CIS 3730

Database Management Systems

Robinson College of Business
Georgia State University

**THE COURSE SYLLABUS PROVIDES A GENERAL PLAN FOR THE COURSE.
DEVIATIONS MAY BE NECESSARY**

*Pre-requisites***: CIS 2010; CSP: I, IV, VII** (see http://robinson.gsu.edu/rcbonline/csps.htm)

NOTE: Pre-requisites for CIS 3730 may not be waived.

Course Details

Course	CIS 3730: *Database Management Systems*
Semester	
Class Sessions	
Instructor	
Assistant	
Office Hours	

COURSE OVERVIEW

Course Objectives

The course, Database Management Systems, provides an introduction to the management of

database systems. The course emphasizes the understanding of the fundamentals of relational systems including data models, database architectures, and database manipulations. The course also provides an understanding of new developments and trends such as Internet database environment and data warehousing. The course uses a problem-based approach to learning.

Student Objectives

At the conclusion of the course, the student be able to:

- Understand terms related to database design and management
- Understand the objectives of data and information management
- Understand the database development process
- Understand the relational model and relational database management system
- Assess data and information requirements
- Construct conceptual data models
- Develop logical data models
- Evaluate the normality of a logical data model, and correct any anomalies
- Develop physical data models for relational database management systems
- Implement relational databases using a RDBMS
- Retrieve data using SQL
- Understand database performance issues
- Understand the basics of data management and administration
- Understand the basics of data warehousing
- Work as a valuable member of a database design and implementation team.

Required Resources
Book(s)

Required: Jeffrey A. Hoffer, Mary B. Prescott, and Fred R. McFadden. *Modern Database Management (8th Ed.).* Prentice-Hall, 2007.

Recommended: Any good book on Microsoft Access 2003 such as:
Roger Jennings: *Special Edition Using Microsoft Office Access 2003*, Que, 2004.
Alan Simpson, Margaret Levine Young, and Alison Barrows: *Access 2003 for DUMMIES*, Wiley Publishing, 2003.
Other: For those seeking a stronger technical treatment of database systems: Elmasri, R. and S. B. Navathe: *Fundamentals of Database Systems (5th Ed.)*, Addison Wesley, 2007.

Readings
Assigned from online resources

Tools

Access 2003, available from MSDNAA (see below)
SQL Server 2005, available from MDDNAA (see below)
Other tools, indicated with the topics

MSDNAA: The primary source of software that will be used in this course is the CIS department's MSDNAA (Microsoft Developer Network Academic Alliance) program (ELMS). The URL is: http://msdn.e-academy.com/gsu_cis/. You can go to the site as a "guest" to see what software is available. During the second week of the class, all the students registered for the course will receive emails on their GSU e-mail addresses (xx.student.gsu.edu) containing the password you can use for downloading the needed software. The id to be used is your complete GSU e-mail address. Questions pertaining to the GSU e-mail address should be directed to GSU IS&T (Tel. 404-651-4507, e-mail: help@gsu.edu) and questions regarding MSDNAA should be directed to MSDNAA_SUPPORT@cis.gsu.edu. If you do not have a fast internet connection then you should bring blank CDs to the GSU Computing Lab. and download the software in the lab.

Learning the use of software. GSU provides a good e-training opportunity to learn the use of software and other skills. You first need to create an account at www.gsu.edu/etraining. Training on **Access 2003**, **Microsoft SQL Server 2005** is available. You need to click on **check catalog** and then search for the desired software title.

COURSE ACTIVITIES

Learning Mechanisms

Participation

Attendance is a prerequisite, not a substitute for class participation. Participation mechanisms include:
- responding to questions asked in class
- initiating discussions on new points in class
- discussing cases and offering solutions to problems

Assignments

There will be four assignments which must be submitted. The due dates for the assignments are final and there will be no make-ups or individual extensions.

In addition to the hardcopies of assignments, electronic (and certifiably virus free) copies should be e-mailed to me on the date they are due. The subject of the e-mail should identify the course and the assignment. File names should clearly identify the course and the assignment.

Quizzes

There will be two closed-book quizzes each of 60-minute duration. The quizzes cannot be taken after the dates scheduled, except in the case of emergencies.

Team Project

Students will participate in one practical team project during the entire course. Groups will consist of nominally three to five students each. Each group will select the goal of the project with the approval of the instructor. It will involve the design and implementation of a real-world database, using the techniques learned in class. Please see the separately distributed **Project Guidelines** for details on the team project. The deliverables for the project should be submitted in hardcopy and also should be e-mailed following the guidelines provided above for assignments.

