Course Name : Database Fundamentals

Course Code	Course Type	Regular Semester	Lecture (hours/week)	Seminar (hours/week)	Lab. (hours/week)	Credits	ECTS
EMS 217	B	Fall	3.00	1.00	0.00	3.50	5.00

Lecturer	Grasiela Baçellari, MSc
Assistant	
Course language	English
Course level	Bachelor
Description	This course provides the necessary theoretical and practical basis related to databases and relational database management systems. Aspects of building a relational database, accessing, manipulating and deleting data in a database will be covered. As well as aspects of the administration of a database.
Objectives	To acquaint students with: 1. Databases, DBMS, 2. The steps followed for the construction and manipulation of databases, 3. The necessary knowledge for database management, 4. How to prevent data loss.
Core Concepts	Basics of Tables SELECT and WHERE Clause WHERE, AND & OR with Operators BETWEEN, IN and NULL Single Table Queries Single Row Functions Grouping Functions GROUP BY and HAVING Clause Joins Inner and Outer Joins EXISTS & NOT EXIST Operators Creating Your Own Tables Using ALTER Creating Tables with SELECT & UPDATE Data DELETE, TRUNCATE, and DROP Commands

Course Outline

Week	Topic
1	Introduction, Syllabus, Course Schedule
2	Introduction to Databases and DBMS. In this topic, the basic knowledge about databases, database management systems, its users and the advantages of DBMS will be covered. (Fundamentals of Database Systems pg.4-22)
3	Data Models. The data model defines the logical structure of how a database is designed. In this topic, the ER, EER, relational model will be treated, as well as the transition from the ER model to the relational model. (Fundamentals of Database Systems pg.60-80 & 150-165)
4	Normal Forms. Normalization is a technique that re-organizes database tables to reduce data dependencies. This topic will focus on the forms of normalization as well as the normalization of relations. (Fundamentals of Database Systems pg.460-483; Learn SQL Database Programming pg 22-30)
5	Introduction to SQL. During this topic, the SQL language will be introduced. Database creation, table creation and modification, data types, temporary tables, table deletion will be covered. (Fundamentals of Database Systems pg.179-188)
6	Data access from one or more tables. In this topic, the methods of data access will be discussed. SELECT command, row filtering, row sorting and aggregate functions(MAX(), MIN(), COUNT(),SUM(), AVG()). Accessing data from more than one table (JOIN, UNION, SUBQUERY) (Fundamentals of Database Systems pg.188-198; SQL (Database Programming) pg.317-350)
7	DML statements - Adding, deleting and modifying data. In this topic, the commands for adding, deleting and modifying data will be dealt with. INSERT, UPDATE, DELETE and TRUNCATE commands. (Fundamentals of Database Systems pg.198-203; SQL (Database Programming) pg.521-550)
8	Midterm

9	Indexes and Views. This topic will cover indexes and views. Creating, changing and deleting views will be illustrated. As well as the different types of indexes will be treated. (Fundamentals of Database Systems pg.228-235; SQL (Database Programming) pg.611-630)
10	Programming in SQL. This topic will cover the main elements of programming through SQL. How to create and use variables, key conditional and loop structures, procedures and functions. (Fundamentals of Database Systems pg.310-340)
11	Programming in SQL - Triggers . This topic will cover triggers. What are triggers and their types. How triggers are created and used. (Learn SQL Database Programming pg. 407- 413; Fundamentals of Database Systems pg.963-970)
12	Transactions. This topic will cover transactions. What are the characteristics of transactions and types of transactions. Explicit and implicit transactions. (SQL (Database Programming) pg.640-649; Fundamentals of Database Systems pg.747-756)
13	Backup and restore. Preventing damage or loss of database data is very important. Backup and restore will be dealt with in this topic. Several strategies for database backup and data recovery depending on the backup strategy used. (Fundamentals of Database Systems pg.814-834)
14	Security of databases. This topic addresses authentication and authorization processes for more secure data access. (Fundamentals of Database Systems pg.1122-1150)
15	Project and Review
16	Final Exam

Prerequisites	The student must attend the course at a minimum rate of 75%.
Literature	• "SQL Database Programming" Fifth Edition by Chris Fehily, Questing Vole Press 2020 • “Fundamentals of Database Systems” Seventh Edition by Ramez Elmasri, Shamkant Navathe, Pearson 2015
References	• "Learn SQL Database Programming: Query and manipulate databases from popular relational database servers using SQL" by Josephine Bush, Packt Publishing 2020

Course Outcome

1	The student manages to create a simple database.
2	The student manages to make different queries in the database.
3	The student manages to manipulate the data of a database with SQL Server or MySQL..
4	The student is able to administer a database.

Course Evaluation

In-term Studies	Quantity	Percentage
Midterms	1	30
Quizzes	0	0
Projects	1	20
Term Projects	0	0
Laboratory	0	0
Class Participation	1	10
Total in-term evaluation percent		**60**
Final exam percent		**40**
Total		**100**

ECTS Workload (Based on Student Workload)

Activities	Quantity	Duration (hours)	Total (hours)
Course duration (Including the exam week: 16x Total hours of the course)	16	4	64
Study hours outside the classroom (Preparation, Practice, etc.)	14	3	42
Duties	1	2	2
Midterms	1	7	7
Final Exam	1	10	10
Other	0	0	0
Total Work Load			**125**
Total Work Load / 25 (hours)			**5.00**
ECTS			**5.00**