CIS 080: DATABASE MANAGEMENT SYSTEMS

Originator
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Co-Contributor(s)

Name(s)
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Justification / Rationale
Add DE modality.
Increase capacity from 32 to 35

Effective Term
Fall 2023

Credit Status
Credit - Degree Applicable

Subject
CIS - Computer Information Systems

Course Number
080

Full Course Title
Database Management Systems

Short Title
DATABASE MANAGEMENT

Discipline

Disciplines List
Computer Information Systems (Computer network installation, microcomputer technology, computer applications)

Modality
Face-to-Face
100% Online
Hybrid

Catalog Description
This course provides the students with an introduction to the core concepts in data and information management. It is centered around the core skills of identifying organizational information requirements, modeling them using conceptual data modeling techniques, converting the conceptual data models into relational data models and verifying
its structural characteristics with normalization techniques, and implementing and utilizing a relational database using an industrial-strength database management system. The course will also include coverage of basic database administration tasks and key concepts of data quality and data security. Moreover, students will develop practical skills in the use of SQL for data design, manipulation, interrogation, and application development. In addition to developing database applications, the course helps the students understand how large-scale packaged systems are highly dependent on the use of Database Management Systems (DBMSs). Building on the transactional database understanding, the course provides an introduction to data and information management technologies that provide decision support capabilities under the broad business intelligence umbrella. C-ID: ITIS 180

Schedule Description
This course provides the students with an introduction to: 1) the core concepts in data and information management and 2) the functional use of SQL for database interaction. It is centered around the core skills of identifying organizational information requirements, modeling them using conceptual data modeling techniques, converting the conceptual data models into relational data models and verifying its structural characteristics with normalization techniques, and implementing and utilizing a relational database using SQL on an industrial-strength database management system.
Prerequisite: CIS 010

Lecture Units
2
Lecture Semester Hours
36

Lab Units
1
Lab Semester Hours
54

In-class Hours
90

Out-of-class Hours
72

Total Course Units
3
Total Semester Hours
162

Prerequisite Course(s)
CIS 010

Required Text and Other Instructional Materials

Resource Type
Web/Other
Open Educational Resource
No

Year
2021

Description
Fundamentals of Database Systems V7
UCertify
https://www.ucertify.com/p/fundamentals-of-database-systems.html

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Class Size Maximum
35

Entrance Skills
Basic understanding of Database Management Systems (DBMS).

Requisite Course Objectives
CIS 010-Using computers effectively requires that students can express their instructions in a form that the computer program can understand and execute.
CIS 010-Explain the basic concepts and understand the uses of various categories of productivity software, including word processing, electronic spreadsheets and database management.
CIS 010-Demonstrate ability to design, create, and query a multi-table electronic database.

Course Content
1. Preface
2. Databases and Database Users
3. Database System Concepts and Architecture
4. Data Modeling Using the Entity-Relationship (ER) Model

5. The Enhanced Entity-Relationship (EER) Model
6. The Relational Data Model and Relational Database Constraints
7. SQL Data Definition and Data Types
8. More SQL: Complex Queries, Triggers, Views, and Schema Modification
9. The Relational Algebra and Relational Calculus
10. Relational Database Design by ER- and EER-to-Relational Mapping
11. Introduction to SQL Programming Techniques
12. Web Database Programming Using PHP
13. Object and Object-Relational Databases
14. Chapter 14: XML: Extensible Markup Language
15. Basics of Functional Dependencies and Normalization for Relational Databases
16. Relational Database Design Algorithms and Further Dependencies
17. Disk Storage, Basic File Structures, Hashing, and Modern Storage Architectures
18. Indexing Structures for Files and Physical Database Design
19. Strategies for Query Processing Chapter
20. Query Optimization
21. Introduction to Transaction Processing Concepts and Theory
22. Concurrency Control Techniques
23. Database Recovery Techniques
24. Distributed Database Concepts
25. NoSQL Databases and Big Data Storage Systems
26. Big Data Technologies Based on MapReduce and Hadoop
27. Enhanced Data Models: Introduction to Active, Temporal, Spatial, Multimedia, and Deductive Databases
28. Introduction to Information Retrieval and Web Search
29. Data Mining Concepts
30. Overview of Data Warehousing and OLAP
31. Database Security
32. Appendix A: Alternative Diagrammatic Notations for ER Models
33. Appendix B: Parameters of Disks
34. Appendix C: Overview of the QBE Language

Lab Content

Data Modeling Using the Entity–Relationship (ER) Model

- Understanding Physical Schema - ER Model

The Enhanced Entity–Relationship (EER) Model

- Understanding generalization

SQL Data Definition and Data Types

- Creating a table
- Using Referential Integrity constraints in a table
- Using Check constraints in a table
- Retrieving the data from the table
- Using select-project-join query
- Using alias-naming
- Retrieving all the attribute values using asterisk
- Retrieving the data using multiple condition
- Specifying the cross product of the table
- Using SELECT DISTINCT statement and UNION operator
- Using substring pattern matching
- Using arithmetic operators
- Retrieving the sorted data using ORDER BY clause
- Inserting values into a table
- Inserting values into a table from existing table
- Deleting the rows from a table
- Updating the table

More SQL: Complex Queries, Triggers, Views, and Schema Modification

- Retrieving values of a table using nested queries I
- Retrieving values of a table using nested queries II
- Retrieving values of a table using JOIN operator
- Using Aggregate functions
- Counting all the rows of a table
- Using the GROUP BY and HAVING clauses
- Using the CASE clause
- Specifying general constraints as Assertions
- Creating view
- Modifying the table definition

The Relational Algebra and Relational Calculus

- Retrieving the distinct rows from the table
- Using the UNION operator
- Using the SELECT operator
- Understanding relational set operator

Object and Object-Relational Databases

- Drag the object database concept to its description.