Wiki

Contributions to the course wiki is optional but strongly encouraged. The contributions should be brief and based on your synthesis, giving credits to any literature used. They should indicate the date and the name of the author.

Logistics

Deliverables

Key deliverables include the following (see course schedule for due dates)

- Assignments (individual)
- Team Project
    -- Project Proposal
    -- Weekly Progress Reports
    -- Preliminary Conceptual Model
    -- Final Project and Report
    -- Final Project presentation
- Wiki contributions (optional but strongly encouraged)

Assessment

Exams: 25 points

- Quiz 1 – 10 points
- Quiz 2 - 15 points

Assignments: 15 points

Team Project: 40 points

- Initial Project Plan - 5 points
- Weekly Progress Reports - 5 points
- Preliminary Conceptual Model - 5 points
- Final Team Project and Report - 20 points
- Final Project Presentation - 5 points

Class participation and discussions: 20 points

The final grade will be determined by computing your total weighted score out of 100, rounding off to the nearest integer value according to the following scale. A: 94 or above, A-: 90 to 93, B+: 87 to 89, B: 83 to 86; B-: 80 to 82; C+: 77 to 79; C: 73 to 76, etc.

COURSE MODULES AND LEARNING OBJECTIVES

MODULE 1: CONTEXT FOR DATABASE MANAGEMENT

Part 1.1: Database Environment

Student Learning Objectives:

1. Explain why database management is an exciting and growing field with ample job opportunities
2. Provide definitions of key terms and concepts that describe the database environment
3. Describe data models and how they are used to capture the nature and relationships among data
4. Identify the broad spectrum of applications and describe how business organizations are using database applications for competitive advantage
5. Describe the major components of the database environment and explain how these components interact with each other

Part 1.2: Database Development Process

Student Learning Objectives:

1. Provide a comprehensive overview of various concepts and issues in database management.
2. Provide a review of systems development methodologies, particularly the systems development lifecycle and prototyping; show how database development fits with these methodologies.
3. Describe how packaged data models can be used to shorten the development process and improve the quality of data models.
4. Describe the different roles involved in a database development team.

MODULE 2: DATABASE ANALYSIS

Part 2.1: Modeling Data

Student Learning Objectives:

1. Describe why understanding of organizational data is important. Argue why unambiguous representation of data in logical terms is needed for implementing a database that will effectively serve the needs of management.
2. Present the E-R model as a logical model that can be used to capture the structure and much, although not all, of the semantics (meaning) of data.
3. Apply E-R modeling to several practical examples.

Part 2.2: Enhanced E-R Model and Business Rules

Student Learning Objectives:

1. Describe the concept of supertype/subtype relationships and recognize when to use these relationships in data modeling.
2. Describe the use of specialization (top-down perspective) and generalization (bottom-up perspective) as complementary techniques for defining supertype/subtype relationships.
3. Use the notation for specifying both completeness constraints and disjointness constraints when modeling supertype/subtype relationships.
4. Describe the basic premises of a business rules paradigm and a simple framework for categorizing business rules.
5. Use the notation for modeling typical operational constraints that can be incorporated in an EER diagram.

MODULE 3: DATABASE DESIGN

Part 3.1: Logical Database Model and the Relational Model

Student Learning Objectives:

1. Describe the position of logical database design within the overall database development process.
2. Describe the relational model including the properties of relations, integrity constraints, and well-structured relations.
3. Describe the principles and detailed steps involved in mapping EER diagrams to relations.
4. Describe the principles of functional dependencies, determinants, and related concepts of normalization.
5. Describe why normalization is important to stable database design with the relational model and concisely describe the various normal forms and the normalization process.

6. Describe some of the anomalies that arise when merging relations and discuss how these anomalies can be addressed.

Part 3.2: Physical Database Design

Student Learning Objectives:

1. Argue why physical database design is a critical element in achieving overall database objectives, rather than as an afterthought.
2. Describe the factors that must be considered in distributing data effectively and how a simple model can be used to obtain at least a first-cut distribution.
3. What are indexes and what are the trade-offs that must be considered in their use.
4. Describe why denormalization must be used with great care and for specific reasons.

MODULE 4: DATABASE IMPLEMENTATION

Part 4.1: Introduction to SQL

Student Learning Objectives:

1. Describe SQL and summarize its basic operators.
2. Provide a historical perspective of the development of SQL and its continuing development.
3. Show that SQL, although standard and a high level language, does have some flaws, and that SQL must evolve to include additional features.
4. Explain and illustrate the power of relational views for simplifying relational database processing.
5. Illustrate data definition language (DDL) commands for creating tables and views as well as for modifying and dropping tables.
6. Formulate single table SQL queries.
7. Formulate SQL queries that use functions.
8. Show how to establish referential integrity using SQL.
9. Use of the *group by* and *order by* clauses in SQL queries.

