School of Technology and Management
Course Unit Syllabus

Level of qualification:
Second Cycle (EQF level 7) - Master
Study cycle:
Internet of Things

Course Unit: – Data Science

Year 1 **Semester 2** **ISCED Code: 481** **ECTS: 6**

Tipe of Course Unit: Compulsory **Delivery Mode:** Face-to-face / Distance Learning **Language of Instruction:** Portuguese

COURSE COORDINATOR: Isabel Sofia Sousa Brito

HOURS OF WORK

TOTAL HOURS	Contact Hours								Hours in autonomous work
	Theory	Theory and practice	Practical and laboratory work	Field work	Seminar	Internship	Tutorial guidance	Other	
150		29							121

Prerequisites (if applicable): n.a.

LEARNING OUTCOMES (knowledge, skills and competence)

On successful completion of this course unit, the student should be able to:

LO 1. Explain the data processing principles and concepts used in different contexts.

LO 2. Understand and develop knowledge discovery processes and the appropriate algorithms/methods at each stage.

LO 3. Understand and apply supervised learning methods in the context of the Internet of Things.

LO 4. Understand and apply unsupervised learning methods in the context of the Internet of Things.

LO 5. Use tools such as Orange or Weka to i) master the data processing concepts and ii) perform data analysis.

CONTENTS

C 1. What is data science? The multidisciplinary nature. Data engineering vs. Data science. The role of a data scientist.

C 2. Knowledge Discovery Process. Formulating questions. Exploratory data analysis.

C 3. Data preprocessing: data cleaning and data transformation.

C 4. Data mining:

4.1. Training strategies and overfitting.

4.2. Unsupervised learning: Clustering and association rules.

4.3. Supervised learning: Classification and regression.

C 5. Model evaluation.

C 6. Processing Data in IoT: Data Streaming

DEMONSTRATION OF THE CONTENTS COHERENCE WITH THE COURSE UNIT'S LEARNING OUTCOMES

C 1. What is data science? The multidisciplinary nature. Data engineering vs. Data science. The role of a data scientist. (LO 1)

C 2. Knowledge Discovery Process. Formulating questions. Exploratory data analysis. (LO 2)

C 3. Data preprocessing: data cleaning and data transformation. (LO3 - LO5)

C 4. Data mining: (LO 4)

4.1. Training strategies and overfitting. (LO3 - LO 5)

4.2. Unsupervised learning: Clustering and association rules. (LO 4, LO 5)

4.3. Supervised learning: Classification and regression. (LO3, LO 5)

C 5. Model evaluation. (LO3 - LO 5)

C 6. Processing Data in IoT: Data Streaming (LO 1)

TEACHING METHODOLOGIES

Large class:

M 1. Explanation of theoretical and practical contents.

Outside class activity:

M 2. Exercises based on practical guides.

Computer laboratory:

M 3. Exercises based on practical guides

DEMONSTRATION OF THE COHERENCE BETWEEN THE TEACHING METHODOLOGIES AND THE LEARNING OUTCOMES

M 1. The principles and concepts will be presented in the classroom for the whole class. (LO 1-5).

M 2. Activities outside the classroom strengthen students' autonomy in identifying solutions more appropriate to the context of the Internet of Things. (LO 2-5)

M 3. Solving practical exercises in the classroom and in the lab gives a significant competence to the students in terms of using different types of algoritms, and the application of concepts, process and data analysis, according to the problem to solve. The laboratory classes also enable them to find answers that simulate the professional context. (LO 2-5)

EVALUATION METHODS

Evaluation:

- Practical case development (group work);

- Individual quiz;

• Final exam.

MAIN BIBLIOGRAPHY

I. H. Witten, E. Frank, M. A. Hall, C. J. Pal. Data Mining Practical Machine Learning Tools and Techniques. 4th Edition. Morgan Kaufman, 2017.

J. Gama. Knowledge Discovery from Data Streams. CRC Press, 2010.

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