Basics of Functional Dependencies and Normalization for Relational Databases

- Normalizing the unnormalized model to 1st normal form I
- Normalizing the unnormalized model to 1st normal form II
- Normalizing the 1st normal form to 2nd normal form
- Normalizing the 2nd normal form to 3rd normal form
- Analyzing the normal forms
- Normalizing the 3rd normal form to BCNF

Relational Database Design Algorithms and Further Dependencies

- Identifying inference rules

Disk Storage, Basic File Structures, Hashing, and Modern Storage Architectures

- Understanding storage device types
- Identifying the components of disk device
- Understanding the buffer replacement strategies
- Understanding program variables
- Describing the hashing techniques

Indexing Structures for Files and Physical Database Design

- Creating a function-based index
- Using a function-based index

Strategies for Query Processing

- Identifying the steps of processing a high-level query
- Counting the number of department from the table
- Using NOT IN operator
- Using INTERSECT operator

Query Optimization

- Unnesting query

Introduction to Transaction Processing Concepts and Theory

- Understanding the page replacement method
- Understanding the transaction states

Concurrency Control Techniques

- Identifying deadlock dealing techniques

Database Recovery Techniques

- Creating a backup

Distributed Database Concepts

- Click to select the advantages of distributed databases.

NOSQL Databases and Big Data Storage Systems

- Categorizing NOSQL systems

Enhanced Data Models: Introduction to Active, Temporal, Spatial, Multimedia, and Deductive Databases

- Classifying spatial operators

Introduction to Information Retrieval and Web Search

- Identifying the features of databases and IR systems
- Identifying types of queries

Data Mining Concepts

- Understanding the applications of data mining

Database Security

- Database Security

There will be assigned projects to be submitted after doing internet research on various assigned topics such as:

1. Oracle DBA resources
2. Internet database consulting services
3. Data mining tools
4. Data quality issues in data warehouses
5. Controlling database deadlocking
6. CASE technologies
7. ANSI/ISO SQL standards
8. The value of ensuring atomicity in database design
9. Indexing

Course Objectives

	Objectives
Objective 1	Define the role of databases and database management systems in managing organizational data and information.
Objective 2	Understand the fundamentals of the basic file organization techniques.
Objective 3	Design a relational database so that it is at least in 3rd Normal Form.
Objective 4	Implement a relational database design using an industrial-strength database management system, including the principles of data type selection and indexing.
Objective 5	Use the data definition, data manipulation, and data control language components of Structured Query Language (SQL) in the context of one widely used implementation of the language.
Objective 6	Describe the role of databases and database management systems in the context of enterprise systems.
Objective 7	Describe the key principles of data security and identify data security risk and violations in data management system design.
Objective 8	Compare the difference between online transaction processing (OLTP) and online analytic processing (OLAP), and the relationship between these concepts and business intelligence, data warehousing and data mining.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Explain the role of databases in the enterprise application context and various business intelligence topics, including enterprise search.
Outcome 2	Design and create working database structures and applications using SQL.
Outcome 3	Develop policies based on key principles of data security, risks, and violations in data management system design.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Lecture	Discuss each of the steps in the design process for a database.
Laboratory	Complete lab activity involving the creation of a relational database using the third normal form to stress the importance of a scrubbed database.
Role Playing	Work in a project team and apply appropriate fact-finding techniques to elicit requirements from the client.
Demonstration, Repetition/Practice	Map a conceptual design to a logical/physical design.

Collaborative/Team	Reflect and review intermediate designs, particularly where information complexity is present.
Collaborative/Team	Create a database for the collection of students records.

Methods of Evaluation

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
Written homework	Computer Laboratory assignments/projects designed to clarify students' individual database implement strengths and areas of improvement related to database implementation skills.	In and Out of Class
Presentations/student demonstration observations	Projects and oral reports combining the use of database design, development and implementation to measure students' critical thinking, comprehension, and organizational skills.	In and Out of Class
Tests/Quizzes/Examinations	Quizzes/examinations designed to measure students' degree of mastery of fundamental database concepts and terminology.	In and Out of Class
Group activity participation/observation	Collaborative projects designed to demonstrate successful understanding and application of database concepts and team work skills.	In and Out of Class
Product/project development evaluation	Exercises/projects designed to demonstrate the acquisition of database concepts and database development skills.	Out of Class Only
Mid-term and final evaluations	Common final examination designed to evaluate students' overall achievement of course objectives in database design and development.	In and Out of Class

Assignments

Other In-class Assignments

1. Projects in order to facilitate and demonstrate the acquisition of skills required to design and develop a database.
2. Collaborative projects/cooperative learning tasks in order to encourage students to develop and apply database design and development skills.

