Master Course Syllabus

School of Engineering and Computer Science
Washington State University Vancouver

CS 451

Introduction to Database Systems

3 Semester Hours

Catalog Description

Introduction to database concepts, data models, database languages, database designs, implementation issues.

Prerequisite Courses

CS 223 – Advanced Data Structures

CS 224 – Programming Tools

Prerequisite Topics

- Proficiency with the C programming language
- Linked list data structures using C pointers
- Sorting and searching algorithms
- Object-oriented concepts and modeling
- Use of Unix environment for coding, compilation, debugging and testing
- Function, relation and set theory
- Basic logic

Measured Course Outcomes

Students taking this course will:

1. Analyze system/user requirements to prepare relational schema from a conceptual information model developed using the entity-relationship method *(Contributes to performance criterion **C-1**)*
2. Use normal forms and perform normalization in the design and implementation of a relational database *(Contributes to performance criterion **A-1**)*
3. Design, code, test and debug programs which perform query and update transactions on a database, demonstrating the use of relational algebra operations *(Contributes to performance criterion **E-2**)*

Required Textbooks

Elmasri and Navathe, Fundamentals of Database Systems. Fourth edition, Addison Wesley Publishing Company. 2003.

or

Kroenke, David M., Database Processing : Fundamentals, Design and Implementation, 9th Edition, Prentice Hall.

Beginning PHP 5 and MySQL : From Novice to Professional by W. J. Gilmore

or

Build Your Own Database Driven Website Using PHP and MySQL, 3rd Edition by Kevin Yank.

Reference Material

None specified.

Major Topics Covered in the Course

1. Introduction to information modeling and information systems
2. Conceptual design of database systems
3. Relational data modeling
4. Structured query language (SQL)
5. Physical data organization
6. Relational database design and implementation

Laboratory Projects

Programming Project Area	Weeks
Design and implementation of a relational database	2
Design and implementation of database transactions	2
Implementation of a user interface for a relational database	2

CSAB Category Content

	FUNDAMENTAL	ADVANCED		FUNDAMENTAL	ADVANCED
Data Structures	0	1	Computer Organization and Architecture	0	.5
Algorithm & Software Design	0	1	Concepts of Programming Languages	0	.5

Oral and Written Communications

There are no significant oral or written communications required in this course.

Social and Ethical Issues

This course contains no significant coverage of social and ethical issues beyond the usual proscriptions against plagiarism and cheating.

Theoretical Content

Topic	Hours
Relational algebra	6
Normalization and normal forms	3
Complexity analysis	2

Problem Analysis

Students take real-world database problems and implement efficient solutions in a DBMS. The problem analysis has two related components. The first component is development of an adequate conceptual design. The conceptual design, an ER model, is an abstract, formal specification of the database schema. Students learn the capabilities and limitations of ER modeling by its application. The second component is an analysis of the practical limitations of a DBMS.

Solution Design

Students are guided through the several design phases in the development of a database. The first phase is a conceptual design (an ER model). Students then map a conceptual design to a logical design (database schema). The logical design is optimized via normalization. The final step is to convert the logical design to a physical design (a sequence of CREATE TABLE statements in SQL). Part of the physical design consists of specifying appropriate data structures (e.g., indices) to improve database performance for the required transactions. Students analyze their solution to identify weaknesses in the design and implementation.

CC2001

This course provides coverage of topics in the following areas (hours listed are minimums):

IM1. Information models and systems [core]	3
IM2. Database systems [core]	3
IM3. Data modeling [core]	4
IM4. Relational databases [elective]	9
IM5. Database query languages [elective]	9
IM6. Relational database design [elective]	9

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