outer joins.
    - Learn how to build Type I and Type II subqueries.
    - Learn a work-around to get results for the DIVISION relational operator (an operator not supported by Oracle and others).
    - Applications & SQL
    - Learn about views.
    - Learn how SQL is embedded in procedural or object-oriented programming languages.
    - Get an overview of PL/SQL, a procedural language, which is the native programming language in the Oracle DBMS.
    - Learn how transaction processing works in an on-line environment.

- **Database Administration.** Writing SQL for end users is quite a bit different than managing the database for security, reliability and efficiency. In this section you'll learn some of the tasks a database administrator performs. You will ...
    - Learn about storage--tablespaces and data files.
- Learn how to create user accounts and assign privileges, roles, and profiles.
- Learn about indexes and database links.

**Current Topics**. As time permits.

# Policy and Procedures

## Point Distribution and Grades

The points possible for this course will be approximately as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>22%</td>
<td>Exam 1</td>
</tr>
<tr>
<td>22%</td>
<td>Exam 2</td>
</tr>
<tr>
<td>22%</td>
<td>Final Exam</td>
</tr>
<tr>
<td>34%</td>
<td>Quizzes and in-class and homework exercises</td>
</tr>
</tbody>
</table>

Grades will be assigned as follows:

- **A**: 90% through 100%
- **B**: 80% through 89%
- **C**: 70% through 79%
- **D**: 60% through 69%
- **F**: Below 60%

## Scholastic Dishonesty

Scholastic dishonesty will not be tolerated. The penalty for dishonest behavior can range from receiving a zero for an assignment or exam to censure from the University (Please refer to the NMSU Student Handbook http://www.nmsu.edu/~vpsa/handbook.html).

## Attendance Policy

Attendance is important to doing well in this class (just ask students from previous semesters). However, I will not take attendance. Lecture, discussion, and assignments are an essential part of learning the concepts and skills in this course. If a student misses a class, it is up to the student to find out what was covered by talking to other students, getting someone's notes, and checking the class Canvas site. The student may get specific assignments from the instructor or ask the instructor specific questions after the student has reviewed the notes for the missed class.

## Class Procedures

The teaching method for this course will include lecture/discussion, in-class exercises, and homework exercises. All individual exercises are to be done by yourself. You're welcome to discuss exercises with other students but if you just copy/paste someone else's solution, you won't learn how to use SQL and you'll get a zero for the assignment.

## Online Procedures

Most of the course material will be available through the Canvas site for this class. There will be topic areas in either the Announcements or the Discussion section where you can post questions about course material and assignments. Please use this public areas rather than individual email so we can share questions and answers. **Please note:** If you have a question about an exam or assignment score because the score is missing in Canvas, please feel free to email me about the missing score. If you want to know why you got a particular score, i.e., what did you miss and why, please come see me in my office. I will not respond to emails that ask, "Why did I miss 5 points?" or "What did I do wrong on problem 6?" It takes too much time to review an exam or assignment and type out an explanation via email but we can look at it together in my office. Often it is clear to the student what the error is when we review it and sometimes the student is able to explain something about his/her answer which I believe justifies additional credit.

## Graduate Students

Graduate students will complete an extra module for this course to receive credit for BCIS 595. This module will be posted before mid-semester.

**Students with Disabilities**

If you have, or believe you have a disability, you may contact the Student Accessibility Services (SAS) Office located in Corbett Center, Room 244, 575-646-6840, or email sas@nmsu.edu. Appropriate accommodations may then be provided for you. All medical information will be treated confidentially. If you have a condition which may affect your ability to exit safely from the premises in an emergency during class, you are encouraged to discuss this in confidence with the instructor and/or the Director of University Disability Services/ADA Coordinator, Diana Quintana, at the SAS Office. Questions regarding the Americans with Disabilities Act (ADA) and/or the American with Disabilities Amendment Act should be directed to the SAS Office. Questions regarding NMSU's
Non-discrimination Policy and discrimination complaints should be referred to Gerard Nevarez, Office of Institutional Equity, 575-646-3635.