

CS 377 Database Design and Implementation SYLLABUS

CLASS MEETING TIMES

Semester: Fall 2024
Section: CS377-01
Course Delivery Mode: Face-to-Face
Class Hours: 09:30-10:50 p.m. Monday & Wednesday.
Classroom: Warehouse B Room 2

INSTRUCTOR

Name: Dr. Byoungyong Lee
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Office Hours: Mon/Wed: 08:30 am – 09:30 am / 12:30 pm – 01:00 pm
Tue/Thu: 11:00am – 12:00 pm / 3:30 pm – 4:00 pm

COURSE DESCRIPTION

This course introduces students to the concepts and theories of database systems. Topics include: information models and systems; the database environment; data modeling; conceptual modeling using the entity-relationship approach and mapping to relational tables; the relational model including the relational data structure, integrity rules; normalization; data definition and data manipulation in SQL; conceptual, logical, and physical database design; security; transaction management; query processing; and advanced topics in database systems.

PREREQUISITES

CS 373 Data Structures and Algorithm and BA230 Data Processing and Data Administration with Mac Application (or OA 210 at GCC)

SKILLS & BACKGROUND REQUIRED OR EXPECTED

Students are expected to be familiar with a database management software such as MS ACCESS. Programming skills in a high-level programming language, such as Java

REQUIRED TEXTBOOK, EQUIPMENT, AND/OR READINGS

Textbook

Kroenke, Auer Vandenberg, and Yoder, Database Concepts (8th ed), Pearson

Reference

Garcia-Molina, Ullman, Widom, Database Systems The Complete Book 2nd , Pearson

RATIONALE FOR THE COURSE

With today's technology, it is impossible to utilize a DBMS successfully without understanding fundamental database concepts. This course will cover the essential database concepts such as fundamentals of the relational model, SQL, data modeling, data warehouse structures, concurrency control, backup and recovery.

COURSE FORMAT

The course consists of lecture, presentation, demonstration, programming projects, and discussion for projects.

STUDENT WORKLOAD

Spend an average of at least 2–3 hours studying for every class, 1-2 hours for each lab assignment, and 2 – 3 weeks for DB project

GRADING SYSTEM/EVALUATION METHODOLOGIES

Course Requirements	Percent (%)
Attendance	10%
Homework	15%
Presentation	15%
DB Projects	15%
Midterm Exam	20%
Final Exam	25%
Total	100%

Letter grades will be assigned per the UOG Catalog:

A	90 – 100%
B	80 – 89%
C	70 – 79%
D	60 – 69%
F	0 – 59%

Homework

Reading assignment and/or problem sets will be given from the textbook and other instructional materials.

Presentation

Students form groups of 2 to 3 members and present group assignments.

DB Projects

1~2 projects will be given, and projects will be a team or individual projects.

Midterm Exam: Comprehensive

Final Exam: Comprehensive

COURSE TOPIC/EXAM SCHEDULE

Week	Topic	
1, 2	Chapter 1: Getting Started: Chapter 2: The Relational Model:	
3	Chapter 2 The Relational Model (cont.)	
4-5	Chapter 3 Structured Query Language: SQL for DDL, SQL for DML,	
6-8	Chapter 4 Database Modeling and the Entity-Relationship Model	Midterm Exam
9	Fall Break	Fall Break
10	Chapter 5 Database Design:	
11-12	Chapter 5 Database Design (cont.)	
13-15	Chapter 6 Database Administration	
16-17	Chapter 7 Data warehouses, Business IntelligenceSystem	
18		Final Exam

Student Learning Outcomes (SLOs)

This course covers the following ACM/IEEE CC 2013 Body of Knowledge student learning outcomes :

- IM/Information Management Concept
- IM/Database Systems
- IM/Data Modeling
- IM/Relational Database
- IM/Query Languages
- IAS/Fundamental Concepts

Maps to Program Learning Outcomes and Institutional Learning Outcomes

CS 377 Student Learning Outcomes (SLO)	Program Learning Outcomes (PLO)*	Institutional Learning Outcomes (ILO)*	Activities/Assessments
3, 11	1	1	Final Exam, Homework
8, 10, 11, 15	1	1	Final Exam
5, 6, 13, 17	2	1	DB Project
2, 9, 12	3	3	DB Project – documentation, presentation
18	5	4	DB Project -Team Projects,
1, 4, 16	6	1	Final Exam, Homework

* Refer to PLO's and ILO's described hereafter

- SLO-1.* Apply the modeling concepts and notation of the relational data model. [Usage]
- SLO-2.* Cite the basic goals, functions, and models of database systems. [Familiarity]
- SLO-3.* Compare and contrast appropriate data models, including internal structures, for different types of data. [Assessment]
- SLO-4.* Connect constraints expressed as primary key and foreign key, with functional dependencies. [Usage]
- SLO-5.* Create a non-procedural query by filling in templates of relations to construct an example of the desired query result. [Usage]
- SLO-6.* Create a relational database schema in SQL that incorporates key, entity integrity, and referential integrity constraints. [Usage]
- SLO-7.* Define the fundamental terminology used in the relational data model. [Familiarity]
- SLO-8.* Demonstrate use of the relational algebra operations from mathematical set theory (union, intersection, difference, and Cartesian product) and the relational algebra operations developed specifically for relational databases (select (restrict), project, join, and division). [Usage]
- SLO-9.* Describe
- concepts in modeling notation (e.g., Entity-Relation Diagrams or UML) and how they would be used. [Familiarity]
 - the advantages and disadvantages of central organizational control over data. [Assessment]
 - the basic principles of the relational data model. [Familiarity]
 - the components of a database system and give examples of their use. [Familiarity]
 - the differences between relational and semi-structured data models. [Assessment]
 - the properties of BCNF, PJNF, 5NF. [Familiarity]
- SLO-10.* Determine the functional dependency between two or more attributes that are a subset of a relation. [Assessment]
- SLO-11.* Evaluate
- a proposed decomposition, to say whether it has lossless-join and dependency-preservation. [Assessment]
 - a set of query processing strategies and select the optimal strategy. [Assessment]
- SLO-12.* Explain
- the concepts of entity integrity constraint and referential integrity constraint (including definition of the concept of a foreign key) with example [Usage]
 - the characteristics that distinguish the database approach from the approach of programming with data files. [Familiarity]

