

Department of Computer Science
College of Arts and Sciences **Grambling State University**

Course Syllabus:

CS 320 Database Management Systems

TR 9:30 am - 10:50 am

3 Credits

Course Description: This course emphasizes data modeling and the theory and practice of the relational model. It covers the services offered by modern database management software and the role of such software in the development of systems. Non-relational models are also introduced.

(Previously CS451). Prerequisites: A grade of C or better in CS235.

I. Rationale

Database technology is the preeminent facilitator of the computer information age. E-business, one example of a dominant progeny of this age, would not be possible without this cutting edge computer technology. Pivotal to organizing, retrieving, querying, and analyzing megabytes of data efficiently and in microseconds is the database management system. This course will focus on design and implementation schemas of a DBMS. The student will utilize IBM-DB2 DBMS software development environment to produce key components of a DBMS in modeling varied real world environments.

The content covered in this course is related to **Human Geography Data Foundation and Management**. Several learning objectives associated with this topic are aligned with the NGA CAE knowledge units that are identified for a Human Geography Specialty area. These objectives are listed below.

- Define common commercial databases and search engines from which data pertinent to Human Geography can be obtained.
- Explain the importance of assessment and how to source Human Geography information.
- Define the purpose of geospatial standards for Human Geography data creation and use.
- Describe how to transform data and information from unstructured to structure formats.
- Comprehend the importance of metadata tagging for Human Geography datasets.
- Describe basic IT terminology and concepts as it relates to Human Geography data, databases, and data stewardship.
- Explain the function of a data schema in the structuring of geospatial data.
- Describe how to attribute data to facilitate discovery and reuse.
- Describe the importance of data management and data enhancement prior to analysis.

II. Additional Competencies

- A. The student should understand the services offered by a DBMS.
- B. The student should understand the stages involved in the development of databases.
- C. The student should understand the concepts of data modeling.
- D. The student should understand the process of constructing conceptual, logical, and physical schemas.
- E. The student should achieve a working knowledge of SQL.
- F. The student should understand the factors that must be considered when evaluating alternative designs.

III. Behavioral Objectives

- A. Describe, and explain the motivation for, the ANSI/SPARC database architecture and the concept of data independence.
- B. Explain the motivation for, and the nature of, each one of the basic functions of the different modules in a typical DBMS.
- C. Understanding of ER concepts and the ability to use these to model some key facet of a real-world enterprise.
- D. Understanding of the relational model and the ability to convert ER schema into relational schema.
- E. Ability to improve relational schemas through a process of data normalization.
- F. Proficiency in the use of relational languages, algebra, and SQL.

G. Compare and contrast the alternative file structures and their relative performance characteristics.

IV. Course Content

Basic concepts

- DBMS characteristics (Vs traditional file systems)
- DBMS functions and users
- The ANSI/SPARC Architecture, and DBMS modules

Conceptual modeling

- Fundamentals of data modeling
- Schema development using the basic ER
- Schema development using the object-oriented Extended ER

Fundamentals of the relational model

- Relations, attributes, keys, and domains
- Constraints of the relational model
- Formal Relational Languages: Algebra & Tuple Calculus

Logical database design

- ER-to-relational schema mapping
- Update anomalies
- Functional dependencies & Normalization (1NF, 2NF, 3NF, BCNF)

The Structured Query Language (SQL)

- Data (schema) definition in SQL
- Data manipulation in SQL: query and update statements
- Views
- Constraint and assertion specification in SQL

File organization

- Disks and buffering
- Heap, sorted, and hashed files
- Indexed files and B-tree organization

Introduction to DBMS services

- Transactions, concurrency control, recovery, and security

V. Learning Activities

Learning activities include lectures, closed and open lab sessions, reading assignments, mini DBMS projects, and programming assignments.

VI. Special Course Requirements

- A. Regular and punctual class attendance.
- B. Adherence to deadlines.
 - * **No** make-up examinations, tests, or quizzes.
 - * **No** late assignments will be accepted.
- C. Preparation and participation in class discussions.
- D. Adherence to class policies regarding collaboration on assignments.
 - *Plagiarized assignments or projects will result in an automatic "F."

The following clause is for students participating in any **GSU extra curricula activity**.

