COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering			
DEPARTMENT	Electrical and Computer Engineering			
LEVEL OF STUDY	Undergraduate			
COURSE UNIT CODE	3.005	**SEMESTER**	3rd	
COURSE TITLE	Introduction to Database Systems			
	COURSEWORK BREAKDOWN		**TEACHING WEEKLY HOURS**	**ECTS Credits**
	Theory (Lectures)		3	4
	Tutorial/Exercises		1	1
	TOTAL		**4**	**5**
COURSE UNIT TYPE	Specialized general knowledge/Skills development			
PREREQUISITES				
LANGUAGE OF INSTRUCTION/EXAMS	Greek			
COURSE DELIVERED TO ERASMUS STUDENTS	No			
WEB PAGE (URL)	https://eclass.hmu.gr/courses/ECE156/			

(2) LEARNING OUTCOMES

Learning Outcomes

The course comprises theoretical treatment and practice and experience exercises. The objective in the theoretical part is to introduce students to the central themes of database systems with emphasis on the following:

- Data modelling, database management systems, architecture of database management systems
- Conceptual data modelling using the Entity-Relationship model and the extended Entity-Relationship model as a tool for database design
- Logical database design using the relational model of data (with emphasis on primitive constructs, integrity constraints and data manipulation languages including relational algebra, relational calculus as well as commercial systems such as SQL, QBE, GQBE, etc.
- General methodology for database analysis and design.

Practice and experience exercises seek to allow students to gain hands-on experience with the analysis and design of databases. This is achieved through a combination of dedicated exercises and / or suitable case studies.

Successful completion of the course will enable students to undertake design and development (conception, analysis, design and implementation) of a database application using an established relational technology (such as PostgreSQL).

General Skills

- Autonomous work
- Teamwork
- Search, analysis and synthesis of data and information, using the necessary technologies
- Decision making
- Promoting liberal, creative and inductive/deductive thinking
- Work in an interdisciplinary environment

(3) SYLLABUS

Four general sections:

- Introduction to data models and databases with emphasis on defining data models, review of classical data models, principles and advantages of database systems, architectural underpinnings of database systems, logical and physical design of databases
- Entity-Relationship model by accounting for its basic concepts and constructs, the extended model and its visual language as well as the application of Entity-Relationship modelling in selected case studies
- The relational model of data highlighting the basic relation as a primitive construct for representing data; properties of relations, integrity constraints, data definition and manipulation languages (including relational algebra, relational calculus, but also modern systems such as SQL, QBE, GQBE) and transformation of Entity-Relationship model to relational schema and vice versa
- Design of relational schemas outlining update anomalies and problems with the relational model, principles of good database design and normal forms.

(4) TEACHING METHODS - ASSESSMENT

<table>
<tr><td>MODE OF DELIVERY</td><td>In-Class Face-to-Face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY</td><td>▪ Use of ICTs in lecturing
▪ Use of ICTs for the communication with students via the e-class platform</td></tr>
<tr><td>EACHING ORGANIZATION</td><td>
<table>
<tr><th>Method description/Activity</th><th>Semester Workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Project (journal/paper reading and theoretical study)</td><td>20</td></tr>
<tr><td>Tutorials</td><td>35</td></tr>
<tr><td>Non-guided personal study</td><td>30</td></tr>
<tr><td>Total Contact Hours</td><td>120</td></tr>
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<tr><td>ASSESSMENT METHODS</td><td>The course grade is based on written examination (100 %. The exam is structured as follows:
1. Part A (50 %) includes five (5) questions aiming to assess the students' understanding of key theoretical concepts and constructs. The response to each question is typically short but may require critical thinking)
2. Part B (50 %) presents three (3) design challenges of comparable complexity. Students are required to select and solve two (out of the three challenges). Each challenge may be split into sub-challenges, thus covering a range of topics.</td></tr>
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(5) RECOMMENDED BIBLIOGRAPHY

-Recommended Bibliography:

- *H. Garcia-Molina, J. Ullman, J. Widom (2020): Database Systems (single volume), Crete University Publishing.*
- *A. Silberschatz, H. F. Korth & S. Sudarshan (2001): Database System Concepts (4th Edition), McGraw-Hill ISBN 0-07-255481-9.*
- *R. Elmasri & S. Navathe (1996): Fundamentals of Database Systems, Μετάφραση στα Ελληνικά από τις εκδόσεις "ΔΙΑΥΛΟΣ".*
- *P. P-S Chen (1976): The Entity-Relationship Model-Toward a Unified View of Data, ACM Transactions on Database Systems 1(1), pp.9-36*

Relevant Scientific Journals:

- *ACM Transactions on Database Systems*