- c. the concept of data independence and its importance in a database system. [Familiarity]
- d. the impact of normalization on the efficiency of database operations especially query optimization. [Familiarity]
- SLO-13.* Give a semi-structured equivalent (e.g., in DTD or XML Schema) for a given relational schema. [Usage]
- SLO-14.* Identify major DBMS functions and describe their role in a database system. [Familiarity]
- SLO-15.* Prepare a relational schema from a conceptual model developed using the entity-relationship model. [Usage]
- SLO-16.* Use
 - a. a declarative query language to elicit information from a database. [Usage]
 - b. SQL to create tables and retrieve (SELECT) information from a database. [Usage]
- SLO-17.* Write
 - a. a stored procedure that deals with parameters and has some control flow, to provide a given functionality. [Usage]
 - b. queries in the relational algebra. [Usage]
- SLO-18.* Develop teamwork through team project

CS Program Learning Outcomes (PLOs)

- PLO-1.* Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- PLO-2.* Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- PLO-3.* Communicate effectively in a variety of professional contexts.
- PLO-4.* Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- PLO-5.* Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- PLO-6.* Apply computer science theory and software development fundamentals to produce computing-based solutions.

UOG Institutional Student Learning Outcomes (ILOs)

- ILO-1.* Critical thinking and problem solving
- ILO-2.* Mastery of quantitative analysis
- ILO-3.* Effective oral and written communication
- ILO-4.* Understanding and appreciation of culturally diverse people, ideas and values a democratic context
- ILO-5.* Responsible use of knowledge, natural resources, and technology
- ILO-6.* An appreciation of the arts and sciences
- ILO-7.* An interest in personal development and lifelong learning

COURSE POLICIES

Assignment

- Late labs and homework assignments will receive late penalties.

Midterm and Final Exam

- There are no make-up exams, unless with the consent of the instructor.

Attendance : Class attendance is mandatory.

Regular and punctual class attendance is expected of all students. Student must accept the consequences of failure to attend. Instructor will drop a student from the course for excessive absences. "Excessive absences" means failure to attend 70% of scheduled class meetings. A student missed more than 30% of scheduled classes will be dropped from the course and will receive a failing grade F. A student so dropped may appeal through the college's Due Process.

Note: Student who arrives after the instructor starts a class will be considered as tardy. 3 tardy will be counted as 1 unexcused absence.

A course for which a student registers and does not attend and is not officially dropped will be recorded as an "F" grade on the student's record. All students (including those who enroll in classes late) are responsible for the work covered and assigned from the first meeting of a class.

ACADEMIC DISHONESTY

Academic Integrity is about performing in your role as a student in ways that are honest, trustworthy, respectful, responsible, and fair (see www.academicintegrity.org for more information). As a student, you will complete your academic assignments in the manner expected by the instructor. Academic dishonesty, including but not limited to cheating and plagiarism may result in suspension or expulsion from the University. Refer to the UOG Student Handbook and Code of Conduct for more information.

Professional and ethical conduct is expected at all times. Unethical conduct includes any form of cheating, including plagiarism. The term "**cheating**" includes, but is not limited to: (1) use of any unauthorized assistance in taking quizzes, tests, or examinations, e.g., looking at other students' answers, using crib notes (including electronic), getting information from another person via any kind of communication; (2) dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; or (3) the acquisition, without permission, of tests or other academic material belonging to a member of the University faculty or staff. If you need to use an electronic translator, you must discuss this with me in advance. All assignments and tests must be your own work. Answers you write on the tests must come only from in your head or the information supplied in the test papers; anything else is cheating. Any evidence of cheating will result in a "0" for that assignments and/or exam or possibly an "F" for the entire course – final decision to be determined by me, the course instructor.

FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT (FERPA)

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. These rights for students, parents and school officials can be viewed at:

<http://www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html>

UOG DISABILITIES POLICY

In accordance with the Americans with Disabilities Act (ADA) of 1990 and the Rehabilitation Act of 1973, the University of Guam does not discriminate against students and applicants on the basis of disability in the administration of its educational and other programs. The University offers reasonable accommodations for a student or applicant who is otherwise qualified, if the accommodation is reasonable, effective and will not alter a fundamental aspect of the University's program nor will otherwise impose an undue hardship on the University, and/or there are not equivalent alternatives. Students are expected to make timely requests for accommodation, using the procedure below.

ADA Accommodation Services

For individuals covered under the ADA (Americans with Disabilities Act), if you are a student with a disability requiring academic accommodation(s), please contact the Disability Support Services Office to discuss your confidential request. A Faculty Notification letter from the Disability Support Services counselor will be provided to me. To register for academic accommodations, please contact or visit Sallie S. Sablan, DSS counselor in the School of Education, office 110, disabilitysupport@triton.uog.edu or telephone/TDD 671-735-2460.

TOBACCO-FREE/SMOKE-FREE/VAPING FREECAMPUS

UOG is a tobacco-free/smoke-free, vaping/e-cigarette free campus. Thank you for not using tobacco products on campus, and for helping make UOG a healthy learning and living environment. For more information visit: <http://www.uog.edu/smoke-free-uog>