Other Out-of-class Assignments

1. Students will be assigned readings from the textbook, from the Learning Modules on the web site, and chapter-based PowerPoint presentations.
2. Answer review questions based on the material in the chapters.
3. Analyze a given problem and determine a solution that requires creating a designed database.
4. Analyze various models, normalize files, demonstrate an understanding of the Systems Development Life Cycle, and create a database.
5. Watch online video tutorials from the book's web site.

Grade Methods

Letter Grade Only

Distance Education Checklist

Include the percentage of online and on-campus instruction you anticipate.

Online %

100

What will you be doing in the face-to-face sections of your course that necessitates a hybrid delivery vs a fully online delivery?

We are using the publisher-provided content and platform that links with Canvas. These activities will now be done remotely rather than in the classroom.

Lab Courses

How will the lab component of your course be differentiated from the lecture component of the course?
Lab component has activities for the students to complete on their own or in collaboration. Lecture is delivered through a set of videos and textbook reading checks.

From the COR list, what activities are specified as lab, and how will those be monitored by the instructor?
Practically every topic in our COR has a lab component that students need to complete. These activities are turned in through Canvas and graded by the instructor.

How will you assess the online delivery of lab activities?
We will monitor our lab activity completion rates and compare them with those of their f2f counterparts.

Instructional Materials and Resources

If you use any other technologies in addition to the college LMS, what other technologies will you use and how are you ensuring student data security?
We will be using publisher-provided content and LMS, much like many other courses at COD. The additional platforms that we will use are all high-profile, robust, and secure.

If used, explain how specific materials and resources outside the LMS will be used to enhance student learning.
The publisher-provided content is dynamic, up to date, and effective. Furthermore, they tie directly to the lectures at hand.

Effective Student/Faculty Contact

Which of the following methods of regular, timely, and effective student/faculty contact will be used in this course?

Within Course Management System:
Discussion forums with substantive instructor participation
Online quizzes and examinations
Private messages
Regular virtual office hours
Timely feedback and return of student work as specified in the syllabus
Video or audio feedback
Weekly announcements

External to Course Management System:
Direct e-mail
Posted audio/video (including YouTube, 3cmediasolutions, etc.)
Synchronous audio/video
Teleconferencing
Telephone contact/voicemail

For hybrid courses:
Orientation, study, and/or review sessions
Scheduled Face-to-Face group or individual meetings
Supplemental seminar or study sessions

Briefly discuss how the selected strategies above will be used to maintain Regular Effective Contact in the course.
There will be weekly discussions regarding topics related to the course with appropriate instructor participation.
Students will create databases using Microsoft Access and Oracle. They will then issue commands to query the db. We keep a close eye on those queries to make sure they are bug-free and optimized. We then discuss them with students individually.
Virtualized exercises provide a substitute for hands-on flow db design and optimization discussions. These discussions will give students the experience they need to be successful in class.

Other Information

Comparable Transfer Course Information

University System
CSU

Campus
CSU San Bernardino

Course Number
IST 2410
Course Title
Database Management and Policies

Catalog Year
2022

University System
UC
Campus
UC Riverside

Course Number
CS-166
Course Title
Database Management Systems

Catalog Year
2022

MIS Course Data

CIP Code
11.0301 - Data Processing and Data Processing Technology/Technician.

TOP Code
070720 - Database Design and Administration

SAM Code
C - Clearly Occupational

Basic Skills Status
Not Basic Skills

Prior College Level
Not applicable

Cooperative Work Experience
Not a Coop Course

Course Classification Status
Credit Course

Approved Special Class
Not special class

Noncredit Category
Not Applicable, Credit Course

Funding Agency Category
Not Applicable

Program Status
Program Applicable

Transfer Status
Transferable to both UC and CSU

General Education Status
Y = Not applicable

Support Course Status
N = Course is not a support course

C-ID
ITIS 180

Allow Audit
Yes

Repeatability
No

Materials Fee
No

Additional Fees?
No

Approvals

Curriculum Committee Approval Date
10/04/2022

Academic Senate Approval Date
10/13/2022

Board of Trustees Approval Date
11/10/2022

Chancellor's Office Approval Date
12/22/2022

Course Control Number
CCC000599875

Programs referencing this course
Computer Information Systems Associate of Science and Transfer Preparation (http://catalog.collegeofthedesert.eduundefined/?key=221)
Liberal Arts: Business and Technology AA Degree (http://catalog.collegeofthedesert.eduundefined/?key=27)
Geographic Information Systems Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined/?key=315)
Computer Information Systems Associate of Science (http://catalog.collegeofthedesert.eduundefined/?key=323)
Computer Information Systems AS Degree for Employment Preparation (http://catalog.collegeofthedesert.eduundefined/?key=61)