Course Definition File

Database system 1

Information

Technology

Engineering

Syrian Arab Republic		الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعلــيم العالـــي
Syrian Virtual University		الجامعة الافتراضية السورية

1. Basic Information:

Course Name	Database system 1
Course Code	BDB501
Number of Presentational Sessions*	2×8
Number of Synchronous Sessions**	8
Number of Shorter Tests***	2
Number of Exams***	1
Theoretical Sessions Work Load (hrs.)	48
Practical Sessions Work Load (hrs.)	24
Credit Hours	4

*Each presentational session comprises both recorded lecture (1.5 hrs.) and interactive learning content (1.5 hrs.).

**Each synchronous session comprises the interactive lecture carried out in real time in a virtual class (1.5 hrs.).

***Each shorter test is 0.5 hr. long. The final exam is 2 hrs. long.

N.B.

Generally, each chapter requires two presentational sessions: one for the recorded content and one for the interactive content (unless the chapter is too long, in which case it may require more sessions). This note applies to synchronous sessions as well, where each chapter requires one synchronous session generally.

2. Prerequisites courses:

Course	Code
Data structures & Algorithms 1*	BDA501

*Should be studied in parallel with Database System lab (1) BDBL501

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3. Course Objectives:

"Database system 1" aims to acquaint the student with the basic concepts of analysis, design, creating Entity Relationship Diagram (ERD), using database management systems and SQL language, and implementing database system.

In particular, the student will be able to:

1. Understand the basic concepts of analysis and design databases.
2. Understand how to design ERD diagrams.
3. The use of relations of relational algebra.
4. Using SQL language.
5. Use of XML databases.
6. Be familiar with the languages used in database management systems.
7. Join databases with programing languages.

4. Learning Outcomes (LO):

By the end of this course, the learner is expected to:

- Analyze the data and data organization needs of organizations.
- Apply the Entity-Relationship (E-R) Model for building information systems' data models.
- Transform an E-R diagram into a relational model.
- Use normalization to create a database relational schema free of redundant data.
- Be capable of using SQL language instructions.
- Discuss the physical database design process of producing an efficient and tuned database.
- Understand the basic concepts of using databases through the internet.

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5. Assessment Results:

Chapter Number	Chapter Title	General Objectives	Assessment Type				
			Interactive Content & Recorded Sessions	Applied Activities (Synch. Sessions)	Final Exam*/ Shorter Tests**	Presentations and Interviews***	Reports ***
CH1	Introduction to Database Systems	Comprehension –Analytical Thinking	√	√	√	√	√
CH2	The Relational Model	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√
CH3	SQL Language	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√
CH4	Data Modeling: The Entity– Relationship Diagram	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√

CH5	Normalization	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√
CH6	Physical Database Design	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√
CH7	The Internet Database Environment	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√
CH8	Complex data types	Comprehension –Analytical Thinking	√	√	√	√	√

*The final exam is two hours long and is given at the end of the course.

**Shorter tests are about 30 minutes long and are given after three or four lectures throughout the semester during synchronous sessions.

***Presentations, interviews, and reports are submitted once after each three or four lectures throughout the semester during synchronous sessions.

6. Course Syllabus

Chapter	Subject	Content	Number of Learning Objects	Number of synchronous Learning Objects
CH1	Introduction to Database Systems	1. Importance of Database systems 2. The main components of database systems 3. Database languages 4. Database design 5. Database engine 6. Database and application architecture 7. Database Users and Administrators	7	3
CH2	The Relational Model	1. Structure of Relational Databases 2. Database Schema 3. Keys 4. Schema Diagrams 5. Relational Query Languages 6. The Relational Algebra	6	2

CH3	SQL Language	1. Overview of the SQL Query Language 2. SQL Data Definition 3. Basic Structure of SQL Queries 4. Additional Basic Operations 5. Set Operations 6. Null Values 7. Aggregate Functions 8. Nested Subqueries 9. Modification of the Database 10. Join Expressions 11. Views 12. Transactions 13. Index Definition in SQL	13	6
CH4	Data Modeling: The Entity−Relationship Diagram	1. Overview of the Design Process 2. The Entity−Relationship Model (ERM) and the entity−relationship diagram 3. Complex Attributes 4. Mapping Cardinalities 5. Primary Key 6. Removing Redundant Attributes in Entity Sets	6	2

CH5	Normalization	1. Normal Forms 2. Functional-Dependency Theory 3. Normalize the data up to the third normal form 4. Validation and rationalization 5. More Normal Forms	5	2
CH6	Physical Database Design	1. Describe the physical database design process, its objectives, and its effect on system performance. 2. Translate a relational data model into efficient database structures. 3. Tune the logical data model to enhance the performance. 4. The important considerations in selecting attributes to be indexed.	4	2
CH7	The Internet Database Environment	1. Introduction to the Internet database environment 2. Web-enabled databases 3. Web-enabled system design 4. Programming in two-tier and three-tier architectures 5. XML and data exchange on the Internet.	5	2

CH8	Complex Data Types	1. Semi−structured Data 2. Object Orientation 3. Textual Data 4. Spatial Data	4	2

7. Practical Activity:

- **Tools and Labs:**

Tool Name	Description
Oracle 12C	Database management system
Power designer	Analytical tools to create databases
Database management systems	MS SQL server, My SQL, Access
Visual studio	Software development tools

- **Practical Activities per Chapters:**

Chapter	Activities Type	Remarks
CH1	☑ Exercises ☑ Homework ☑ Webinars ☐ Project ☐ Other	
CH2	☑ Exercises ☑ Homework ☑ Webinars ☐ Project ☐ Other	

CH3	☑ Exercises ☑ Homework ☑ Webinars ☐ Project ☐ Other	
CH4	☑ Exercises ☑ Homework ☑ Webinars ☐ Project ☐ Other	
CH5	☑ Exercises ☑ Homework ☑ Webinars ☐ Project ☐ Other	
CH6	☑ Exercises ☑ Homework ☑ Webinars ☐ Project ☐ Other	
CH7	☑ Exercises ☑ Homework ☑ Webinars ☐ Project ☐ Experiment ☐ Other	

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CH8	☐ Exercises ☐ Homework ☑ Webinars ☑ Project ☐ Other	

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8. References:

1. Hoffer, J. A., Venkataraman, R., & Topi, H. (2019). Modern database management (13th ed.) Prentice Hall.
2. Silberschatz, A., Korth, H., & Sudarshan, S. (2019). Database system concepts (7th ed.) McGraw– Hill.