UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
COMP-302	Database Management Systems	6
Prerequisites	**Department**	**Semester**
Junior Standing	Computer Science	Fall, Spring
Type of Course	**Field**	**Language of Instruction**
Required	Computer Science	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st Cycle	Dr Vasso Stylianou	3rd
Mode of Delivery	**Work Placement**	**Corequisites**
Face-to-face	N/A	None

Course Objectives:

The main objectives of the course are to:

1. Explain the purpose and architecture of database-management systems (DBMS).
2. Build a solid foundation in the relational model, ER modelling, and relational algebra.
3. Develop competence in SQL for data definition, manipulation, control, and selected advanced features (CTEs, window functions, JSON).
4. Teach high-quality schema design: normalisation, integrity constraints, basic physical design.
5. Introduce transaction processing, isolation levels, and recovery.
6. Introduce students to cloud-hosted and distributed relational services.
7. Compare relational technology with key NoSQL families.
8. Demonstrate how relational stores support business-intelligence pipelines.
9. Highlight security, compliance, and ethical responsibilities in data management.

Learning Outcomes:

After completion of the course, students are expected to be able to:

1. Describe DBMS components and their roles.
2. Model application domains with ER diagrams and map them to relational schemas.
3. Write ANSI SQL queries, including CTEs, window functions, and JSON operations.
4. Apply 1NF → BCNF normalisation and justify denormalisation when appropriate.
5. Design basic physical structures (data types, indexes) and interpret execution plans.
6. Configure transactions, isolation levels, and recovery mechanisms.
7. Deploy a small cloud database with automated backups and read replication.

8. Explain encryption, Role-Based Access Control (RBAC), auditing, GDPR, and related ethical issues.
9. Summarise key-value, document, column-family, and graph stores and justify when a relational design is preferable.
10. Build a simple ETL process, populate a star schema, and issue OLAP queries.

Course Content:

1. DBMS overview; data ethics & societal impact.
2. Relational model; relational algebra; SQL setup.
3. ER modelling; mapping ER → relations.
4. SQL DDL & core DML.
5. Joins, sub-queries, set ops, CTEs.
6. Window functions; JSON columns; intro to plans.
7. Normalisation (1NF–BCNF).
8. Physical design: data types, indexing, partitioning; plan analysis.
9. Transactions & concurrency; security & compliance.
10. Cloud & distributed relational DBs; scalable analytics demo.
11. BI pipeline (ETL, star schema, OLAP); NoSQL overview.

Learning Activities and Teaching Methods:

Interactive lectures; Supervised labs; CASE tools demonstrations; Team project integrating modelling, SQL, BI, and ethics.

Assessment Methods:

Midterm exam; Team project; Final exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Database Processing; Fundamentals, Design, and Implementation, 16th ed.	Kroenke, D. M., Auer, D. J., Vandenberg, S. L., Yoder R. C.	Pearson	2021	9780136930174

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Fundamentals of Database Systems, 7th ed.	Elmasri, R., & Navathe, S.	Addison-Wesley	2017	9780470440513
Database System Concepts, 7th ed	Silberschatz, A., Korth, H. F., & Sudarshan, S.	McGraw-Hill	2020	
Designing Data-Intensive Applications	Kleppmann, M.	O'Reilly	2017	
SQL Performance Explained, 3rd ed.	Winand, M.		2022	
Official documentation: PostgreSQL 16, MySQL 8				
Cloud provider tutorials: AWS RDS, Azure SQL, Google Cloud SQL & BigQuery				