- E. Any student participating in extra curricula activities (e.g., band, football, track, etc,...) must bring signed verification from activity's sponsor/director on or before third week of school. **Notification** of scheduled events that conflict with test dates must be given in advance so that tests may be rescheduled. Test or assignments may be rescheduled to an earlier date than the scheduled date, but must be complete prior to the next class period. If the student neglects to give early notification a grade of F will be given for that test or assignment.

VII. Evaluation Process

- A. Methods:

Students will be evaluated based on their performance on quizzes, tests, and programming assignments and oral presentations. Tests will depend heavily on the contents of the lectures and assignments in order to discourage unlawful collaboration.

Tests (2)	50 %
Final Exam	20 %
Quizzes/Assignments/projects	30 %

Test content will be representative of classroom lectures and lab and reading assignments.

B. Grading Scale:

<u>Percent</u>	<u>Grade</u>
90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
Below 60	F

C. Plagiarism & Late Assignments.

A grade of “F” will be given for any *late* or *plagiarized* assignments or projects.

VIII. References

A. Textbook

Fundamentals of Database Management Systems, 2nd ed by Mark L. Gillenson

B. Additional References

DBMS Books, journals (library and on-line), and class handouts.

Disability Statement (Please see ADA Student Service Handbook page 3 for Assurance statement)

If you need accommodation in this class/setting/facility related to a disability, please make an appointment to see me as soon as possible. My office hours are set forth at the beginning of this document.

Contact Information and Resolution of Concern(S) and Problem(S)

If you have any concerns/problems regarding any aspect of the course, please discuss it FIRST with me (instructor). If you are not satisfied with my answer then discuss with department head, followed by Dean if necessary.

IX. Student outcomes

Student outcomes addressed by this course are given in the table below:

Student Outcomes	Strong	Weak	None
S1. apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices	X		
S2. analyze a problem and identify and define the computing requirements appropriate to its solution		X	
S3. design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs	X		
S4. apply design and development principles in the construction of software systems of varying complexity	X		
S5. effectively work on a group/individual project	X		
S6. understand professional, ethical, legal, security, and social issues and responsibilities		X	

S7. communicate effectively with a range of audiences	X		
S8. analyze the local and global impact of computing on individuals, organizations, and society		X	
S9. recognize the need for and engage in continuing professional development		X	
S10. use current techniques, skills, and tools necessary for computing practice	X		

Grambling State University's Mission Statement

Grambling State University is a comprehensive, historically-black, public institution that offers a broad spectrum of undergraduate and graduate programs of study. Through its undergraduate major courses of study, which are undergirded by a traditional liberal arts program, and through its graduate school, which has a decidedly professional focus, the University embraces its founding principle of educational opportunity. With a commitment to the education of minorities in American society, the University seeks to reflect in all of its programs the diversity present in the world. The University advances the study and preservation of African American history, art, and culture.

Grambling State University is a community of learners who strive for excellence in their pursuit of knowledge and who seek to contribute to their respective major academic disciplines. The University prepares its graduates to compete and succeed in careers related to its programs of study, to contribute to the advancement of knowledge, and to lead productive lives as informed citizens in a democratic society. The University provides its students a living and learning environment which nurtures their development for leadership in academics, athletics, campus governance, and in their future pursuits. The University affords each student the opportunity to pursue any program of study provided that the student makes reasonable progress and demonstrates that progress in standard ways. Grambling fosters in its students a commitment to service and to the improvement in the quality of life for all persons.

The University expects that all persons who matriculate and who are employed at Grambling will reflect through their study and work that the University is indeed a place where all persons are valued, "where everybody is somebody."

Department of Computer Science

The mission of the Department of Computer Science is to provide excellence in teaching, research, and public service. The Department aims to foster an environment that supports scholarship; encourages innovative thinking, mutual respect and diversity; and promotes ethical behavior and life-long learning. Programs are designed to meet the educational, cultural, and social needs of a multi-cultural clientele that is primarily statewide and secondarily, national and international. Through a purposeful and creative program design that emphasizes both the theory of computing and its practice using current technologies, we are making learning a stimulating, enjoyable, and worthwhile experience to our students that lasts a lifetime.