



## Course Syllabus

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

### Course Objectives:

The main objectives of the course are to:

- Examine databases, database management systems and their role in the organization.
- Follow historically the development of database management systems until present time.
- Analyze data models and data modeling techniques.
- Cover relational database design by converting a conceptual data model to a database schema.
- Explain normalization and use it to design normalized relational databases.
- Cover Structured Query Language's (SQL), data definition (DDL), data manipulation (DML), and data control (DCL) components.
- Introduce data and database administration functions.
- Introduce on-line transaction processing (OLTP) and its role in the business environment.
- Introduce business intelligence to include on-line analytic processing (OLAP), data warehousing, data mining.

### Learning Outcomes:

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

1. Explain the role of databases and database management systems in managing organizational data and information.
2. Follow the historical development of database management systems and logical data models.
3. See the role of information requirements specification processes in the broader systems analysis and design context.

4. Distinguish between the basic approaches to data modeling techniques (i.e. object-oriented data modeling, semantic data modeling, etc.)
5. Use at least one conceptual data modeling technique (such as entity-relationship modeling) to capture the information requirements for an enterprise domain.
6. Design high-quality relational databases.
7. Explain the purpose and principles of normalizing a relational database structure and design a normalized relational database.
8. Implement a relational database design using an industrial database management system, including the principles of data type selection and indexing.
9. Use the data definition, data manipulation, and data control language components of SQL in the context of one widely use implementation of the language.
10. Perform simple database administration tasks.
11. Understand the concept of database transaction and apply it appropriately to an application context.
12. Understand the role of databases and database management systems in the context of enterprise systems.
13. Understand the difference between on-line transaction processing (OLTP) and on-line analytic processing (OLAP), and the relationship between these concepts and business intelligence, data warehousing and data mining.

#### Course Content:

- 1) Basic File Processing Concepts
- 2) Database Approach
- 3) Types of Database Management Systems
- 4) Conceptual Data Model
  - a) Entity-relationship model
  - b) Object-oriented data model
  - c) Specific modeling grammars
  - d) Semantic data modeling
- 5) Logical Data Model
  - a) Hierarchical data model
  - b) Network data model
  - c) Relational data model
    - Relations and relational structures
    - Relational database design
      - Mapping conceptual schema to a relational schema
      - Normalization
      - Anomalies
- 6) Physical Data Model
  - a) Indexing
  - b) Data types
- 7) Structured Query Language (SQL): DDL, DML, and DCL
- 8) Data and Database Administration
- 9) Data Views
  - a) Virtual views (i.e. declaring views, query views, etc.)

- b) Modifying views (i.e. Triggers)
- 10) Transaction Processing
- 11) Business intelligence
  - a) On-line analytic processing
  - b) Data warehousing
  - c) Data mining

**Learning Activities and Teaching Methods:**

Lectures, Lab Sessions, CASE tools demonstrations, Exercises

**Assessment Methods:**

Final Exam, Midterm Exam, Coursework

**Required Textbooks / Readings:**

Title	Author(s)	Publisher	Year	ISBN
Database Processing; Fundamentals, Design, and Implementation, 14/e	D. M. Kroenke, D. J. Auer	Pearson	2016	9780133876703

**Recommended Textbooks / Readings:**

Title	Author(s)	Publisher	Year	ISBN
Beginning Database Design Solutions	S. Rod	Wiley Publ. ProQuest ebrary	2009	9780470440513
Database Modeling and Design, 5/e	T.J. Teorey, S.S. Lightstone, T. Nadeam, H.V. Jagadish	Morgan Kaufmann and Elsevier (Science Direct Platform)	2011	978-0123820204
Database Modeling with Microsoft Visio	T. Halpin, K. Evans, P. Hallock, B. Maclean	Morgan Kaufmann and Elsevier (Science Direct Platform)	2003	978-1558609198

Database Management Design	C.S.V. Murthy	Himalaya Publ. ProQuest ebrary	2008	9789350432761
Fundamentals of Database Systems, 7/e	R. Elmasri, S. Navathe	Addison-Wesley	2017	978-0133970777
Database System Concepts, 5/e	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2006	9780071325226

**Weekly Schedule:**

<b>Week</b>	<b>Topic</b>	<b>Assigned Readings</b>
1	Databases, database management systems and their role in the organization. An introduction.	Ch. 1
2	Structured Query Language (SQL): DML component; Building queries	Ch. 2
3	Structured Query Language (SQL): DML component; Building queries (Continued)	Ch. 2
4	Logical Data Model: Hierarchical, Network, Relational data model; Relations and relational structures	Ch. 3 (Part I)
5	Conceptual Data Model: Entity-relationship model, Object-oriented data model, Specific modeling grammars, Semantic data modeling	Ch. 5
6	Relational database design <ul style="list-style-type: none"> <li>• Mapping conceptual schema to a relational schema</li> <li>• Normalization</li> </ul>	Ch. 6, Ch. 3 (Part II), Ch. 4
7	Relational database design <ul style="list-style-type: none"> <li>• Mapping conceptual schema to a relational schema</li> <li>• Normalization (Continued)</li> </ul>	Ch. 6, Ch. 3 (Part II), Ch. 4
8	Revision and <b>Midterm Exam</b>	Ch. 1-6
9	Physical Data Model – Database Implementation: Data types, indexing. Data Views Structured Query Language (SQL): DDL, DML, and DCL	Ch. 7
10	Data and Database Administration. Database Redesign.	Ch. 8
11	Multi-user databases. Database Administration, Security, Recovery, etc.	Ch. 9
12	Advanced Topics; <b>Project submission;</b> <b>Revision</b>	Selected material
13	Study Week	
14 -15	Final Exam	