Part 4.2: Advanced SQL

Student Learning Objectives:

1. Demonstrate SQL capabilities such as multiple-table data retrieval (join and other operators such as difference, union, and intersection), explicit and implicit joining, and built-in functions.
2. Illustrate the differences between the joining and subquery approaches to manipulating multiple tables in SQL.
3. Describe triggers and stored procedures and provide examples of how these might be used.

Part 4.3: Client/Server Database Environment

Student Learning Objectives:

1. Provide a comprehensive view of the possibilities of client/server computing and the advantages and disadvantages of different architectural structures.
2. Provide a framework for discussion of tiered architectures and the vocabulary that goes along with it.
3. Describe the conceptual underpinnings of connections to remote databases.

Part 4.4: Internet Database Environment

Student Learning Objectives:

1. Describe the importance of new and emerging technologies that will carry businesses forward in a constantly evolving environment.
2. Define the different constructs of the Internet and the Web-enabled database, and provide a comprehensive view of how they work together.
3. Describe how clients pull up remote applications and data.

Part 4.5: Data Warehousing

Student Learning Objectives:

1. Argue the fact that many organizations today are experiencing an information gap; they are drowning in data but starving for information.
2. Define data warehousing and describing characteristics of a data warehouse.
3. Describe major factors that drive the need for data warehousing as well as several advances in the field of information systems that have enabled data warehousing.
4. Contrast operational systems and information systems from the point of view of data management.
5. Describe the basic architectures that are most often used with data warehouses.
6. Contrast transient and periodic data, and discuss how data warehouses are used to build a historical record of an organization.
7. Discuss the purposes of populating a data warehouse and the problems of data reconciliation.
8. Contrast data warehouses and data marts.
9. Describe and illustrate the dimensional data model (or star schema) that is often used data warehouse design.

SCHEDULE

Meeting Times

Schedule of Classes

(tentative, subject to change)

Week	Date	Topic	Activities	Primary Reading
1.		Syllabus, Course Overview		
Module 1: Database Management Context				
2.		1.1 Database Environment	**Team**	Text: Ch. 1
3.		1.2 Database Development Proc		Text: Ch. 2
Module 2: Database Analysis				
4.		2.1 Database Modeling	**Team Project Proposal du**	Text: Ch. 3
5.		2.2 Enhanced ER Model	*Assignment[1] 1 assigne*	Text: Ch. 4
Module 3: Database Design				
6.		3.1 Relational Model and Logical Database Design	**Team Preliminary Project Conceptual Model due** **Assignment 1 due** *Assignments 2 and 3 assigned*	Text: Ch. 5
7.		3.2 Physical Database Design	**Assignments 2 and 3 due**	Text: Ch. 6
Module 4: Database Implementation				
8.		4.1 Introduction to SQL	**Quiz 1 (Ch.**	Text: Ch. 7
March 3: Last Day to Withdraw to possibly get W				
March 5: Spring Break				
9.		4.2 Advanced SQL	*Assignment 4 assigned*	Text: Ch. 8
10.		4.3 Client/Server Database Environment	**Assignment 4 due**	Text: Ch. 9
11.		4.4 Internet Database Environment		Text: Ch. 10
12.		4.5 Data Warehousing		Text: Ch. 11
13.		Course Wrap-Up	**Quiz 2 (Ch. 7-11)**	
14.		Project Work		
15.		Final Project Presentations	**Team Final Project and Report**	

[1] Assignments are to be completed individually

POLICIES

Course Policies

This course uses Problem Based Learning (PBL) and other novel methods to drive learning. The central theme of these pedagogies is to place a significant onus on YOU to take charge of your learning. YOU will drive your own learning. I will facilitate this by providing a number of resources, problems, questions and acting as a coach through the semester.

- You will need to prepare for the class sessions ahead of time by reading the materials provided, and working on questions and problems that are to be discussed in class - either individually or as part of a team.
- Class sessions will be interactive, though guided by the instructor with the help of a number of questions, as well as small cases and problems.
- The team project will be the core learning experience. It is necessary that you perform this "on time," "professionally," and "comprehensively" keeping me informed throughout the semester.
- The deliverables for the assignments and projects should be delivered as agreed upon, at or before the deliverables, unless prior approval is obtained from the instructor.

CIS Department Class Policies

1. Prerequisites are strictly enforced. Students failing to complete any of the prerequisites with a grade of "C-" or higher will be administratively withdrawn from this course with *loss of tuition fees*. **There are no exceptions.**

2. Students are expected to attend all classes and group meetings, except when precluded by emergencies, religious holidays, or bona fide extenuating circumstances.

