

# MODULE DESCRIPTION FORM

| Module Information                 |                                |                               |  |  |
|------------------------------------|--------------------------------|-------------------------------|--|--|
| Module Title                       | Principles of Database Systems |                               |  | Module Delivery  |
| Module Type                        | Core                           |                               |  | <input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Practical |
| Module Code                        | IT2103                         |                               |  |  |
| ECTS Credits                       | 6                              |                               |  |  |
| SWL (hr/sem)                       | 150                            |                               |  |  |
| Module Level                       | UG2                            | Semester of Delivery          | 1  |  |
| Administering Department           | Information Technology         | College                       | College of Science   |  |
| Module Leader                      | Hussein Zaki Jassim            | e-mail                        | <a href="mailto:hussein.almngoshi@uowa.edu.iq">hussein.almngoshi@uowa.edu.iq</a> |  |
| Module Leader's Acad. Title        | Asst. Lecturer                 | Module Leader's Qualification | Msc  |  |
| Module Tutor                       | Hussein Zaki Jassim            | e-mail                        | <a href="mailto:hussein.almngoshi@uowa.edu.iq">hussein.almngoshi@uowa.edu.iq</a> |  |
| Peer Reviewer Name                 | Asst. Prof Haider Mohammed     | e-mail                        | <a href="mailto:hayder.alghanami@uowa.edu.iq">hayder.alghanami@uowa.edu.iq</a>   |  |
| Scientific Committee Approval Date | 2025-09-1                      | Version Number                | V1.0   |  |

| Relation with other Modules |      |  |  |          |
|-----------------------------|------|--|--|----------|
| Prerequisite module         | None |  |  | Semester |
| Co-requisites module        | None |  |  | Semester |



Department Head Approval

Dean of the College Approval

| Module Aims, Learning Outcomes and Indicative Contents |  |
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| <b>Module Aims</b>                                     | <ol style="list-style-type: none"> <li>1. Provide a solid understanding of database concepts, principles, and best practices.</li> <li>2. Familiarize students with the design, implementation, and management of databases.</li> <li>3. Cover topics such as data modeling, normalization, and query optimization.</li> <li>4. Develop practical skills in using database management systems and query languages.</li> <li>5. Cultivate critical thinking and problem-solving abilities in the context of database design and administration.</li> <li>6. Prepare students to apply their knowledge in real-world scenarios.</li> <li>7. Equip students to contribute to effective database solutions in the IT industry.</li> </ol>  |
| <b>Module Learning Outcomes</b>                        | <ol style="list-style-type: none"> <li>1. Understand the fundamental concepts and principles of databases, including data models, schemas, and normalization.</li> <li>2. Demonstrate proficiency in designing, implementing, and managing databases using a database management system (DBMS).</li> <li>3. Apply data modeling techniques to develop logical and physical database designs that meet specified requirements.</li> <li>4. Construct and execute complex SQL queries to retrieve, update, and manipulate data stored in a database.</li> <li>5. Evaluate and optimize query performance through the use of indexing, query tuning, and other optimization techniques.</li> <li>6. Implement and enforce data integrity constraints, including entity relationships, referential integrity, and data validation rules.</li> <li>7. Employ appropriate security measures to protect data and ensure database confidentiality, integrity, and availability.</li> <li>8. Utilize backup and recovery procedures to safeguard data and restore databases in the event of failures or disasters.</li> </ol> |
| <b>Indicative Contents</b>                             | <p>Indicative content includes the following.</p> <ol style="list-style-type: none"> <li>1. <b>Introduction:</b><br/>Briefly explain the purpose and goals of the database.<br/>Provide an overview of its intended users and stakeholders.<br/>Outline the benefits and value the database brings to the organization.</li> <li>2. <b>Database Design:</b><br/>Describe the overall structure and organization of the database.</li> </ol>  |

