COURSE OUTLINE

(1) GENERAL

SCHOOL	Information Sciences and Technology		
ACADEMIC UNIT	Department of Statistics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**6245**	**SEMESTER**	**6th**
COURSE TITLE	Introduction to Database Management Systems		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	4	7
Labs	2	

COURSE TYPE	General Background - Elective
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://www.dept.aueb.gr/en/stat-courses

(2) LEARNING OUTCOMES

Learning outcomes
The aim of this course is for the students to be able to correctly design and implement a database application, to know how to set simple and complex questions in the database and to define those structures that lead to optimal system performance.
General Competences
After completing the course the student will be able to: - Model a business or institution's data using Entity Relationship Models or the relational model. - Write simple or complex questions in SQL, through which they manage a relational database or retrieve data in various ways. - Use a relational database management system for all the above.

(3) SYLLABUS

Databases began as a simple application in early 70s and grew to one of the most important fields in computer industry, touching hundreds of IT applications. This outcome was somehow expected, since the focus of database

research is the description, storage and usage of data. To describe a database application, we need a data model, such as the entity-relationship or the relational model. To retrieve and make use of the stored data, we need a generic query language, such as SQL. Finally, there are numerous ways to store data, depending on how this will be used. The goal of this course is to educate students on how to design properly, build efficiently and use a database intelligently. Furthermore, it should make apparent the various trade-offs that exist in designing, building and using such an application. The aim of this course is for the students to be able to correctly design and implement a database application, to know how to set simple and complex questions in the database and to define those structures that lead to optimal system performance.
The course contents include:

- Introduction: Purpose, data models, database languages, users, transactions, architecture.
- Entity-Relationship Model: Entities, relationships, attributes, keys, mapping cardinalities, weak entities, E-R diagrams, mapping to tables, examples.
- Relational Model: Relations, relational schema, relational algebra.
- The SQL Language: Basic structure, nested subqueries, aggregation, views, update, procedural and embedded SQL, triggers.
- Relational Design: Integrity constraints, functional dependencies, decomposition, normalization.
- Storing and Indexing: File organization, indexing, hashing, trees.
- Special Topics (if there is time): Data warehousing, OLAP, data mining, data streams, OO DBs.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td><td>YES</td></tr>
<tr><td>TEACHING METHODS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Class lectures</td><td>52</td></tr>
<tr><td>Lab Exercise</td><td>20</td></tr>
<tr><td>Project/Report Writing</td><td>35</td></tr>
<tr><td>Individual Study</td><td>68</td></tr>
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<tr><td>Course total</td><td>175</td></tr>
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<tr><td>STUDENT PERFORMANCE EVALUATION</td><td>Written exam at the end of the semester: 70%
Coursework/Projects w/ Oral Examination: 30%</td></tr>
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(5) ATTACHED BIBLIOGRAPHY

- Database System Concepts, Silberschatz et al., 7th Ed., Εκδόσεις Μ. Γκιούρδας
- «Συστήματα Διαχείρισης Βάσεων Δεδομένων», Τόμος Α΄ & Β΄, R. Ramakrishnan & J. Gehrke, 3η έκδοση, Εκδόσεις Τζιόλα,
- «Θεμελιώδεις Αρχές Συστημάτων Βάσεων Δεδομένων», 7η έκδοση, R. Elmasri S. B. Navathe, Εκδόσεις Δίαυλος.