3. Students who, for non-academic reasons beyond their control, are unable to meet the full requirements of the course should notify the instructor, by email, as soon as this is known and prior to the class meeting.

4. There is a new policy on how many withdrawals a student is allowed during his/her program. If within the allowed number of withdrawals, a "W" grade will be assigned for the course if a student withdraws before mid-semester if (and only if) he/she has maintained a passing grade up to the point of withdrawal. Withdrawals after the mid-semester date or a withdrawal exceeding the allowed number of course withdrawals will result in a grade of "WF". See the GSU catalog or registrar's office for details.

5. Spirited class participation is encouraged and informed discussion in class is expected. This requires completing readings and assignments **before** class.

6. All exams and assignments are to be completed by the student alone with **no** help from any other person.

7. Collaboration within groups is encouraged for project work. However, collaboration between project groups will be considered cheating.

8. Copying work from the Internet without a proper reference is considered plagiarism and subject to disciplinary action as delineated in the GSU Student Handbook.

9. Any non-authorized collaboration will be considered cheating and the student(s) involved will have an Academic Dishonesty charge completed by the instructor and placed on file in the Dean's office and the CIS Department. All instructors regardless of the type of assignment will apply this Academic Dishonesty policy equally to all students. See excerpt from the Student Handbook below on **<u>Academic Honesty</u>**:

(Abstracted from GSU's *Student Handbook* Student Code of Conduct "Policy on Academic Honesty and Procedures for Resolving Matters of Academic Honesty" - http://www.gsu.edu/~wwwreg/ugcat2000/academic/honesty.htm)

As members of the academic community, students are expected to recognize and uphold standards of intellectual and academic integrity. The University assumes as a basic and minimum standard of conduct in academic matters that students be honest and that they submit for credit only the products of their own efforts. Both the ideals of scholarship and the need for fairness require that all dishonest work be rejected as a basis for academic credit. They also require that students refrain from any and all forms of dishonorable or unethical conduct related to their academic work.

Students are expected to discuss with faculty the expectations regarding course assignments and standards of conduct. Here are some examples and definitions that clarify the standards by which academic honesty and academically honorable conduct are judged at GSU.

Plagiarism: Plagiarism is presenting another person's work as one's own. Plagiarism includes any paraphrasing or summarizing of the works of another person without acknowledgment, including the submitting of another student's work as one's own. Plagiarism frequently involves a failure to acknowledge in the text, notes, or footnotes the quotation of the paragraphs, sentences, or even a few phrases written or spoken by someone else. The submission of research or completed papers or projects by someone else is plagiarism, as is the unacknowledged use of research sources gathered by someone else when that use is specifically forbidden by the faculty member. Failure to indicate the extent and nature of one's reliance on other sources is also a form of plagiarism. Any work, in whole or part, taken from the Internet or other computer based resource without properly referencing the source (for example, the URL) is considered plagiarism. A complete reference is required in order that all parties may locate and view the original source. Finally, there may be forms of plagiarism that are unique to an individual discipline or course, examples of which should be provided in advance by the faculty member. The student is responsible for understanding the legitimate use of sources, the appropriate ways of acknowledging academic, scholarly or creative indebtedness, and the consequences of violating this responsibility.

Cheating on Examinations. Cheating on examinations involves giving or receiving unauthorized help before, during, or after an examination. Examples of unauthorized help include the use of notes, texts, or "crib sheets" during an examination (unless specifically approved by the faculty member), or sharing information with another student during an examination (unless specifically approved by the faculty member). Other examples include intentionally allowing another student to view one's own

examination and collaboration before or after an examination if such collaboration is specifically forbidden by the faculty member.

Unauthorized Collaboration. Submission for academic credit of a work product, or a part thereof, represented as its being one's own effort, which has been developed in substantial collaboration with another person or source or with a computer-based resource is a violation of academic honesty. It is also a violation of academic honesty knowingly to provide such assistance. Collaborative work specifically authorized by a faculty member is allowed.

Falsification. It is a violation of academic honesty to misrepresent material or fabricate information in an academic exercise, assignment or proceeding (e.g., false or misleading citation of sources, the falsification of the results of experiments or of computer data, false or misleading information in an academic context in order to gain an unfair advantage).

Multiple Submissions. It is a violation of academic honesty to submit substantial portions of the same work for credit more than once without the explicit consent of the faculty member(s) to whom the material is submitted for additional credit. In cases in which there is a natural development of research or knowledge in a sequence of courses, use of prior work may be desirable, even required; however the student is responsible for indicating in writing, as a part of such use, that the current work submitted for credit is cumulative in nature.