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|  | <p>Identify the key entities, attributes, and relationships within the database.</p> <p>Explain the normalization process employed to ensure data integrity and eliminate redundancy.</p> <p>Discuss any design considerations specific to the database, such as performance optimization or scalability.</p> <p>3. Data Model:</p> <p>Present the conceptual, logical, and physical data models used in the database.</p> <p>Explain the entity-relationship (ER) diagram, tables, and schema design.</p> <p>Discuss the various data types, constraints, and indexes used in the database.</p> <p>Highlight any additional modeling techniques or methodologies applied.</p> <p>4. Functionality and Features:</p> <p>Enumerate the main functions and features provided by the database.</p> <p>Outline the CRUD operations (Create, Read, Update, Delete) supported.</p> <p>Describe any specialized or advanced features, such as data validation, triggers, or stored procedures.</p> <p>Mention any security measures implemented, such as user authentication and access control.</p> <p>5. Data Sources and Integration:</p> <p>Identify the sources of data that feed into the database.</p> <p>Explain any data integration processes, including extraction, transformation, and loading (ETL).</p> <p>Discuss any data quality or cleansing procedures employed to ensure data accuracy.</p> <p>6. Performance and Scalability:</p> <p>Discuss the database's performance characteristics, including response times and throughput.</p> <p>Describe any performance tuning techniques used, such as indexing or query optimization.</p> <p>Explain how the database handles scalability and growth, including considerations for increasing data volume or user load.</p> <p>7. Maintenance and Administration:</p> <p>Outline the procedures for database backup, recovery, and disaster management.</p> <p>Explain the ongoing maintenance tasks, such as data archiving or purging.</p> <p>Describe the roles and responsibilities of database administrators.</p> <p>Mention any monitoring and alerting mechanisms in place.</p> |
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| Learning and Teaching Strategies |  |
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| <b>Strategies</b>                | The learning and teaching strategies for studying the database subject in an IT department involve a balanced approach of theoretical understanding and practical application. Lectures, interactive discussions, and case studies provide the necessary theoretical foundation. Practical exercises, group work, and projects enable hands-on experience with database management systems. Workshops, demos, and industry examples offer real-world insights. Online resources, assessments, and feedback aid in reinforcing learning. Virtual labs and continuous learning emphasize practical skills. |

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|  | development and staying updated with industry trends. These strategies ensure a comprehensive understanding of databases and their relevance in the IT field. |
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| Student Workload (SWL)        |                               |                               |   |
|-------------------------------|-------------------------------|-------------------------------|---|
| <b>Structured SWL (h/sem)</b> | 60                            | <b>Structured SWL (h/w)</b>   | 4 |
| <b>Unstructured SWL (h/se</b> | 87                            | <b>Unstructured SWL (h/w)</b> | 6 |
| <b>Total SWL (h/sem)</b>      | $147 + 3 \text{ final} = 150$ |                               |   |

| Module Evaluation           |                           |             |                         |            |                           |
|-----------------------------|---------------------------|-------------|-------------------------|------------|---------------------------|
|                             |                           | Time/Number | Weight (Marks)          | Week Due   | Relevant Learning Outcome |
| <b>Formative assessment</b> | <b>Quizzes</b>            | 5           | 10% (8)                 | 2,4,6,8,10 | 1,2,3,4,5,6,7             |
|                             | <b>OnSite Assignments</b> | 5           | 10% (5)                 | 2,4,7,9,12 | 3,5,8                     |
|                             | <b>Projects.</b>          | 1           | 10% (7)                 | 12         | All                       |
|                             | <b>Lab</b>                | 5           | 10% (15)                | 3,5,7,9,11 | All                       |
|                             | <b>Home Work</b>          | 5           | 10%(5)                  | 2,5,8,9,12 | All                       |
| <b>Summative assessment</b> | <b>Midterm Exam</b>       | 2hr         | 10% (10)                | 7          |                           |
|                             | <b>Final Exam</b>         | 3hr         | 50% (50)                | 16         |                           |
| <b>Total assessment</b>     |                           |             | <b>100% (100 Marks)</b> |            |                           |

| Delivery Plan (Weekly Syllabus) |   |
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|                                 | Material Covered  |
| <b>Week 1</b>                   | Introduction to databases: concepts, importance, and applications<br>Relational database management systems (RDBMS) |

