

**Winter Term MBA 2023**

**1/2 credit**

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DB Introduction to Databases

Introduction

*A database is a set of related information. In the old times, that information was stored on paper. Nowadays, computer database systems have replaced the paper databases. Since they store data electronically rather than on paper, they are able to retrieve the information faster, and to index the data in multiple ways.*

*There are different ways to store and represent the data, but one of them, the relational database management system, has dominated the world of databases since the 1980’s. For most users, database is a synonym of relational database. In relational databases, the data are organized in tables, with fields (columns) and records (rows). All the data in the same column are of the same type (numeric, text, etc.). The queries are operations which extract information from one or several tables, typically by filtering and aggregation.*

*To build databases and interact with them, we use a language called SQL. Many people query databases by using SQL unconsciously, since they communicate with a database server through a graphical interface, with drop down menus and mouse clicks. But SQL is still worth to know, because using it in a direct way allows us to query databases in a more efficient way and helps us to understand how information systems are structured. So, familiarity with SQL is a typical requisite in job descriptions.*

*What makes SQL so popular? First, that it can cope with practically any question you can write about your data, as far as they can be stored in a single server and fit in the relational format. Second, it is fast, compared to the alternatives at hand. It seemed, a few years ago, that the preeminence of SQL was over, as the big data wave, which brought the 3V challenge (volume, variety and velocity) gave birth to the so called NoSQL databases. But most of these new approaches to database management provide SQL-like interfaces, to make users comfortable.*

Objectives

*The objectives of this course are:*

* *To introduce the student to the world of databases.*
* *To show, through examples, how to use SQL in querying databases.*

Learning Outcomes

After taking this course, the students will be able to:

* *Query a database by means of SQL statements.*
* *Manage table joins and subqueries in SQL statements.*
* *Import/export data between databases and text files.*

**Competences**

*The students of this course will****:***

* *Develop a comprehensive view of the world of relational databases.*
* *Understand the basics of the SQL language.*
* *Understand the limitations of relational databases.*
* *Be able to design queries for a number of different purposes.*
* *Develop a programmatic approach to database management.*

**Content**

1. *General introduction.*
2. *Creating databases.*
3. *Query basics.*
4. *Joining tables.*
5. *Subqueries, virtual tables and views.*
6. *Conditional logic.*

**Methodology**

*This course is based on a learning-by-doing approach. The different ways of interacting with a relational database are introduced directly, through their application to real databases. It includes a brief introduction to the SQL language. Laptops are allowed in class, as far as they are used to replicate the current analysis.*

*The course materials include a concise introduction to every topic and some tutorials including SQL code. This is complemented by day-to-day short exercises, discussed in class, and a final assignment.*

**Evaluation**

* *Class participation (1/2)*
* *Individual assignment (1/2).*

Course Outline

**Title of Session & Material**

|  |  |  |
| --- | --- | --- |
| *Session* | *Title* | *Material* |
| 1 | *General introduction* | [DB-01] Introduction to relational databases |
| 2 | *Creating databases* | [DB-02] Creating a database |
| 3 | *Query basics* | [DB-03] Query basics |
| 4 | *Advanced queries* | [DB-04] More on queries |
| 5 | *Joining tables* | [DB-05] Joins and unions |
| 6 | *Subqueries* | [DB-06] Subqueries |
| 7 | *Views and common table expressions* | [DB-07] Views and common table expressions |
| 8 | *Conditional logic* | [DB-08] Conditional logic |
| 9 | *Indexes and constraints* | [DB-09] Indexes and constraints |
| *Assignment* | | |
| 10 | *Discussion of the assignment* |  |

Bibliography

1. *A Beaulieu (2009), Learning SQL, O’Reilly.*
2. *A Opel (2011), Databases Demystified, McGraw-Hill.*

**Professor’s Biography**

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**Prof. Miguel Ángel Canela**

*Associate Professor of Decision Analysis*

*Prof. Canela holds a PhD degree in Mathematics from the Universitat de Barcelona (1980). Before joining IESE in 2009, he was a professor at the Department of Applied Mathematics and Analysis of that university and a part-time professor of the PhD program at IESE. He also worked many years as a consultant at the Institut Català de Tecnologia.*

*At IESE, he currently teaches data science, database management and machine learning in the MBA and MiM programs.*