COURSE OUTLINE

GENERAL

SCHOOL	Sciences and Engineering		
ACADEMIC UNIT	Computer Science		
LEVEL OF STUDIES	1st Cycle		
COURSE CODE	COMP-302	**SEMESTER**	Fall/Spring
COURSE TITLE	Database Management Systems		
INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*		**WEEKLY TEACHING HOURS**	**CREDITS**
		2.5	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special Background		
PREREQUISITE COURSES:	Sophomore Standing		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)			

LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

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

- Describe DBMS components and their roles.
- Model application domains with ER diagrams and map them to relational schemas.
- Write ANSI SQL queries, including CTEs, window functions, and JSON operations.
- Apply 1NF → BCNF normalisation and justify denormalisation when appropriate.
- Design basic physical structures (data types, indexes) and interpret execution plans.
- Configure transactions, isolation levels, and recovery mechanisms.

- Deploy a small cloud database with automated backups and read replication.
- Explain encryption, Role-Based Access Control (RBAC), auditing, GDPR, and related ethical issues.
- Summarise key-value, document, column-family, and graph stores and justify when a relational design is preferable.
- Build a simple ETL process, populate a star schema, and issue OLAP queries.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

The course primarily aims at the following general competencies:

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Adapting to new situations
- Decision-making
- Working independently
- Team work
- Project planning and management
- Showing social, professional and ethical responsibility and sensitivity to gender issues
- Criticism and self-criticism
- Production of free, creative and inductive thinking

SYLLABUS

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.

TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Use of ICT in teaching / Χρήση ΤΠΕ
Communication with students / Επικοινωνία με Φοιτητές</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>35</td></tr>
<tr><td>Project</td><td>41</td></tr>
<tr><td>Weekly preparation</td><td>40</td></tr>
<tr><td>Exam preparation</td><td>30</td></tr>
<tr><td>Exams (midterm and final)</td><td>4</td></tr>
<tr><td>Course total</td><td>150</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>Group Project, Midterm Exam, Final Exam</td></tr>
</table>

ATTACHED BIBLIOGRAPHY

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Database Processing; Fundamentals, Design, and Implementation, 16/e	D. M. Kroenke, D. J. Auer, S.L.Vandenberg	Pearson	2021	**9780136931577**

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				