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| <b>Week 2</b>  | Overview: Introduction to Structured Query Language (SQL)                              |
| <b>Week 3</b>  | Database design principles and data models   |
| <b>Week 4</b>  | Entity-Relationship (ER) modeling and ER diagrams                                      |
| <b>Week 5</b>  | Database constraints: primary key, foreign key   |
| <b>Week 6</b>  | Database constraints unique, and check constraints                                     |
| <b>Week 7</b>  | Database administration and security: user management, permissions, and access control |
| <b>Week 8</b>  | Backup and recovery strategies for databases   |
| <b>Week 9</b>  | Indexing and query optimization techniques   |
| <b>Week 10</b> | Transaction management and concurrency control in databases                            |
| <b>Week 11</b> | Relational model and relational calculus   |
| <b>Week 12</b> | Relational model and relational algebra  |
| <b>Week 13</b> | Transaction management and concurrency control in databases                            |
| <b>Week 14</b> | Transaction management and concurrency control in databases                            |
| <b>Week 15</b> | Database performance monitoring.   |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>  |

| <b>Delivery Plan (Weekly Lab. Sy</b> |  |
|--------------------------------------|--|
|                                      | <b>Material Covered</b>  |
| <b>Week 1</b>                        | Lab 1: Setting up the database environment   |
| <b>Week 2</b>                        | Lab 2: practicing basic SQL queries  |
| <b>Week 3</b>                        | Lab 3: Designing an ER diagram for a given scenario  |
| <b>Week 4</b>                        | Lab 4: translating ERD into a relational schema  |
| <b>Week 5</b>                        | Lab 5: Normalizing a sample dataset and implementing the normalized tables in the database |
| <b>Week 6</b>                        | Lab 6: Learn all types of data used in database systems                                    |
| <b>Week 7</b>                        | Lab 7: Learn to create a database with all specifications                                  |
| <b>Week 8</b>                        | Lab 8: Learn to create tables with the ability to modify fields                            |
| <b>Week 9</b>                        | Lab 9: Learn addition operations for constraints in tables with constraints                |
| <b>Week 10</b>                       | Lab 10: Learn operations for updates to constraints in tables with constraints             |
| <b>Week 11</b>                       | Lab 11: Learn delete operations for constraints in tables with constraints                 |
| <b>Week 12</b>                       | Lab 12: Learn to build procedures for adding and modifying data                            |

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| <b>Week 13</b> | Lab 13: Learn to build procedures with input variables                               |
| <b>Week 14</b> | Lab 14: Learn to construct procedures with output variables                          |
| <b>Week 15</b> | Lab 15: Implementation of an integrated database management project for each student |

| Learning and Teaching Resources |   |                           |
|---------------------------------|---|---------------------------|
|                                 | Text  | Available in the Library? |
| <b>Required Texts</b>           | Elmasri, Ramez, and Shamkant Navathe. Fundamentals of database systems. AddisonWesley Publishing Company, 2018. | Yes                       |
| <b>Recommended Texts</b>        | Database design, application and development.   | No                        |
| <b>Websites</b>                 | <a href="http://www.sqlcourse.com/">http://www.sqlcourse.com/</a>   |                           |

| Grading Scheme                  |                         |                   |           |                                       |
|---------------------------------|-------------------------|-------------------|-----------|---------------------------------------|
| Group                           | Grade                   | Mark              | Marks (%) | Definition                            |
| <b>Success Group (50 - 100)</b> | <b>A - Excellent</b>    | Excellent         | 90 - 100  | Outstanding Performance               |
|                                 | <b>B - Very Good</b>    | Very Good         | 80 - 89   | Above average with some errors        |
|                                 | <b>C - Good</b>         | Good              | 70 - 79   | Sound work with notable errors        |
|                                 | <b>D - Satisfactory</b> | Fair / Average    | 60 - 69   | Fair but with major shortcomings      |
|                                 | <b>E - Sufficient</b>   | Pass / Acceptable | 50 - 59   | Work meets minimum criteria           |
| <b>Fail Group (0 - 49)</b>      | <b>FX – Fail</b>        | Fail (Pending)    | (45-49)   | More work required but credit awarded |
|                                 | <b>F – Fail</b>         | Fail              | (0-44)    | Considerable amount of work required  |
|                                 |                         |                   |           |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.