

<i>Course</i>	<b>Mechanical and Industrial Informatics</b>			<i>Academic year</i>	2021/2022		
<i>Subject</i>	<b>Industrial Information Systems</b>			ECTS	5		
<i>Type of course</i>	<b>Compulsory</b>						
<i>Year</i>	<b>3rd</b>	<i>Semester</i>	<b>1st</b>	<i>Student Workload:</i>			
<i>Professor(s)</i>	<b>José Carlos Coelho Martins da Fonseca</b>			<i>Total</i>	135	<i>Contact</i>	60
<i>Area Coordinator</i>	<b>Maria Clara dos Santos Pinto Silveira</b>						

**Planned SD**

## 1. LEARNING OBJECTIVES

Upon completion of the UC, students should be able to:

1. Develop Oracle databases securely in a competitive environment
2. Manipulate and analyse databases using SQL
3. Program procedures, functions and triggers in the PL/SQL language

## 2. PROGRAMME

1. Introduction to databases
2. Database conceptual model
  - a. Entity-relationship model
  - b. Normalisation
  - c. Denormalisation
3. Programming in SQL
  - a. Table and view manipulation
  - b. Data integrity
  - c. Operations
  - d. Operators
  - e. Sorting
  - f. Functions
  - g. Sub queries
  - h. Data aggregation
4. Transaction and locking
  - a. Transactions and concurrency control
  - b. Locking
5. Indexing
6. Security
  - a. Users and quotas
  - b. Privileges and Roles
7. Programming in a procedural language for data manipulation
  - a. Structure and organization
  - b. Variable declaration
  - c. Database interaction
  - d. Flux control
  - e. Cursors

- f. Procedures
- g. Functions
- h. Triggers

### **3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES**

1. Contents 1, 2, 4, 5 and 6 are consistent with Objective 1 as they focus on the characteristics of databases and their evolution, the development of Oracle databases from the ER logic model, the use of normalization and denormalization, the logical and physical database structures and processes, transactions in a concurrent environment, indexing and security in the management of users and privileges.
2. Content 3 is consistent with Objective 2 as SQL language is taught focusing on database creation and management as well as data query.
3. Content 7 is consistent with Objective 3 because the procedural native language of Oracle databases, PL/SQL, is taught as well as its use in developing code for procedures, functions and triggers in order to efficiently access database data.

### **4. MAIN BIBLIOGRAPHY**

Mandatory:

1. Manuscripts provided by the teaching team
2. Groff, J., Weinberg, P., Using SQL, McGraw-Hill, 1990
3. Campos, L., Oracle 8i - Curso Completo, FCA, 1998

Recommended:

4. Ramklass, R., OCA Oracle Database 12c SQL Fundamentals I Exam Guide (Exam 1Z0-061), Oracle Press, 2014
5. Oracle, Manuais do Oracle, online:  
<http://www.oracle.com/technetwork/indexes/documentation/index.html>
6. Pepin, D., Oracle Programmer's Guide, QUE, 1990
7. Feuerstein, S., Pribyl, B., Oracle PL/SQL Programming, O'Reilly, 2009
8. Ramakrishnan, R., Gehrke, J., Database Management Systems, Third Edition, McGraw-Hill, 2007.

### **5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)**

Teaching methodologies:

- Lecture
- Interactive lesson
- Problem solving
- Project

Evaluation methodology for all evaluation periods:

- Students must attend at least 1/2 of the class hours to develop the project and the ongoing assessment. Students with student worker status do not have to meet this requirement.
- Written test (25%).

- Practical work carried out throughout the semester, which can be done in or outside the classroom, and evaluated only once during the continuous evaluation period, with no possibility of extra credit to improve the grade attributed (75%).

Mean grade equal to or higher than 10 values to obtain approval, with 20 being the highest grade possible.

## **6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES**

1. Lectures are consistent with the objectives due to the need to provide students with the theoretical contents, including the various aspects related to the development of databases and SQL and PL/SQL languages.

2. Interactive lessons are consistent with the objectives since student/teacher interaction helps the learning of concepts of the program and the introduction of new ideas, perspectives and solutions that can be applied both in the analysis and implementation of databases as well as in the study of different strategies for code development.

3. Problem solving is consistent with the objectives since the application of theoretical concepts to solve real life practical exercises related to the study, research and manipulation of databases in a concurrent environment and in the development of PL/SQL software helps consolidate the concepts, highlighting the students' expertise.

4. Project development is consistent with the objectives since it covers the development of a database, through all stages from its conception to its use, requiring the practical application of all concepts covered throughout the semester to a new realistic situation.

## **7. ATTENDANCE**

*N.A.*

## **8. CONTACTS AND OFFICE HOURS**

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