

 **Jerash University**

 **Faculty of Computer Science and Information Technology**

 **Computer Sciences Department**

 **Semester**: Fall Semester 2018/2019

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| **Course symbol and number:** 1002140  | **Course Name: قواعد بيانات**  |
| **Teaching Language:** English | **Prerequisites:** 1001108. |
| **Credits:** 3 hours**.** | **Course Level:** 100 |

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| **Course Description**  |
| This course introduces the basics of database systems, as well as the modeling, desgin and manipulation of relational databases. At the end of this course, a student will be able to understand and apply the fundamental concepts required for the use and design of database systems. Topics include basic concepts and terminology of the database approach, data modeling (the entity relationship model, relational data model), database design theory (entity relationship to relational mappings, normalization using functional dependencies), data definition and manipulation languages (relational algebra, SQL). The course will enable the students to create and manipulate databases on the Oracle database management system. |

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| **Course Objectives**  |
| The main objectives of this course are to:  * Describe databases, their typical users.
* Describe DBMS concepts, terminology, and architecture.
* Describe the concepts of the Entity-Relationship (ER) model.
* Describe how ER diagrams are presented and used to illustrate conceptual database design.
* Focus on data abstraction and semantic data modeling concepts, and extends the ER model to incorporate these ideas, leading to the enhanced-ER data model and EER diagrams.
* Describe the basic concepts necessary for a good understanding of databases design and implementation
* Describe the conceptual modeling techniques used in database systems.
* Describe the relational data model, its integrity constraints and update operations, and the operations of the relational algebra.
* Describe the relational DBMSs.
* Give a comprehensive introduction to object databases.
* Give a comprehensive introduction to object-relational systems.

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| **Learning Outcomes**  |
| Upon completion of this course, students should be able to: * Be able to design effective database schemas for realistic applications
* Become proficient in using relational, key-value, document, and graph database systems
* Understand the basics of transactions
* Gain an introductory background in indexing, concurrency control, and recovery
* Be able to integrate databases into applications using both lightweight and ORM frameworks
* Understand what is meant by polyglot persistence and NoSQL
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|  | **Text Book(s)**  |
| **Title**  |  [Fundamentals of Database Systems](https://newmail.just.edu.jo/owa/redir.aspx?C=c6b6690e76984d17b8fe228a8dedafd5&URL=http%3a%2f%2fwww.cit.just.edu.jo%2flabreg%2flab%2fsignup.aspx)  |
| **Author(s)**  | Elmasri, R. and Navathe |
| **Publisher**  | Thomson  |
| **Year**  | 2010  |
| **Edition**  | 7th  Edition  |

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|  | **References**  |
| **Books**  | 1. Rob, P. and Coronel, C., Database Systems: Deign, implementation and management, 5th Edition, 2001, Course Technology.
2. Foundations of database systems by Abiteboul, Hull and Vianu.
3. Database management systems by Raghu Ramakrishnan and Johannes Gehrke.
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| **Internet links**  |  http://www.jpu.edu.jo/lms |
| **Course link**  | [Click here](http://www.jpu.edu.jo/lms) |

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|  | **Instructors**  |
| **Instructor**  |  Dr..Bassam Mohammed El-zaghmouri |
| **Office Location**  | الطابق السابع - 709 |
| **Office Phone**  | 189 |
| **E-mail**  | b.elzaghmouri@jpu.edu.jo |

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| **Topics Covered**  |
| **Topics**  | **Chapters in Text**  | **Week number**  | **Teaching hours**  |
| **Introduction:** Types of Databases and Database ApplicationsBasic DefinitionsTypical DBMS FunctionalityExample of a Database (UNIVERSITY)Main Characteristics of the Database ApproachDatabase UsersAdvantages of Using the Database ApproachWhen Not to Use Databases | Chapter 1 | 1-2 | 6 |
| **Database System Concepts and Architecture :** Data Models and Their CategoriesHistory of Data ModelsSchemas, Instances, and StatesThree-Schema ArchitectureData IndependenceDBMS Languages and InterfacesDatabase System Utilities and ToolsCentralized and Client-Server ArchitecturesClassification of DBMSs | Chapter 2 | 3-4 | 6  |
| **Data Modeling using the ER model :** Overview of Database Design ProcessExample Database Application (COMPANY)ER Model Concepts* Entities and Attributes
* Entity Types, Value Sets, and Key Attributes
* Relationships and Relationship Types
* Weak Entity Types
* Roles and Attributes in Relationship Types

ER Diagrams - NotationER Diagram for COMPANY SchemaAlternative Notations – UML class diagrams, others | Chapter 3 | 5-6  | 6 |
| **Enhanced ER Modeling:** EER Model Conceptsspecialization/generalizationcategories (UNION types)attribute and relationship inheritance | Chapter 4 | 7 -8 | 6 |
| **The Relational Data Model and Relational Database Constraints:** Relational Algebra* Unary Relational Operations
* Relational Algebra Operations From Set Theory
* Binary Relational Operations
* Additional Relational Operations
* Examples of Queries in Relational Algebra

Relational Calculus* Tuple Relational Calculus
* Domain Relational Calculus

Example Database Application (COMPANY)Overview of the QBE language (appendix D) | Chapter 5 | 9-10 | 6  |
| **Relational Database Design by ER- and EERR-to-Relational Mapping:** ER-to-Relational Mapping Algorithm Mapping EER Model Constructs to Relations  | Chapter 7 | 11-12 | 6 |
| **Schema Definition, Constraints, and Queries and Views:** Data Definition Constraints Queries Views | Chapter 8 | 13-14  | 6 |
| **Normalization :** Functional dependences Normalization  | Chapter 10 | 15  | 6 |

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|  | **Evaluation**  |  |
| **Assessment Tool**  | **Expected Due Date**  | **Weight**  |
| Programming assignments and LMS |   | 20 %  |
| First Exam  |   | 20 %  |
| Second Exam  |   | 20 %  |
| Final Exam  | According to the University final examination schedule  | 40 %  |

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|  | **Policy**  |
| **Attendance**  | Attendance is very important for the course. In accordance with university policy, students missing more than the allowed absence rate of total classes are subject to failure. Penalties may be assessed without regard to the student's performance. Attendance will be recorded at the beginning or end of each class.  |
| **Exams**  | All exams will be CLOSE-BOOK; necessary algorithms/equations/relations will be supplied as convenient.  |

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| **Class Schedule & Room**  |

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| **Office Hours**  |
|  Sun: 8 – 9:30 Mon: 9:30-11  Tues: 11- 12:30  Wed: 11 – 12:30 |

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|  | **Teaching Assistant**  |
| To announced later on.  |  |

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|  | **Prerequisites**  |
| **Prerequisites by course**  | 1001108  |