Relational Databases

1. **Course number and name:** 020BDRES2/020RDBES2 Relational Databases

2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours

3. **Name of course coordinator:** Khalil Hariss

4. **Instructional materials:** Slides; course handouts in-class problems

   References:
   - http://www.mysql.com/
   - https://www.microsoft.com/en-us/sql-server/
   - http://www.oracle.com/
   - Fundamentals of Database Systems, El Masri, 7th edition
   - Modern Database management, Hoffer Prescott, nineth edition

5. **Specific course information**
   a. **Catalog description:**
   This course provides a comprehensive introduction to database systems, emphasizing both theoretical foundations and practical applications. Topics include logical models of databases, relational algebra, and database design principles such as functional dependencies. Students will gain proficiency in Structured Query Language (SQL), covering both basic commands and advanced queries. Additional topics include views, triggers, functions, and stored procedures within database management systems. The course also explores indexing structures for physical database design. Students will develop skills to translate relational algebra into SQL and design efficient database solutions.

   b. **Prerequisites:** None

   c. **Required** for CCE students

6. **Educational objectives for the course**
   a. **Specific outcomes of instruction:**
   - Understand Database Fundamentals: Explain the fundamental concepts of database systems, including the role of databases and the differences between logical models.
   - Apply Relational Algebra: Use relational algebra as a theoretical foundation for understanding database queries.
   - Design Efficient Databases: Identify and apply functional dependencies to normalize databases and design efficient database schemas.
   - Master SQL Commands: Write and execute basic and advanced SQL queries to interact with relational databases.
   - Utilize Database Views: Create and manage views within a database management system to simplify and secure data access.

- Implement Triggers and Stored Procedures: Design and implement triggers, functions, and stored procedures to enhance database functionality.
- Translate Theory to Practice: Convert relational algebra expressions into SQL queries and vice versa, bridging theoretical concepts with practical applications.
- Optimize Database Performance: Understand and apply indexing structures and physical database design principles to improve query performance.

b. PI addressed by the course:

PI	1.1	1.2	1.3	2.1	2.2	2.3	4.2
Covered	x	x	x	x	x	x	x
Assessed	x	x	x	x	x	x	x

7. Topics and approximate lecture hours

- Introduction to Databases (2 lectures).
- Data Modeling and ER Diagram (2 lectures).
- Logical Models of Databases (3 lectures).
- Relational Algebra (2 lectures).
- Functional Dependencies and Database Design (3 lectures).
- Basic SQL Commands and Queries (2 lectures).
- Advanced SQL Queries (5 lectures).
- Functions, Stored Procedures, Triggers (2 lectures).
- Translate Relational Algebra to SQL (2 lectures).
- Indexing Structures for Files and Physical Database Design (1 lecture).